

OUR SECOND BIG SHOW NUMBER—100 PAGES

ALL THE NEW IDEAS

Amateur Wireless

Usual Price 3^d

Wireless

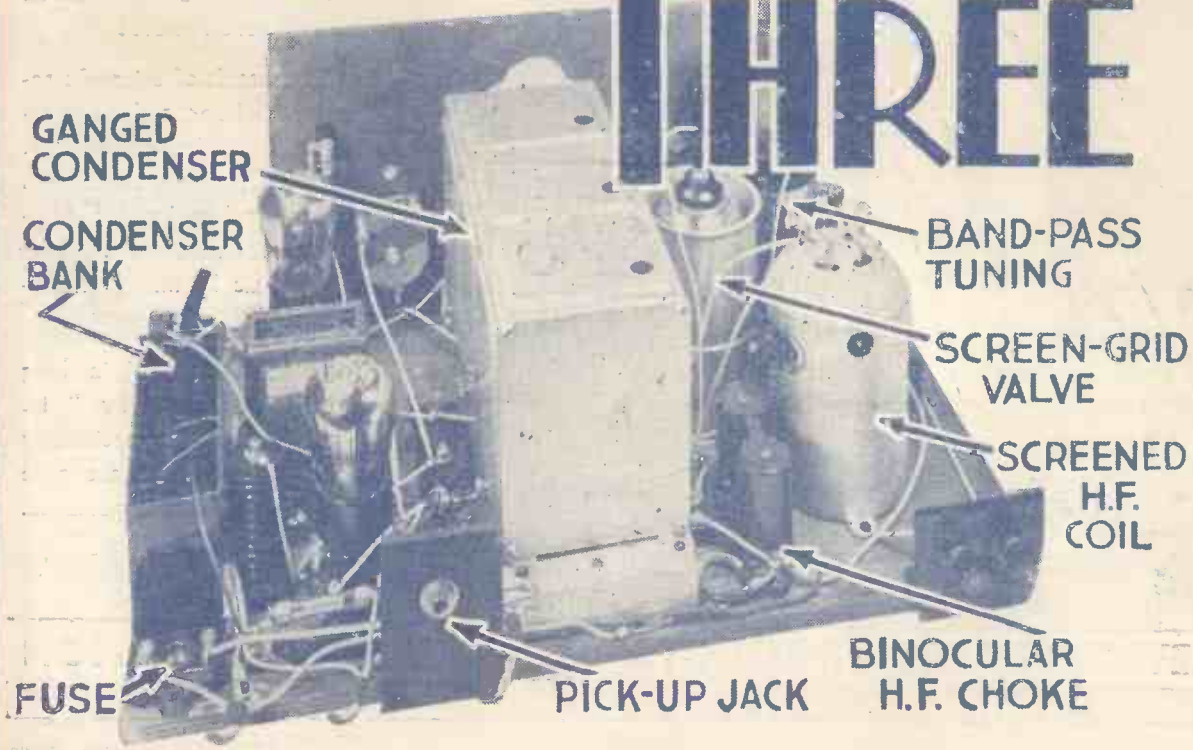
and Radiovision

Vol. XIX. No. 485

Saturday, September 26, 1931

BUILDING

The OLYMPIAN THREE



GANGED
CONDENSER

CONDENSER
BANK

FUSE

PICK-UP JACK

BAND-PASS
TUNING

SCREEN-GRID
VALVE

SCREENED
H.F.
COIL

BINOCULAR
H.F. CHOKE

The **NEW** **LEWCOS** H.F. CHOKE

(Regd)



PRICE
2/6

Here is something new that will prove a boon to all radio constructors!

As a result of scientific research Lewcos have produced this low-priced H.F. CHOKE, on the same basis as all other Lewcos components—with the best materials by master craftsmen.

Its small size ($2\frac{1}{8}$ in. long by $1\frac{1}{16}$ in. wide by $\frac{1}{16}$ in. high) renders it particularly suitable for sets where space is of paramount importance.



LEWCOS RADIO PRODUCTS FOR BETTER RECEPTION
THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED, CHURCH ROAD, LEYTON, LONDON, E.10

BIGGER & BETTER THAN EVER



THE FAMOUS BULGIN CATALOGUE

New 1931-32 Edition

HERE it is, 75 pages packed with details of new components essential to up-to-date radio.

Pages of practical hints and diagrams. An entirely fresh section detailing the new Bulgin Technical Service. Send 2d. postage for a copy without delay. Below are listed some of the BRAND NEW BULGIN PRODUCTIONS.

SEE THEM ON STAND 102
Empire Hall - - Ground Floor

Thermo Switch, New Range of Toggle Switches, Moving Coil Meters, Volume Controls, Valve Holders, D.C. Mains Equipment, New Range Anode Resistances, Grid Leaks, Spaghetts, Condensers, Fuseholders, Terminals, Pick-ups, Mains Plugs, Quickwyre, etc., etc.



QUALITY COMPONENTS

A. F. BULGIN & CO., LTD.

ABBAY ROAD, BARKING, ESSEX

Telephones: GRANGEWOOD 3266 and 3267

London Showrooms: 9, 10, 11, Cursitor Street, Chancery Lane, E.C.4.

Telephones: Holborn 1072 and 2072.

THE LARGEST RANGE IN THE WORLD
OBTAINABLE FROM EVERY DEALER OF REPUTE

To Ensure Speedy Delivery, Mention "A.W." to Advertisers

AMPLION MOVING COILS

THE famous Amplion M.C.6 Unit is acknowledged as representing the best value and the greatest efficiency amongst small permanent magnet moving coil speakers. Its reproduction and sensitivity are really remarkable, and it will handle without distortion adequate volume for all normal requirements. It requires no external excitation and the universal transformer which is fitted enables the speaker to be correctly matched to either Power, Super Power or Pentode output from standard British 2, 3 or 4 valve receivers.



M.C. 6 UNIT
COMPLETE WITH
TRANSFORMER

67/6

M.C.9 UNIT

This is also a permanent magnet type, but is much larger and more powerful than the M.C.6.

Unit only **£6 - 0 - 0**

Or on deferred terms,
matching transformer
15/- extra.



CABINET MODELS

THE M.C.6 Unit is also available in handsome cabinets of very modern and striking design. Transformer is also fitted in Cabinet Models.

M.C.6 Oak - **£5 - 10 - 0**

M.C.6 Walnut **£5 - 19 - 6**

Both Cabinet Models are available upon deferred terms.

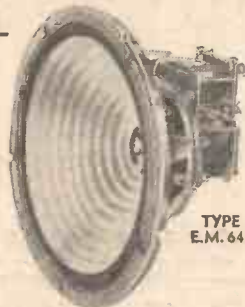
M.C.9 Oak - **£9 - 9 - 0**

M.C.9 Walnut **£10 - 10 - 0**

All M.C.9 models are available on deferred terms. Both the Cabinet Models are fitted with matching transformers.

D.C. ENERGISED MODEL

A MOST efficient unit for D.C. Voltages 100/110, 200/240, very suitable for A.C. sets. Full details of alternative methods of operation supplied with each model.



TYPE
E.M. 644

UNIT ONLY **29/6**

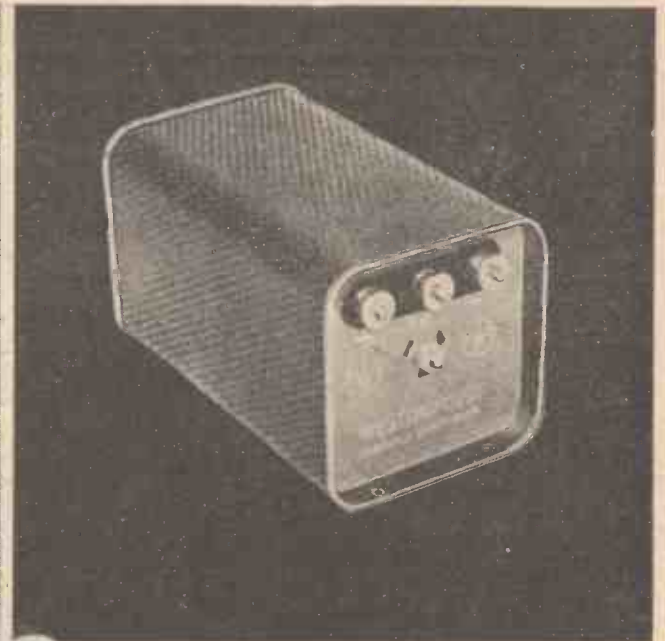
UNIT WITH
matching trans-
former - - - **42/-**

Don't forget to visit the AMPLION Stand
No. 75 EMPIRE HALL, OLYMPIA.

Ask at Stand for invitation to AMPLION HOUSE (close to Olympia), where all AMPLION Models can be heard working from direct Broadcast.

GRAHAM AMPLION LTD., 26, Savile Row, W.1.

royds



H.T.8

250 volts, 60 m.a.
(After smoothing)

21/-

This new Rectifier
is on view on
STAND 44
RADIO EXHIBITION,
OLYMPIA,
together with a complete range
of our standard established
units.

Call for a copy of the
1932 "All-Metal Way"

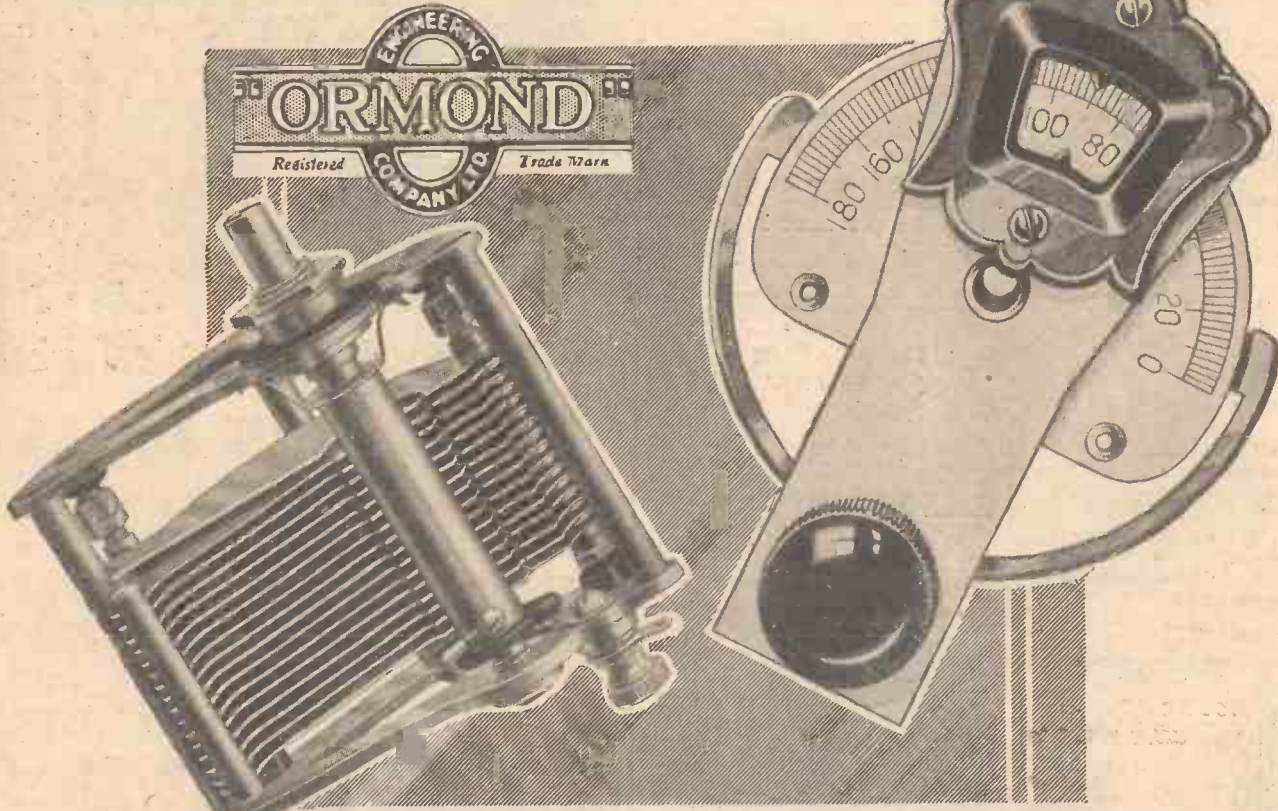
WESTINGHOUSE METAL RECTIFIERS

The Westinghouse Brake & Saxby Signal Co.,
Ltd., York Road, King's Cross, London, N.1.
Phone: North 2415

WE ARE EXHIBITING AT



The Name that Guarantees Quality & Precision



The ORMOND No 6 LOG CONDENSER

The ORMOND DISC DRIVE

This Ormond Condenser, produced at a remarkable price, sets a new standard in Value.

The construction is of aluminium and is very robust, the whole being a precision instrument designed to follow the logarithmic law.

The vanes are perfectly rigid, and are firmly secured to slotted spindles. The special mounting of the fixed vanes support reduces dielectric losses to a minimum.

The moving vanes are connected to the frame, thus eliminating stray capacity effects.

Easy to mount "One Hole" fixing.

Terminals and Soldering Tags for connections.

This Condenser is not supplied with dial.

This NEW ORMOND Dial will prove an instant favourite with those who desire a "back of panel" illuminated dial. The Dial, with support for the variable condenser, is mounted at the back of the panel, the window and knob, with fixing screws and nut, being the only parts at the front. The lamp bracket is secured to the support, in a convenient position.

An extremely smooth slow-motion movement of ratio approximately 9 to 1 is incorporated.

Easy to mount and may be used on plain type "One Hole" fixing condensers.

Cat. No.	Capacity	Price
R/481	.00025	4/-
R/482	.00035	4/-
R/483	.0005	4/-

**THE ORMOND
ENGINEERING CO., LTD.**

WE ARE EXHIBITING AT

THE NATIONAL
RADIO
EXHIBITION
OLYMPIA

SEPT. 18 to 26

Cat. No. R/361. Price 2/6

**ORMOND HOUSE,
ROSEBERY AVE., LONDON, E.C.1**
Telephones: Clerkenwell 5334-5-6 and 9344-5-6.
Telegrams: "Ormondengi, Isling."

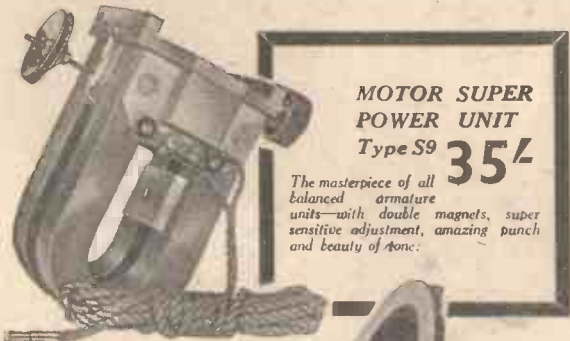
STAND 34

Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention.

PLAIN WORDS and Sweet Music

MoToR Units need no high-sounding superlatives to describe their vivid, brilliant tone. Two words only are necessary. Hear them! Their better performance speaks for itself. There are no other units like them, or to equal them. They are the year's supreme givers of radio enjoyment.

Go to your nearest radio dealer and ask to hear the 1932 MoToR Units and Cabinet Speakers. You will hear loud-speaker performances that will make you immediately dissatisfied with your existing speaker.



**MOTOR SUPER
POWER UNIT
Type S9 35/-**

The masterpiece of all balanced armature units—with double magnets, super sensitive adjustment, amazing punch and beauty of tone.



**MOTOR
CHASSIS C.99
56/-**

This popular Chassis assembly can only be described as amazing in its performance—in its bell-like clarity and wealth of volume.

There are three MoToR Units, three corresponding Chassis assemblies, and five Cabinet Speakers of unusual beauty, that offer the finest loud-speaker values that money can buy. In case of any difficulty in procuring them, write direct for booklet.

TEKADE Radio & Electric LTD.
147 FARRINGDON ROAD, LONDON, E.C.1

Northern Wholesale Distributors: **L. KREMNER, LTD.**, 2 Bradshaw Street, Manchester; **HARDMAN & CO., LTD.**, The Baum, Yorkshire Street, Rochdale; 61 Bridge Street, Manchester; 12 Back Lord Street, Blackpool; 25 Trinity Street, Leeds.

Agent for Scotland:—**R. G. J. NISBET**, 132 Renfrew Street, Glasgow, C.2.

West of England:—**BRUNWEC, LTD.**, 28 Cumberland Street, St. Paul's, Bristol.



You will Help Yourself and Help Us by Mentioning "A.W." to Advertisers



See this New MULTIPLE MAINS CONDENSER ON STAND 61

Radio Show
PRICE 9/6

Simplified construction for the builders of the
"A.W." OLYMPIAN 3"

The Formo Company have again pioneered the latest development in simplified set construction with a bank condenser fitted with coloured leads for easy fixing in the circuit.

The condenser illustrated above, embodies the Formo "Vacuum Process" condensers as specified in the "A.W." circuit and is specially designed for this super efficient set.

Formo Mains condensers have set a new standard of high working and test voltages with a high insulation resistance that ensures long life and great reliability.



MAINS CONDENSERS

Obtainable from all Radio Dealers.

Complete catalogue of all Formo products from:—

ARTHUR PREEN & CO., LTD.,

Golden Square, Piccadilly Circus,
LONDON, W.1

Crown Works, Southampton.



DUX

THE TRANSFORMER FOR THE MILLION

Ⓜ have designed and produced the "DUX" to provide the British Public with a thoroughly efficient transformer at the lowest possible price.

A TRIUMPH OF EFFICIENCY

"DUX" has won triumph after triumph in every test made by the experts of the Radio Press, who have published their reports in glowing terms of praise.

GUARANTEE OF PERFORMANCE

The full technical information available and given with the "DUX," exactly as with higher priced transformers, is the guarantee, before you buy, of efficient performance. Compare this advantage with uncertain results of the so-called cheap foreign article and inferior transformers.

ECONOMY with SATISFACTION

To-day, when economy dictates, "DUX" will give you certain satisfaction at a lower price. By asking for, and insisting on "DUX," you will obtain the best transformer for your money—made by the firm famous for their transformer production since the inception of popular radio.

You are invited to make the acquaintance of 'DUX' at the 1931 Radio Exhibition at Olympia

National Hall, STAND 29, Ground Floor

Be sure you obtain Your Copy of the Fine Catalogue. It contains all R.I. New Productions



"DUX"
The Leader.



The "DUX" L.F. Transformers
Primary Inductance 30 henries
full Technical information and Diagrams
supplied with every "Dux"

6'9

ASK FOR "DUX" THE BEST BRITISH LOW PRICED TRANSFORMER

The Advertisement of R.I. Ltd., Croydon, England. Phone: Thornton Heath 3211
Advertisers Appreciate Mention of "A.W." with Your Order

THE NEW STANDARD OF VALUE

LOTUS ALL-MAINS

LUXURY SET for £14.14.0

for A.C. & D.C. Mains

**MAGNAVOX MOVING
COIL SPEAKER - -
MAZDA VALVES - -
IRRESISTIBLE H.P. TERMS**

Never before have such outstanding features, such a luxurious cabinet, such magnificent reception been available at such a low price.

The new Lotus Table Console is made for both A.C. and D.C. Mains. It is conceived and designed by J. Sieger, the famous radio engineer, who is now a member of the Lotus Research Laboratories.

One-knob Tuning, and All-mains operation make for the acme of simplicity. The Magnavox Moving-coil Speaker, Mazda Valves, S.G., Detector and Power, make for unequalled reproduction. Guaranteed full strength, perfect reproduction of 12 European Stations:

The Lotus Table Console is entirely self-contained in a beautifully polished walnut cabinet of matchless proportions and finish.

**TRULY THE RADIO OF THE FUTURE—
NOW!**

The Hire-purchase Terms are irresistible—27/9 deposit secures this marvellous set, the balance being paid in 11 monthly instalments of 27/9 each. Ask your dealer for a demonstration.

Cash Price £14 14s., A.C. or D.C



RADIO OF THE FUTURE — NOW!

TABLE

CONSOLE



**THE WORLD'S KEENEST TUNING
KEENEST PRICED POWER SET** ▶

**ALL
BRITISH
MADE**



Don't Forget to Say That You Saw it in "A.W."



LOTUS

A complete range of new Components at keenly competitive prices by J. Sieger, the famous radio designer.

In addition to the new Lotus Components illustrated below, there are many new lines, including Gang Condensers, Transformers, Chokes, Switches, Slow-motion Drives, etc. You will be interested in the complete range, write to-day for full descriptive list.

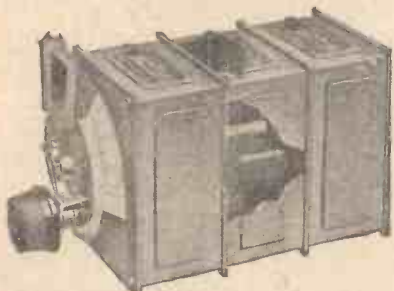
SPECIFIED FOR THE "OLYMPIAN THREE"

Lotus 3 Ganged Condenser; Lotus Reaction Condenser; Lotus Valve Holders; and the Lotus Jack JK5.

Famous from the earliest days of broadcasting, Lotus Components have always enjoyed the esteem of the radio constructor.

This year many new lines have been born from the Lotus Research Laboratories. Designed by the genius of J. Sieger, and manufactured with the unequalled resources of the Lotus Works and experience, they are miracles of efficiency and value.

In no case has quality been sacrificed for price. Nevertheless, through highly intensified production, they are within the reach of every pocket. All the leading set designers specify Lotus. They know that for reliability and efficiency they are absolutely dependable. Follow the expert's lead—insist on Lotus Components.



2-GANG
20/-

GANGED CONDENSERS.—Each unit is totally screened and precision matched, and sturdy construction ensures lasting accuracy. With Disc Drive, 5/- extra, or with Drum Drive, 7/6 extra. 3 Gang, 30/- 4 Gang, 40/- (as illustrated)



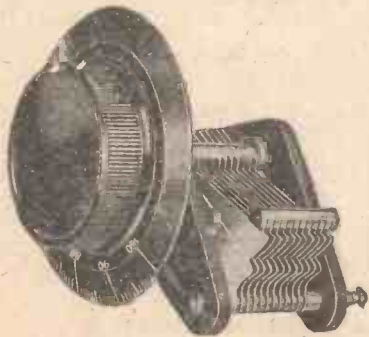
1/6

UNIVERSAL SWITCH.—A provisionally patented rotary switch with self-cleaning contacts. Easily ganged. For many types of switching arrangements.



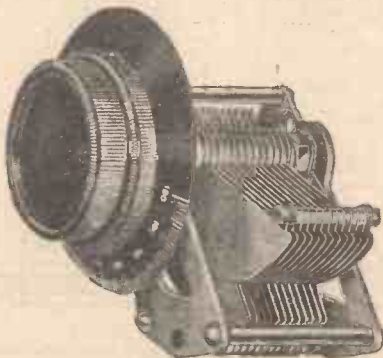
10/6

BINOCULAR DUAL-WAVE COIL.—Long and short wave windings on separate formers, silent wave-change switch. These coils are all matched and can be ganged. Completely and compactly screened. Designed by J. Sieger for hair-line selectivity.



3/6

RIGID DRIVE LOG CONDENSER.—An inexpensive but reliable component for the home constructor. With knob-dial, .0003 and .0005 capacity.



6/6

SLOW-MOTION CONDENSER.—Stout construction with integral ball-bearing slow-motion device. Complete with knob-dial. Capacity .0003 and .0005.



5/6

AUDIO TRANSFORMER No. 1.—An inexpensive instrument for the home constructor. It is remarkably efficient and has a good straight-line amplification curve. Ratios, 3-1 and 5-1.

LOTUS RADIO LTD., MILL LANE, LIVERPOOL

Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention

PING PONG at stand 99



Notice the giant sprung valves at Stand 99, Olympia. They have a message for you. They stand for the fact that all Benjamin valve holders of whatever type, "Clearertone," "Vibrolder," or "Five Pin," support the valve in sprung sockets which effectually damp out vibration and mechanical shock, thereby preserving the filament emission life, and eliminating microphonic "pong." The name Benjamin still stands for the best in valve holders, and it still stands for the most popular valve holders—nearly five million of them have been sold. Remember the message of the giant sprung valve, and specify Benjamin valve holders for your set too.



STAND



OLYMPIA

BENJAMIN

The Benjamin Electric Ltd., Tariff Road, Tottenham, N.17.

Tottenham 1500



NEW R.K.'S

PRICES NOW FROM 3/6

Minor Permanent Magnet Model—A moving-coil speaker to work from a small output valve. Capable of handling outputs up to 2 watts. Performance is comparable with the Senior R.K. Price £2-10-0.



Minor D.C. Model—Similar to permanent magnet Minor, but suitable for 200 volts mains field excitation. Price £1-11-6.



1931/2 Senior Permanent Magnet—Incorporates the highest grade cobalt steel magnet, and 10" corrugated cone. New Reduced Price £5-12-6.



1931/2 Models. Senior A.C. Model—10" corrugated cone. Incorporates Westinghouse metal rectifier. New Reduced Price £7-15-0.

Senior D.C. Model—Similar to A.C. model, but without metal rectifier and suitable for mains field excitation. New Reduced Price £5-5-0.



Minor Permanent Magnet R.K.—In fumed oak cabinet. Price £3-17-6. In special walnut cabinet, Price £4-4-0. Dimensions of cabinet 14" high, 13" wide, 7 1/2" deep.



R.K. reproduction is the ambition of every radio enthusiast. Now—that ambition can be realised. The 1931 range of redesigned R.K. moving coil speakers is released to the public!

In this new range, from the "Minor" D.C. Model at 3/6 to the "Senior" A.C. Model at £7.15.0, there is an R.K. to suit your purpose and pocket. Come and see the new R.K.'s at the **RADIO EXHIBITION, STAND NO. 21** or ask your dealer for a demonstration.

B.T.H.



MOVING COIL LOUDSPEAKERS



THE EDISON SWAN ELECTRIC CO. LTD.
Radio Division:
155 Charing Cross Road, London, W.C.2.
Branches in all the Principal Towns.

W.159

EDISWAN RADIO PRODUCTS

To Ensure Speedy Delivery, Mention "A.W." to Advertisers

COMPONENTS OF MERIT FOR THE "OLYMPIAN 3"

"WEARITE" H.F. CHOKE

A first-class component with a very fine performance. Specified for the "Olympian 3." It covers efficiently the remarkable range from 10 to 2,000 metres without any marked resonances. Self-capacity very low. Type H.F.O. 6/6



HFO

"WEARITE" FILAMENT SWITCH

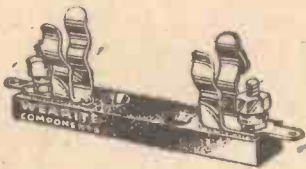
On-and-Off Battery Switch, extremely small and compact. Push-pull action with single-hole fixing. Self-cleaning. G.22. Price 1/-



G22

"WEARITE" GRID-LEAK HOLDER

Has new type contact spring clips. Fits any size grid-leak. Price 6d.



"WEARITE" 4-pin VALVE HOLDER

Suitable for use in the "Olympian 3." This valve holder is fitted with sockets which split in four places and are therefore ideal for the new solid pins fitted to modern valves. Fitted with terminals and soldering tags. Price 1/3



S3

Write for FREE illustrated list.
WRIGHT & WEAIRE, LTD.,
 740 High Rd., Tottenham, N.17
 Phone: Tottenham 3847/8/9

"WEARITE" POTENTIOMETER

This Potentiometer is specified for the "Olympian 3." Wire wound, it will carry up to 5 milliamps. Designed for panel mounting. 50,000 ohms. Price 4/-

WEARITE COMPONENTS

VISIT US AT OLYMPIA — STAND No. 152

You will Help Yourself and Help Us by Mentioning "A.W." to Advertisers

ALL-MAINS RADIO FOR EVERY TYPE OF BATTERY SET

No alterations to either
set or valves



3 MORE "ATLAS"
ALL-MAINS UNITS

£6-10

£6/10/- or 10/- down
and 9 monthly pay-
ments of 15/- each.



MODEL A.K.22

For sets up to 3 valves. 1 Tapping 60/80v., 1 Tapping 90/100v., 1 Tapping 120/150v. Output, 12 m/A. Trickle Charger for 2 volt L.T. accumulators at .3 amps. Price 77/6; or 10/- down and 9 monthly payments of 8/6 each.



MODEL A.K.260

For sets up to 4 valves. 1 Tapping 60/80v. (maximum and minimum), 1 Tapping 50/90v. (maximum, medium, and minimum), 1 Tapping 120/150v. Output 20 m/A at 120v. Trickle Charger for 2, 4, and 6-volt L.T. accumulators at .3 amps. Price 90/-; or 10/- down and 9 monthly payments of 10/- each.



MODEL A.C.188

This amazingly successful unit was voted the finest Mains Unit at Olympia, 1930. For sets up to 5 valves. 2 Variable Tappings 0/100 and 0/120v., 1 Fixed 150v. Output 25 m/A at 150v. Trickle Charger for 2, 4 and 6-volt L.T. accumulators at .5 amps. Price £8; or 10/- down and 7 monthly payments of 15/6 each and one of 14/6.

"ATLAS" ALL-MAINS UNIT, MODEL A.C.290 H.T., L.T., and G.B.

(Regd. No. 765640)

This new Super "ATLAS" All-Mains Unit makes any battery set up to 5 valves fully mains-operated, and endows it with a bigger range, greater volume and better quality reproduction. As with all "ATLAS" Units, no alterations whatsoever are required to either set or valves, and operation is as safe and simple as with dry batteries.

"ATLAS" Model A.C.290 provides 2 Variable H.T. Tappings of 0/100 and 0/120 volts respectively and one fixed of 150 volts. Output, 25 m.a. at 150 volts. Four entirely independent G.B. Tappings of 1½, 3, 9 and 16 volts respectively, with Electrolytic Condenser smoothing. Trickle Charger for 2, 4 and 6-volt L.T. Accumulators. A tapped input ensures the highest efficiency on all mains voltages between 200 and 250. Moreover a unique "Atlas" switching arrangement isolates the receiver whilst trickle-charging.

A double adaptor is fitted for connecting the unit to either a lamp socket or 2-pin socket. Incorporating Westinghouse Rectifier. Without a doubt the finest All-mains Unit ever produced at the price. Ask your dealer for a demonstration or write direct to the makers for full details of the "ATLAS" range.

"CLARKE'S" ATLAS MAINS UNITS

H. CLARKE & CO. (M/CR) LTD.

EASTNOR STREET,
OLD TRAFFORD - MANCHESTER

London Office - - BUSH HOUSE, W.C.2



Don't Forget to Say That You Saw it in "A.W."

**Convert your
"CENTURY SUPER"
"1931 ETHER SEARCHER"
"1931 BRITAIN'S FAVOURITE 3"**

**TO AN AUTOMATIC RECORD-CHANGING
RADIO-GRAMOPHONE OR AN ARMCHAIR-
CONTROLLED RADIO-GRAMOPHONE**



In a handsome walnut cabinet of compact design is fitted the new "His Master's Voice" automatic record changing mechanism, pick-up and volume control. By connecting it to your radio receiver eight, 10 or 12 inch records (unmixed) may be played at one loading or a single record repeated up to eight times. A unit you have been waiting years for. A.C. or D.C. Model 117.

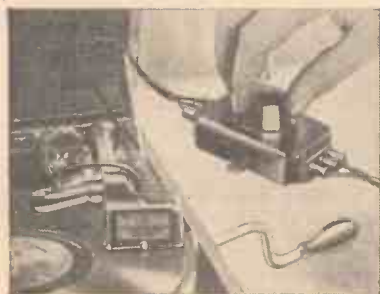
Price 18 guineas

The new "His Master's Voice" pick-up, volume control, electric turntable motor and automatic start and stop, housed in an oak cabinet of pleasing design. By connecting it to a loudspeaker radio-receiver records may be played from one's armchair. Interchangeable resistances may be clipped in to the volume control to match the pick-up to any radio receiver. A.C. or D.C. Model 116.

Price 10 guineas



**NEW "HIS MASTER'S VOICE"
RADIO ACCESSORIES FOR THE RADIO EXPERIMENTER**



This pick-up is similar to the one fitted to all our new instruments. It can be attached easily to any type of tone-arm and is supplied complete with a logarithmic volume control and connecting leads. The weight of the pick-up is 5½ ozs.; it has an input of over 1 volt R.M.S., and a D.C. Resistance of 6,000 ohms.

Price Complete 2 gns.

Model 11

A permanent magnet moving-coil loudspeaker in an arched walnut cabinet of attractive design. It is extremely sensitive and will handle up to 3 watts without difficulty. A universal input transformer incorporated in the instrument enables it to be matched to receivers with triode, pentode or push pull output.

Price 5 guineas

Model L.S.7



★ See all the new "His Master's Voice" Models at the "His Master's Voice Modern Hall of Music," opposite Olympia, September 18th-26th. Admission free. Special measuring apparatus designed in the "His Master's Voice" Research Laboratory will be shown publicly for the first time.

"His Master's Voice"

The Gramophone Co. Ltd., London, W.1.





BRITAIN'S LEADING RADIO WEEKLY
FOR CONSTRUCTOR, LISTENER & EXPERIMENTER

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NEWS & GOSSIP OF THE WEEK

A SECOND BUMPER NUMBER

MANY readers will be buying this second Special Show Number at Olympia, and we refer them to the reviews of new sets and components given in this issue, together with detailed floor plans of the Empire and National Halls. Set builders and listeners must see the special articles on the "Olympian Three," the "New Amateur's Linen-Speaker," and "The Crystal Set for 1932." There are dozens of other special features, making this bumper show number of interest to every reader.

OUR STAND '71

IF you are going to Olympia then make a point of visiting our Stand 71. It is on the ground floor of the Empire Hall, to the left of the main entrance. See a special demonstration of the "Olympian Three" and make the acquaintance of other popular AMATEUR WIRELESS "winners."

FOOTBALL COMMENTS

ALTHOUGH it is a little early to think of the Football Association final at Wembley, there is a feeling at Savoy Hill that it will be broadcast. No agreement has been signed, but no definite objections have been raised. The Rugby clubs are favourably disposed towards the idea of the B.B.C. broadcasting their principal games. It is also thought that the internationals will be relayed from Twickenham, Murrayfield, and the other Rugby grounds.

FOOTBALL LEAGUE

MR. GERALD COCK, the chief of the B.B.C.'s O.B. department, is working for a re-opening of the question of broadcasting First Division matches of the Football League Committee. But, as we have predicted, eye-witness accounts and full results in the first news bulletin are all that football fans can really count on hearing of First Division matches this winter.

GANDHI TO BROADCAST?

SO far Gandhi has not been offered the courtesy of the B.B.C.'s microphone, but it is expected that he will be heard if and when an Indian settlement is reached. Incidentally, Gandhi now shares with Lady

Astor, Mussolini, and Dean Inge the distinction of having his opinions relayed from Europe to America.

B.B.C.'s ARCHIVES

THE Blattnerphone record of the Prime Minister's speech on the formation of the National Government will probably



A WORD TO THE READER.

THE WORLD'S RECORD ISSUE OF A WIRELESS WEEKLY.

LAST week's AMATEUR WIRELESS—our Big Show Number—is Great Britain's record in wireless weekly publications—a world's record, too. You remember it contained, with cover, 116 pages, including about 78 pages of advertisements. IT EASILY BEAT ALL COMPETITORS.

Why has AMATEUR WIRELESS achieved this outstanding success? The advertiser knows why; its circulation in its own class is the most valuable in the world. The reader knows why; it consistently strives in every possible way to meet his needs. It never stands still: it has "drive" behind it.

May I offer warm thanks to all the many friends who have congratulated us.
B. E. J.

find a permanent home in the museum at Broadcasting House. Material is being collected for the B.B.C.'s archives. B.B.C. engineers are looking out old microphones. Every object with a past is being examined. Photographs are wanted for the picture gallery, but several members of the original B.B.C. staff seem reluctant to face the camera.

NEWSPAPER FEARS

OUR exclusive account in last week's issue regarding the narrow escape the B.B.C. has had from sponsored programmes has aroused fears among newspaper interests. For if the B.B.C. were to sell its broadcasting time to advertisers, the Press fears it would suffer some loss of revenue. We understand that the newspapers are wholeheartedly in support of the present B.B.C. regime and they will use all their influence to keep things as they are.

DANGER TO REGIONAL SCHEME

NOW that the B.B.C. has survived the crisis, we can disclose that a cut of a quarter of a million pounds would have been disastrous to the regional scheme. Separate programmes for each region would have had to stop. The alternative programme for each region would then have been relayed from London. Only by some such drastic method could money have been saved.

ORGAN TESTS

WE hear that the concert studio at Broadcasting House will be ready for organ tests in November. The designers think the control tower in the new building will be proof against the communication of every sound likely to be produced within it, with the exception of the rumbling bass notes of the organ. The engineers will wait until the studio is decorated and ventilated before they put in an organ pipe. The effect of two or three blasts will then determine whether an organ is to be installed.

PIANO LESSONS

THE music department at Savoy Hill is being pressed to broadcast piano lessons, which, incidentally, are a feature of American radio. Enthusiasts for physical jerks are also campaigning for early-morning broadcasts. The B.B.C. is not

NEWS & GOSSIP OF THE WEEK —Continued

anxious to broadcast piano lessons or physical jerks, yet other broadcasting organisations, with less money than the B.B.C., manage to include all sorts of special stunts.

A COMPTON MACKENZIE PLAY

COMPTON MACKENZIE has written a radio drama which is to be broadcast Regionally on October 1 and Nationally on October 2. Entitled *The Lost Cause* and dealing with "The Forty-five," it will be produced by a Scotsman and acted by Scottish artistes. This is the first play to be broadcast Nationally via Scottish Broadcasting House in Edinburgh.

NEW SYMPHONY CONCERTS

A NEW season of symphony concerts begins in the Queen's Hall on October 14, and listeners will hear one concert a week thereafter until May 4, 1932. The conductors will include Richard Strauss, Sir Henry Wood, Sir Landon Ronald, Ernest Ansermet, Nikolai Malko, Felix Weingartner, and Bruno Walter, in addition to Dr. Boult. The promenade season comes to an end on October 3, with the usual Fantasia on British Sea Songs, by Sir Henry Wood, in addition to the other popular fare customarily provided for the final concert.

STARS AHEAD

JACK BUCHANAN is down as a certainty for broadcasting in the near future. It is interesting to hear that Jeanette Macdonald may also broadcast from the London station at an early date.

FOREIGN OFFICE RADIO

THE B.B.C. was recently asked by the Foreign Office to accommodate fifty foreign journalists wanting to hear Mr. Philip Snowden's talk on his Budget plans. While agreeing to do what it could, the B.B.C. expressed surprise that in this year

march from Savoy Hill to Broadcasting House when the great move takes place. The Director-General would lead the procession, followed closely by Jack Payne and his band; after this would come a squad of engineers bearing spanners and other tokens of their art! Next we might

Here is a novel talking advertisement. The clockwork driven figures are synchronised with a gramophone record reproduced by means of an electric amplifier in the base of the apparatus, and the figures appear to talk



TOY TALKIES!

of grace the Foreign Office was not well equipped with a broadcast receiving set.

MACDONALD'S SPEECH

B.B.C. programme officials consider that Mr. Ramsay Macdonald's broadcast speech explaining the reason for the formation of the National Government was his best yet. As a Blattnerphone record was made of this speech the B.B.C. proposes to keep it as an historic memento of a great occasion in the nation's affairs.

NORTH REGIONAL PLANS

IT is the custom of the North Regional Director to give listeners an idea of the general arrangements for programmes during the winter months. This will be done on September 28. As there are many new features in the first winter programmes to be transmitted from the North Regional station at Moorside Edge, this talk should be of very great interest.

PROCESSIONAL MARCH?

A SUGGESTION is going around that the B.B.C. should organise a processional

see members of the publication department, scattering B.B.C. publications *en route*. At the end of the procession would come Dr. Adrian Boult, leading his Symphony Orchestra. A B.B.C. official, when taxed with the truth of this suggestion, said that he thought it would be impossible as the B.B.C. departments were going over to Broadcasting House at different times. Another great idea gone wrong!

ALEXANDER AND MOSE

AS James Carew is going on the films, the famous radio combination of Alexander and Mose will be broken up. But we hear that Billy Bennett will continue the act with Albert Whelan.

NATIONAL CONCERTS

TO take the place of the National S.B. programmes of last season, European broadcasting organisations have arranged a series of National concerts for Europe-wide relay. In November there will be an extensive hook-up with Austria, for a Lehar programme. Britain will provide the concert in January, and many European countries will take it.

7-METRE BROADCASTING

THE idea of using ultra-short wavelengths for what may be called "localised" broadcasting over a comparatively restricted area, such as a big town, first originated in Germany. The advantage of the system is that although they produce an adequate field-strength locally, the short waves do not cause interference further afield. Of course, a short-wave adaptor must be used, but this can take the form of an inexpensive addition to any standard receiving set.



What is claimed to be the largest cone speaker in the world is this new directional "searchlight" speaker which can be heard three miles away

IS A LUGANO PLAN COMING?

ALAN HUNTER, in this topical article explains how the international broadcasting situation is pointing to-



wards a revision of the present Prague Plan of wavelength distribution among the transmitting stations of Europe.

AS I write, there is much talk of why the Chief Engineer of the B.B.C. is attending the Brussels meeting of the Technical Commission of the International Broadcasting Union. The meeting at Brussels is a routine job that has nothing to do with any particular development in the international broadcasting situation. Nevertheless, at this meeting the Chief Engineer will, no doubt, put forward the B.B.C.'s proposals for a revision of the present Prague Plan, under which the broadcasters of Europe are now working. This Technical Commission will probably thrash out the problem of ether congestion, which every listener with a long-distance receiver is keenly worried about. We may take this Technical Commission as a preliminary to the full-dress meeting of the International Broadcasting Union in Rome on October 14.

Unfortunately, even if the Rome meeting decides that the Prague Plan must be revised, no active steps can be taken until the consent of the Governments subscribing to the Prague Plan has been obtained. The hope of an early revision in the Prague Plan is based upon the fact that when this Plan was originally formulated, a revision was provided for in a special protocol.

Wavelength Revision Necessary

Great Britain undoubtedly wants a revision as soon as possible. Knowing that this cannot happen until the Governments are consulted, the International Broadcasting Union has invited the Governments to meet the broadcasters at the end of October. Lugano, on the Swiss-Italian frontier, has been chosen for this meeting, because it is a convenient stopping-place for many members of the Union on their way from Rome.

The Government invitations have been sent through the International Telegraph Bureau at Berne. A few acceptances have already been received. Whether the Lugano meeting takes place now depends upon the acceptances yet to be received. If there is a majority, the meeting will be held, in spite of those holding back. The B.B.C.'s present concern is to stir up sufficient enthusiasm among the Governments to ensure a majority of acceptances, for, as already mentioned, unless the Governments participate there can be no revision.

At Lugano, the B.B.C. proposes to put forward a strong case for a wider separation

of frequency between adjacent high-power stations. With the present wavelengths available for broadcasting, this wider separation can be obtained only by sacrificing some of the existing wavelengths. The B.B.C. is prepared to give up two of its present ten wavelengths. To ensure a 12-kilocycles separation between stations entails equally drastic sacrifices by other European broadcasters. At present there are 103 wavelengths with the 9 kilocycles separation. If we increase this separation to 12 kilocycles only 88 wavelengths would be available. Just as everyone associates Prague with nine kilocycles, so Lugano may one day be associated with 12 kilocycles.

Regional Scheme Modifications

To give up two of its present ten wavelengths, the B.B.C. would have to modify the Regional Scheme. The idea is to put all the National stations on one wavelength. By thus synchronising London National, North National and the proposed Falkirk and Watchet National stations, the B.B.C. could just spare two wavelengths.

The proposed meeting at Lugano might therefore closely affect British listeners in the service areas of all the National transmitters. When stations are synchronised the affect is to reduce the service area in which reliable reception can be obtained. The B.B.C. suggests that this reduction can be more than compensated by the high-power Daventry station on the long waves. Assuming synchronisation of all the medium-wave National stations, there is every reason to expect that Daventry, our only long-wave National station, would be increased in power, probably to 150 kilowatts.

It is easy for the B.B.C. to talk of wavelength sacrifices when dealing with such an accommodating country as Great Britain. Unfortunately, foreign countries have to cope with much greater geographical difficulties than the B.B.C. Moreover, the language problem, which does not exist in this country, is often the deciding factor in the broadcasting arrangements of foreign countries, such as Czechoslovakia. While the B.B.C. is very keen on the widening of the frequency separation between broadcasting stations, many foreign countries take the view that it is better to leave wavelengths alone and eliminate the interference by more selective sets. Sets made so selective that heterodyne interference is eliminated must cut off all frequencies above three thousand cycles. This means

that freedom from interference can be obtained only by a great sacrifice in the quality of reproduction.

As readers know, the B.B.C. has always insisted upon the need for first-class quality in the reproduction of its programmes; and this is surely the attitude taken by all keen amateurs in this country.

To put it crudely, a big row is expected at Lugano. The Technical Commission has failed to find a solution to the wavelength problem and that is why the Governments have been called in to meet the leaders of the International Broadcasting Union at Lugano. The B.B.C. will have to contend with a wide-spread apathy on the part of the Post Office organisations of Europe. It seems that we alone appreciate the



Mr. Noel Ashbridge, Chief Engineer of the B.B.C.

menace to broadcast reception that a continuance of the present Prague Plan implies.

GRAMOPHONE PICK-UPS

IT is desirable for correct reproduction that the pick-up needle should remain tangential to the sound track at all positions on the record. In a new model recently placed on the American market, this result is obtained by making the pick-up move bodily along a groove cut in the tone-arm, so that it drifts inwards towards the centre of the disc as the record is being played. B.

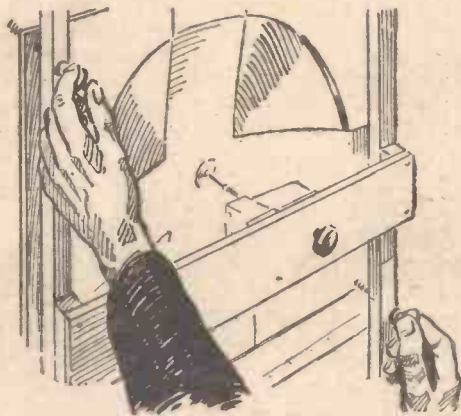


Completing The AMATEUR'S LINEN SPEAKER

More about the easy-to-build speaker, first constructional details of which were given in last week's issue

ONE big advantage of a linen speaker is that you can make practically every part of it yourself, with the exception, of course, of the actual loud-speaker movement.

An important thing which the AMATEUR WIRELESS Technical Staff kept in mind



Each sash screw should be adjusted a turn at a time

when designing the new "Amateur's Linen Speaker" was that it should be very easy to build, so that any home constructor should have no difficulty in getting really good sensitivity and tone. This calls for a rather special design, because certain types of linen speaker do not give good results unless the tensioning is very carefully carried out.

You must, naturally, be careful to follow the dimensions given on the blueprint when building the "Amateur's Linen Speaker," but there are no difficult constructional points.

Use only the material specified, for cheap linen or frail woodwork would certainly upset the tone.

When you have completed the speaker and have it working, you will probably be very surprised at the amount of vibration which is transmitted to the big board supporting the diaphragm and unless this is made of the 7-ply wood specified, the board itself will have a natural vibration period within the range of the speaker's reproduction.

The supporting pieces, too, must be quite strong and of the dimensions given. It is

really a good plan to use oak for the back supports and the two 24-in. battens, but good, strong, white wood may be used if cheapness is a consideration.

As explained last week, you can have a full-size blueprint of the speaker obtainable, price 1s., post free, from the Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4. The small scale reproduction may be used.

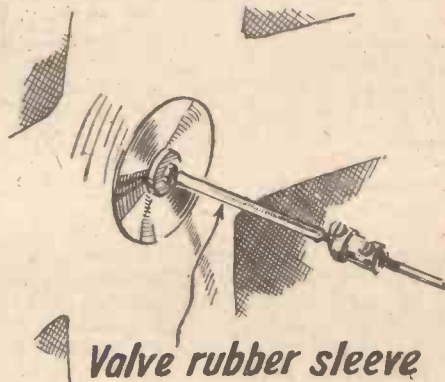
With the full-size print you can mark off direct the 20-in. and 7-in. circles on the two plywood boards, but if you use the small scale print, then it will be quicker to mark off these circles by means of two nails and lengths of string, as mentioned last week.

MATERIALS REQUIRED

- Plywood board, 24 in. by 24 in. with 20 in. hole for diaphragm.
- Plywood board, 10 in. by 10 in. with 7 in. hole for tensioning piece.
- Special doped linen, 28 in. by 28 in. for diaphragm and sheet 12 in. by 12 in. for tensioning cross piece (Weedon).
- Four feet of 1/2-in. batten for tensioning board supports.
- Wood for back pieces and supporting platform of speaker unit.
- Four window-sash screws with one plate each.
- Special chuck, cone washers and extension rod (Weedon, Tenex).
- Loud-speaker unit (Telsen, Blue-Spot, Hegra, Ormond, Lissen, Wufs, Tekade).

cross-piece is held, of course, by the four window-sash screws. To prevent any loose movement here it is advisable to drill the holes (9 in. apart along the battens and 10 in. between) a trifle smaller than the actual diameter of the bolts, so that they cut their own threads in the woodwork.

The plates on the opposite side of the adjusting head are threaded, of course, and these take the main tensioning strain, but



Valve rubber sleeve

Valve rubber may be slipped over the speaker drive rod to prevent resonance

The 24-in. board has a 20-in. diameter hole and the 10-in. board has a 7-in. diameter hole.

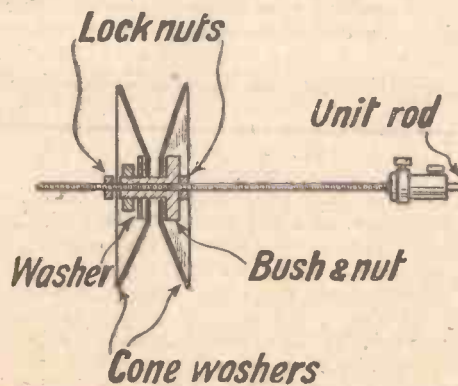
The blueprint gives also the dimensions of the back supports and it cannot be emphasised too strongly how important it is to make a good job of screwing these supports firmly to the large board. The 10-in. board supporting the tensioning

it is much more satisfactory for the woodwork of the tensioning device itself also to take part of the load.

By the way, these window-sash bolts are usually sold with two plates each and only one plate is needed on each bolt. These four plates should be firmly screwed to the 10-in. board on the side facing the large diaphragm. Some bolts have the shafts of the screw handle finished off in a ball-ended manner and in this case the woodwork on the side opposite the plates should be slightly countersunk.

When adjustment of these screws is carried out after the linen has been doped, turn each a fraction at a time so that there is no side strain on the tensioning cross-piece. The driving unit of the speaker is supported on a bridge piece of 7-ply wood measuring approximately 10 in. by 3 in. A bridge piece of these dimensions will accommodate most types of speaker unit. A hole must be drilled for the spindle of the pole-piece adjustment.

It is well worth taking a little trouble in coupling up the driving unit after the diaphragm has been doped and properly tensioned. If the unit is mounted so that



This diagram shows the assembling of the cone chuck and universal joint

(Continued on page 556)

SET-CONSTRUCTION PARTS AT THE EXHIBITION

Some of the leading new lines for home constructors are here described in a brief review of the exhibits at Olympia

well worth spending a good while seeing the other parts in the Varley range—the new gramophone pick-up, spaghetti resistances, power chokes and multi-volt mains transformers.

Bulphone, who in the early days made a fine name by the production of a range of really good

Smallness in size, a characteristic of many new parts, is typified by the Dux and Parafeed transformers on the R.I. stand.

As I continue putting my Olympia impressions on paper it becomes increasingly difficult to get a true perspective out of the exceptionally wide range, and I must be forgiven if I refer only to those parts which find a clear place in my memory and if I overlook others which are equally important.

Ekco have new H.T. units on their stand. The A.C.12 is a good unit for anything up to a three-valve set, requiring not more than 12 milliamperes. Bigger fellows in the range are the A.C.18 and A.C.25. There are D.C. models, of course, and also some new combined H.T. and L.T. chargers.

The variable Mu valve promises to do great things, and the Mullard M.M.4V (an indirectly heated A.C. valve) is among the new Mullard productions to be seen on their Stand. It has a mutual conductance of 3 milliamperes per volt (grid volts zero), and .01 milliamperes per volt (grid volts 40). Ask one of the Mullard technical people to explain the working of this to you.

Six-Sixty on Stand 20 are specialising in the Chassikit which, as it is described fully on another page by "Set Tester" needs no words of mine to describe it.

speakers, have now turned attention to mains apparatus, and the new A.C. and D.C.1 and D.C.2 eliminators are deserving of inspection.

As valves play such a big part in getting good results, I think you will want to spend a good while at the Mazda Stand 21 seeing the new types. Graham-Farish have certainly set their designers to work and there are literally dozens of new parts. To keep company with the last year's £2 2s. speaker, they have brought out the new A.C.4 chassis, new switches, condensers, valve holders, and other small parts are also remarkable for value. The fixed condensers from .0005 microfarad to .002 microfarad cost only 6d., and a good push-pull switch had for 8d.

(1) Junit A.C. mains unit (2) Ready-Rad Instamat transformer (3) Lissen flexible resistance (4) Lissen 60-volt H.T. battery (5) Utility gang condenser (6) Goltone wavetrap (7) Pertrix L.T. accumulator (8) Exide 2-volt non-spill cell

THERE are approximately 250 exhibitors at Olympia this year. Most firms have one or two new lines and some have thoroughly revised their ranges and brought out, literally, hundreds of new parts.

You see, therefore, how difficult it is in a brief review to give more than just a rough outline of the kind of material available for set builders for the coming season.

Bakelite pressing done in small quantities is an expensive matter, but when tackled scientifically the price can be reduced. Just how low the price can be reduced is well shown, I think, by Telsen on Stands 19 and 213. Most of the parts in the Telsen range have bakelite mouldings or coverings and insulation. But it is not only in insulation that Telsen have made great strides.

The value offered in what one used to regard as expensive components, low-frequency chokes and transformers, is remarkable. An ordinary L.F. intervalve coupling choke of 125 henries costs only 5s.

Plenty of Novelty

Bulgins have several interesting new parts and these show careful thought in designing. Thermal delay switches for mains users and spot-welded spaghetti resistances are among the parts which particularly appeal to me, while the present range of switches has been extended by one or two new types. All these can be seen on Stand 102.

Apart from triple-coil units for "Century Super" builders, Lewcos on Stand 27 are showing a new range of H.F. chokes and a useful bandpass filter. Marconiphone this year are specialising chiefly in complete sets, but all showgoers must make a point of seeing the new mains valves, including D.C. types and the A.C.-fed V.M.S.4, and the M.S.4B.

Because of its inclusion in our "Olympian Three" the Varley "Square Peak" coil, which you can see on Stand 58, is bound to be a big success during 1932, together with its associate H.F. intervalve coil. It is



SET-CONSTRUCTION PARTS AT THE EXHIBITION"

(Continued from preceding page)

Wearite, as pioneers in super-hot coils, are naturally specialising in these on their Stand 152, Wearite mains components,

batteries and low-tension accumulators is of interest.

The Pertrix Stand is 39, the Every Ready, 76; and the Chloride Electrical Storage Co., Ltd., Stand 8. Here, and on the stands of other battery manufacturers, you will find much of interest in the way of high-tension

The set-constructor parts in the Lissen range are well worth seeing, the Torex transformer and the new spaghetti resistances interesting me particularly.

Among mains eliminators and parts you will find new ideas on the Regentone Stand 22 and the Junit Stand 97, at which latter, apart from complete eliminators, you will find a wide range of chokes and transformers for the home constructor of units.

Kit Sets

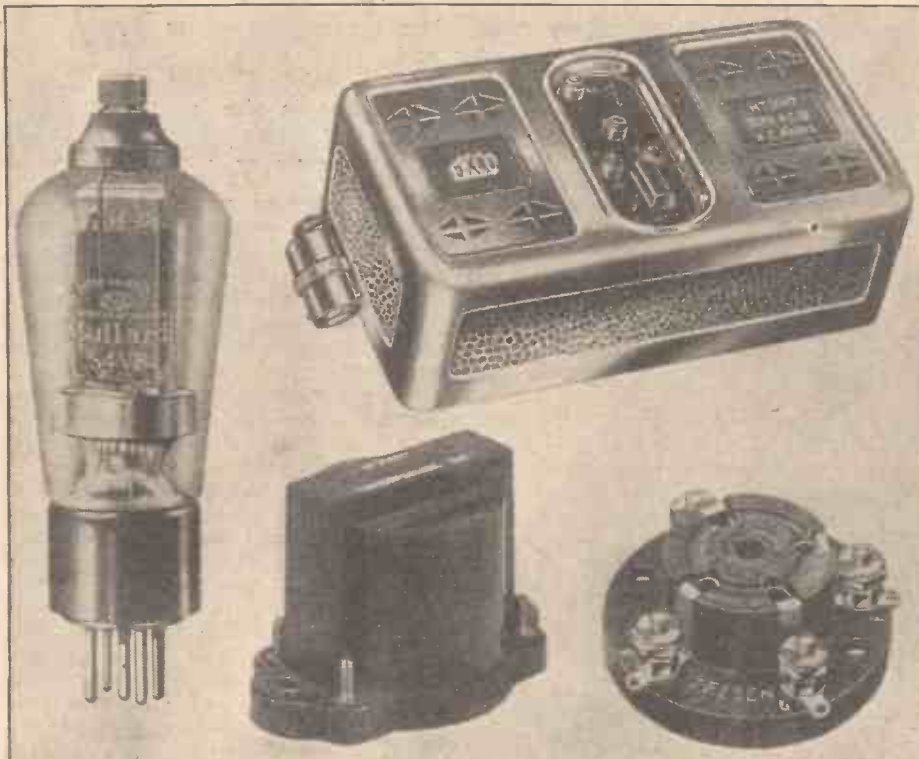
Ready Radio on Stand 6 are not only dealing with kits of parts for set builders, but are showing several new components, some of them exceedingly interesting. I like the new Ready Radio output transformers, known as Instamat, which have a rapid adjustment of ratio switching.

Lotus Radio, Ltd., on Stand 23, interest me with their new ganged condenser—a particularly neat job, fully screened and with easy trimming adjustment. This is detailed for use in the AMATEUR WIRELESS "Olympian Three."

The W.B. P.M.3 permanent magnet moving-coil speaker seems to me to typify the general trend in speaker design. There is a surprising number of permanent-magnet jobs at the Show this year and the W.B. speaker is certainly typical of the best in this direction.

There are several complete kits of parts for set builders, and the "Radio for the Million" outfits strike me as being of outstanding interest. Extreme ease of construction is coupled with a truly workmanlike efficiency of the finished job.

The foregoing brief guide to outstanding exhibits will, I trust, be of value to enthusiasts who are going from stand to stand picking out features which interest them. Set constructors are in for a fine time in 1932, as all the new parts mean not only lowered cost, but better performance and easier construction. The truth of this is strikingly demonstrated by a visit to Olympia. KENNETH ULLYETT.



(Left) Mullard S4VB A.C. valve; (top right) Ekco A.C.18 H.T. unit; (centre) Igranite Midget transformer and (bottom right) Telsen valve holder.

H.F. chokes and dual-range frame aerials must be seen too.

It is very difficult to describe battery progress in a few words. Very many of us have not yet facilities for all-mains working, and anything in the way of dry high-tension

batteries which stand up to a heavy discharge and accumulators which really are non-spillable.

Lissen, Ltd., on Stand 17, have 60-, 100-, and 120-volt batteries in the standard capacity range and 60 and 100 volts 'supers.'

FLEX'S FRIEND WANTS HIS SET TO BE HEARD—



—IN HIS OWN HOME



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Olympia 1931

Dear Constructors,

Following my letter to the Editor published in last week's advertisement, I have been overwhelmed by unanimous expressions of approval coupled with great enthusiasm for my 1932 policy of supplying Author's Kits.

I must ask you to excuse individual replies, and wish wholeheartedly to thank you all here for the good wishes and praises of support conveyed in your many letters, everyone of which convinces me that the Home Constructors have long waited for a firm to offer an Author's kit that they are able to build with complete confidence.

With the close of the Exhibition and the arrival of long evenings, you will all be ready to start right in building a new set for the winter. Therefore, to avoid any disappointments, I have taken such steps as are necessary to speed up delivery from manufacturers of the specified components.

Finally, let the Author be your Surety and the Pilot your Guide when buying your New Radio Kit for 1932.

Always at your Service,

Peto Scott

Of course! Customers wishing to depart from the Author's Kit may depend on the co-operation and advice of my technical staff in the choice of approved substitutes. Again, we shall be pleased to supply separately any part for the sets described, whether specified or substitutes.

Our second full-page announcement appears on page 555 of this issue. It contains prices of Pilot Author's Kits for other favourite "A.W." sets, as well as Cash, C.O.D. and H.P. Terms for such popular radio equipment as Battery Eliminators, Speakers and Manufacturer's Kits. Full lists in the Peto-Scott Radio Bulletin. Sent free upon request.

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OLYMPIAN 3

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or 12 monthly payments of 11/2
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 - Kit C Author's Kit, complete with valves, cabinet and stool, less speaker, CASH or C.O.D. £11 - 15 - 11
Speaker extra and supplied to customer's choice.
or 12 monthly payments of 21/7
- Any parts supplied separately. Sent C.O.D. We pay all post charges on all orders over 10/-

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

Check this Pilot Author's Kit of parts for the "Olympian 3" with the Author's specification on page 429 of last week's issue of "A.W."

	2 s. d.
Three-ply wood panel 16" x 8", and 7-ply baseboard, 16" x 10" ...	2 6
1 J.B. 0005-mfd. triple-gang condenser with slow-motion dial ...	1 9 6
1 Lotus .0003-mfd. reaction condenser ...	4 0
1 Sovereign 50,000-ohm potentiometer ...	4 6
1 Varley Dual-range Square Peak Aerial Coil, and Dual-range H.F. Intervalve Coil ...	1 3 6
1 Dubilier .04-mfd. fixed condenser ...	2 0
1 Peto-Scott S.G. valve screen ...	2 6
1 Telsens binocular H.F. choke ...	5 0
3 Lissen .0002-mfd. fixed condensers ...	3 0
1 Ready Radio grid-leak holder ...	1 6
1 Dubilier 2-meg. grid leak ...	1 9
1 Busco filament switch ...	1 3
1 Ready Radio high-frequency choke ...	4 6
1 Telsens low-frequency transformer, ratio 7-1 ...	8 6
1 Formo condenser bank comprising two 2-mfd. and two 1-mfd. fixed condensers ...	9 6
2 Lewcos 10,000-ohm, two 20,000-ohm and one 30,000-ohm spaghetti resistances ...	7 6
1 Bulgin fuse and holder ...	1 3
1 Lotus JK5 gramophone jack ...	10
7 Clix wander plugs (marked) ...	3 0
2 Clix marked spade terminals ...	4
4 Belling-Lee marked terminals ...	1 0
1 Belling-Lee anode connector ...	6
2 Sovereign terminal blocks ...	1 0
1 Siemens 9-volt G.B. cell ...	1 0
4 Yards Lewcoflex, Lewcos connecting wire and Lewcos sleeving, etc. ...	3 0

KIT "A," Cash or C.O.D. 6 1 11

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

ACCESSORIES

1 Camco cabinet ...	2 5 0
1 Camco stool for cabinet ...	1 10 9
1 SG215, HL210, P220, or PM12, PM1HL, PM2 Valves ...	1 19 0

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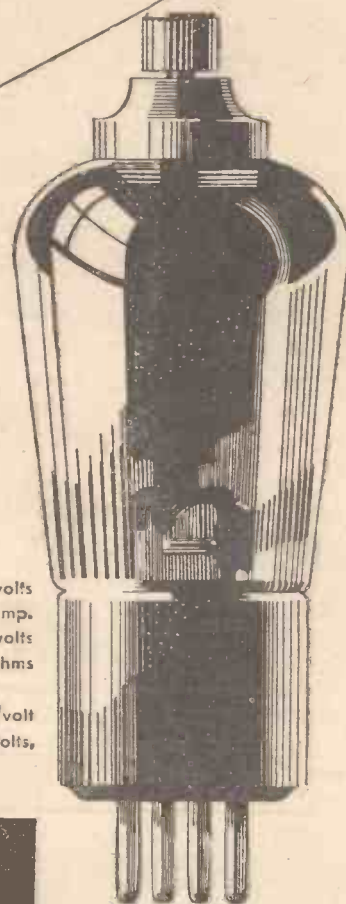
In the Mullard range of 2-volt valves there is a valve for every stage of every battery operated receiver, each giving that improved performance which is the basis of Mullard supremacy. The P.M.12 for example, is the Mullard 2-volt screened-grid H.F. amplifier. This highly efficient valve, in its new form, possesses greatly improved characteristics which means increased sensitivity. Fit a P.M.12 now, and notice the increased range of your receiver.

PRICE 20/-

THE IDEAL
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COMBINATION
THE P.M.12
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P.M.22

CHARACTERISTICS:

Max. Filament Voltage	- -	2.0 volts
Filament Current	- -	0.15 amp.
Max. Anode Voltage	- -	150 volts
*Anode Impedance	- -	180,000 ohms
*Amplification Factor	- -	200
*Mutual Conductance	-	1.1 mA./volt
*At Anode Volts 150; Screen Volts 75; Grid Volts, Zero.		



Mullard

THE MASTER VALVE

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

To Ensure Speedy Delivery, Mention "A.W." to Advertisers

Arks

On Your Wavelength!

AWAY WITH IT

WHEN will the B.B.C. do away with that depressing interval signal which seems to consist of an interminable series of what in the thrillers they call "sickening thuds." It always sounds to me as if the body were bumping down the stairs. It is really a most depressing and horrible noise, and there is no reason why we should not have something brighter. Abroad they have all sorts of jolly interval signals. There is the canary that twitters away at Naples, Vienna's metronome that ticks away so fast that you almost expect it to bust itself, Toulouse's big bell, and the cheerful little musical twiddly bits of Budapest and other stations. We undoubtedly want an interval signal to prevent Ham-handed Henry and Oscillating Oswald from jumping to the conclusion that the silence is caused by their reaction couplings being too slack; but we do want something very different from these sickening thuds.

AN ENLIGHTENING EVENING

RECENTLY I was asked to try out one of the best known American sets, about which there has been a great flourish of trumpets. I looked forward to the task because I have never before been turned loose on to an American set and given the opportunity to fiddle about with it to my heart's content. This particular one worked from the mains and installing it was simplicity itself. All that was necessary was to stick its plug into the wall socket, connect up aerial and earth, and to switch on. The tuning was genuine "single-knob," and I waited impatiently for it to warm up, since I was dying to get down to work.

DIAL SPREAD

"RAUCOUS REG" I found in a moment; in fact, he practically found himself, for he comes in pretty powerfully at fifteen miles. "Noisy Nat" made his appearance in much the same manner. At this point you could almost have knocked me down with the proverbial feather. I had always been made to understand that the strong point in American sets was their selectivity. Well, it certainly isn't the strong point of this set. "Noisy Nat" spread from 240 to nearly 280 metres and "Raucous Reg" from 345 to 370. The selectivity on high-powered stations at short range turned out, in fact, to be about that of British sets two years old. Then I tried the Midland Regional at forty-five miles. He spread loudly over the stations on either side of him. The North Regional at two hundred miles was the only high-powered station that did not spread. I could not get Stockholm clear of Rome, and on the long waves Motala was almost blotted out by Warsaw.

CURIOUS

I HAD always understood that we scored over the Yanks in quality and they over us in selectivity. It was interesting to find

that this set's strongest point was its quality. This was distinctly good, though it was rather of the typical American kind, with heaps of bass and lots of middle, and not very much of the top notes. The number of stations receivable without interference was very much less than that within the compass of a moderately good battery-operated set of British make containing the same number of valves. The mains set should, of course, score over the battery set every time, owing to the enormous efficiency of mains valves.

A POINT TO REMEMBER

SHOULD you be attracted by the apparently very low price of American sets containing large numbers of valves, there is one point that I would humbly urge you to consider before you decide to invest. Receiving sets in the two countries are designed on quite different lines. It has always been our practice to make a small number of valves do a great deal. In the United States, on the other hand, very little is expected from each individual valve.

THREE TO FIVE

THE amplification factors are lower, as a rule, and the interval couplings are designed for stability rather than for getting the most out of the valves. The net result is that if you purchase, say, a five-valve American set you will not get from it much better results than you would from a British three-valver. That is just about the proportion; five American valves do roughly the work of three of ours. Therefore, in comparing prices, you should make due allowance for this. I know, myself, that if I were presented with sufficient money to buy a Yank five-valver, I would either purchase an English three-valver or expend the money on the parts needed for building a big, fine set.

THE ROBOT RECEIVERS

I WONDER how many of my readers have seen the unique Marconiphone demonstration at the Exhibition? I mention this particular one because it seems to me that it is such a successful and ingenious method of demonstrating the reproduction qualities of different receivers and at the same time providing real entertainment. For the benefit of those who were not able to attend the Exhibition, briefly the scheme was to make the individual receivers literally "speak for themselves," and finally for them to render a well-known part song. Records were used, of course, the output from the pick-up being switched to the individual receivers at the correct moment. Altogether a most entertaining show.

OFFICIAL WAVELETS

IT is very interesting to read that the B.B.C. is seriously considering the possibilities of 7-metre relay transmissions. The system is at present being tried out in Germany and, so far as the experiments have gone, the results appear to be most promising. One of the strong points of the "seven-metrelets" is that they travel in straight lines, like beams of light, instead of following the curvature of the earth's surface like their big brothers. This means, so far as we can see at present, that a transmitter operating on such a wavelength would serve only the area actually visible from the top of its aerial mast. Reception would be impossible outside this area and the station could therefore cause interference with no other. Local stations would have to be placed on hilltops, where possible, and be provided with very high masts. Their operation, though, would ensure perfect reception within their service area.

A year or two ago the suggestion would have been condemned at birth as impracticable, owing to the difficulty that existed then of designing apparatus for the reception of such wavelengths. When you think that a wavelength of 7 metres corresponds to a frequency of nearly 43,000,000 a second, you will realise, then, that there are problems involved. Nowadays, though, we know a whole lot more about short-wave reception than we did, and I do not see why apparatus that is perfectly simple and quite easily tuned should not be designed for local 7-metre reception.

SOME ADVANTAGES

YOU have only to spend half an hour on the medium waveband as it is at present to realise that all is not exactly well. The number of stations that are heterodyning one another is large, and therefore trouble is experienced from the harmonics, not only of long-wave stations, but also from those on the medium waveband. Vienna, for example, produces a pretty useful second harmonic on 258.5 metres, which is apt to heterodyne both Leipzig and Hörby. If the 7-metre system were universally adopted, Europe could be covered by a network of thousands of small stations each serving its own local area and causing no interference outside. One hardly expects to see this, but there seems no reason why a plan should not be worked out whereby each country had about half its present number of medium and long-wave stations, and give the rest of its broadcast services on 7 metres. This would be an ideal arrangement, for it would ensure first-rate local reception as well as perfect reception of distant stations of reasonable power. I have said more than once in these columns that the regional high-power scheme would be obsolete before it was completed; the present talk about 7-metre relaying may be the cloud no bigger than a man's hand . . .

Next Week—A fine two-valver for local and distant stations

On Your Wavelength! (continued)

SOMETHING LIKE A SHORT

I HAD a short the other day of such magnificence that it is really worth describing. To appreciate its full glory you must know that I have a flashlamp bulb which acts as a fuse in each of the high-tension leads. I had found the set perfectly normal when I used it during the afternoon, but when I switched on in the evening there was a sudden blinding flash and then silence. Looking at the little panel on which the four fuse bulbs (H.T.— and H.T.+1, 2, 3) are mounted, I saw that the filaments of two of them (H.T.— and H.T.+3) had not merely been burnt out: they had been volatilised. The inside of the glass of each bulb was silvered just like that of a wireless valve after the process of getting with magnesium.

FINDING THE REASON

NOW, when you get a short like that there is only one way to tackle it; don't go on using the high-tension battery whilst you are tracking it down, or you will give the poor thing such kicks in the neck that you may well finish it right off. Instead, substitute a 9-volt grid battery. Plug in your H.T. leads into its negative and three positive sockets, and put a 1,000-ohm resistance in series with the negative lead. You then reduce the total current that can pass in the case of a direct short of H.T.+3 to 9 milliamperes—which won't hurt the battery or anything else. In this way you can replace your fuses, put a milliammeter in series, and proceed with the work of tracking down what must be an absolutely dead short. So long as you get a reading in the neighbourhood of 9 milliamperes, you can feel sure that a short is taking place. Working in this way, I found that one of the loud-speaker leads had come slightly untwisted and that one single fine strand was touching the earthed metal cabinet of the set. The output filter circuit was unfortunately separately housed. There are two morals to this tale. One is always to have the output filter circuit or output transformer inside the cabinet if you can; the other is that flex leads should always be properly tagged.

STORM WRACK

THE fuse bulbs, though, were not the only things blown up by this portentous short. There is a milliammeter permanently wired in the common H.T. negative lead, and this was looking very much the worse for wear. Instead of pointing to 0, its needle stood at something considerably below zero, and tests soon showed that it was passing no current. The obvious diagnosis was a burnt-out moving-coil, and I put the instrument aside as probably of no further use until it had had a maker's overhaul. Speaking of overhauls, by the way, I would mention that I have been pleasantly surprised on several occasions when I have sent good instruments up to their makers for repairs. Some time ago I burnt out a 3-guinea Weston instrument and the bill came to 7s. 6d. Don't, therefore, throw away a

burnt-out or damaged instrument unless it is of the cheapest foreign make, in which case it is probably not worth bothering about.

PROPER PRIDE

I WAS able to repair this milliammeter myself, and I am so proud of the job that I want to tell you all about it. As a matter of fact, it is one that may well come your way, and you can undertake it yourself, provided that you can do rather fine soldering jobs. When I came to examine

A fine four-valve radio-gramophone will be described in next week's issue.

MAKE SURE OF YOUR COPY

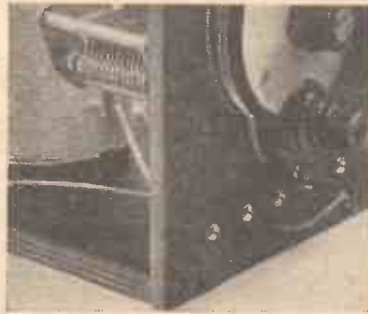
the instrument I found that the windings of the moving coil were intact; the fuse bulbs had saved them. But there are two tiny hair springs; just like those of a watch, mounted one at either end of the pivot. These serve both to convey current to the windings of the moving coil and to return the needle to zero when no current is flowing. One of them was broken not far from its outer end, owing to the violence of the needle's kick when the short occurred.

HOW THE REPAIR WAS MADE

TO undertake a repair one must first of all remove the instrument from its case, which is easy. You then take out the permanent magnet by withdrawing the securing bolts and, lastly, you withdraw the "action" of the instrument, which consists of a little framework carrying the moving-coil pivot and the needle. To do this you require a jewellers' screwdriver, for the screws are very small. If one of the hair springs is broken near its outer end the

A WAVETRAPH HINT

If your wavetrapp has a tapped coil, which it should have in order to find the most suitable tuning point, why not bring the tappings out to sockets on the



panel front near the wavetrapp condenser? This has been done in the trap shown here and enables you to change the waveband very quickly.

repairing job is simple. There is a little pillar to which the end is soldered and you will see the broken end fixed to this. Snip it off close with a pair of nailscissors. With a small pair of pliers draw the end of the spring on to the pillar and fix it with a tiny blob of solder. If you haven't a miniature soldering iron, fix a piece of very stout copper wire into a cork, tin the end, and there you are.

A GRAMOPHONE POINT

WHAT is the best way to stop a gramophone record in the middle? Don't be funny and say "No" or anything like that. One often wants to try a passage over again and then to switch off immediately afterwards without waiting for the record to play right through. Probably this seems rather a silly question. If you want to stop the motor, switch it off, you say.

All very well, but I once heard a ferocious argument because one man persisted in switching off in this manner, while his friend, who was of the superior variety, held up his hands in horror and announced that he was simply ruining his records. Friend A, peeved by the aspersion on his own knowledge, was up in arms at once, and said that it was a darn sight better way to switch a record off than picking up the needle in the middle and probably dropping it on the record or dragging it across the surface. Although B assured him that he was not in the habit of treating his records like this, the fact remains that an occasional slip may result in an accident of the type described, and, after all, one only needs to do it once to a decent record.

HOW DAMAGE IS DONE

I WAS rather interested myself by this time, because I did not see any reason against switching the motor off and allowing the record to run down. Of course, there is a most unpleasant noise from the gramophone while this is happening because the frequency of the music falls in pitch continually, and the machine certainly sounds as if some damage were being done, but on thinking it over I could not see that there was any justification for the suggestion. Friend B enlightened me on the point by selecting a record on which there was some heavy orchestral work and (with his friend's permission) switching the motor off in the middle of a passage. The resulting noise certainly did sound like a steam-roller going over broken bricks.

I gathered that tone-arm resonances were responsible for the unpleasant noise. If the motor is allowed to run down, then the frequency of the music gradually falls from its normal value to something quite small, and in doing so it passes through all the resonances, not only of the tone arm, but of the soundbox or pick-up. As it goes through each one there is a severe strain placed on the walls of the record groove, and if the record happens to be heavily modulated at this particular point, serious damage may be done. Therefore, it is really better to lift the needle before switching off rather than leave it where it is. THERMION.

Telsen Variable Condensers



TELSEN BAKELITE DIELECTRIC CONDENSERS
 These Condensers are of a new and improved type and of exceptionally compact dimensions. The moving vanes, which are interleaved with finest quality bakelite, are keyed on to the spindle so that they cannot be pushed out of line, and there is a definite stop at each end of the travel. The connection to rotor is made by means of a phosphor-bronze pigtail so that there is no cracking due to rubbing contacts. The connection to the stator vanes is absolutely positive—a very important point.

Telsen Bakelite Dielectric Differential Condenser—
 Made in capacities of .0003, .00015, .0001 Price **2/-**
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 Made in capacities of .0003, .00015, .0001 Price **2/-**
 Made in capacities of .00675, .0005 ... Price **2/6**
Telsen Bakelite Dielectric Tuning Condenser—
 Made in capacities of .0005, .0003 ... Price **2/-**

TELSEN LOGARITHMIC VARIABLE CONDENSERS
 The Telsen Logarithmic Variable Condenser is of robust construction and high insulation. The H.F. losses are very low and the frame is braced at three points, so that the possibility of distortion and short circuiting is negligible. Substantial terminals are provided with alternative connection to the stator.

Telsen Logarithmic Variable Condenser—
 Made in capacities of .0005, .00035, .00025, Price **4/6**

TELSEN PRE-SET CONDENSERS
 These Condensers have been carefully designed to give proper separation of vanes when the adjustment is unscrewed, which results in a very low minimum capacity, giving a wide range of selectivity adjustment when used in the aerial circuit.

Telsen Pre-set Condenser—
 Made in capacities of:

Maximum capacity	Minimum Capacity	Price
.002	.00025	Price 1/6
.001	.00004	Price
.0003	.000005	Price
.0001	.000001	Price

OLYMPIA
 National Hall
 Ground Floor
 STAND 19

TELSEN

THE SECRET OF PERFECT
 RADIO RECEPTION

Telsen L.F. Transformers



TELSEN L.F. TRANSFORMERS

Telsen transformers have achieved fame in the radio world on account of the high standard of their quality and performance. Designed and built on the soundest engineering principles, these robust, full-size transformers give not only efficient but enduring service.



TELSEN L.F. TRANSFORMERS

- Telsen "Ace" Transformer, Ratios 3-1, 5-1 ... Price 5/6
- Telsen "Radiogrand" Transformer, Ratios 3-1, 5-1 ... Price 8/6
- Telsen "Radiogrand" 7-1 Super Ratio Transformer ... Price 12/6
- Telsen Intervalve Transformer, Ratio 1.75-1 ... Price 12/6

TELSEN

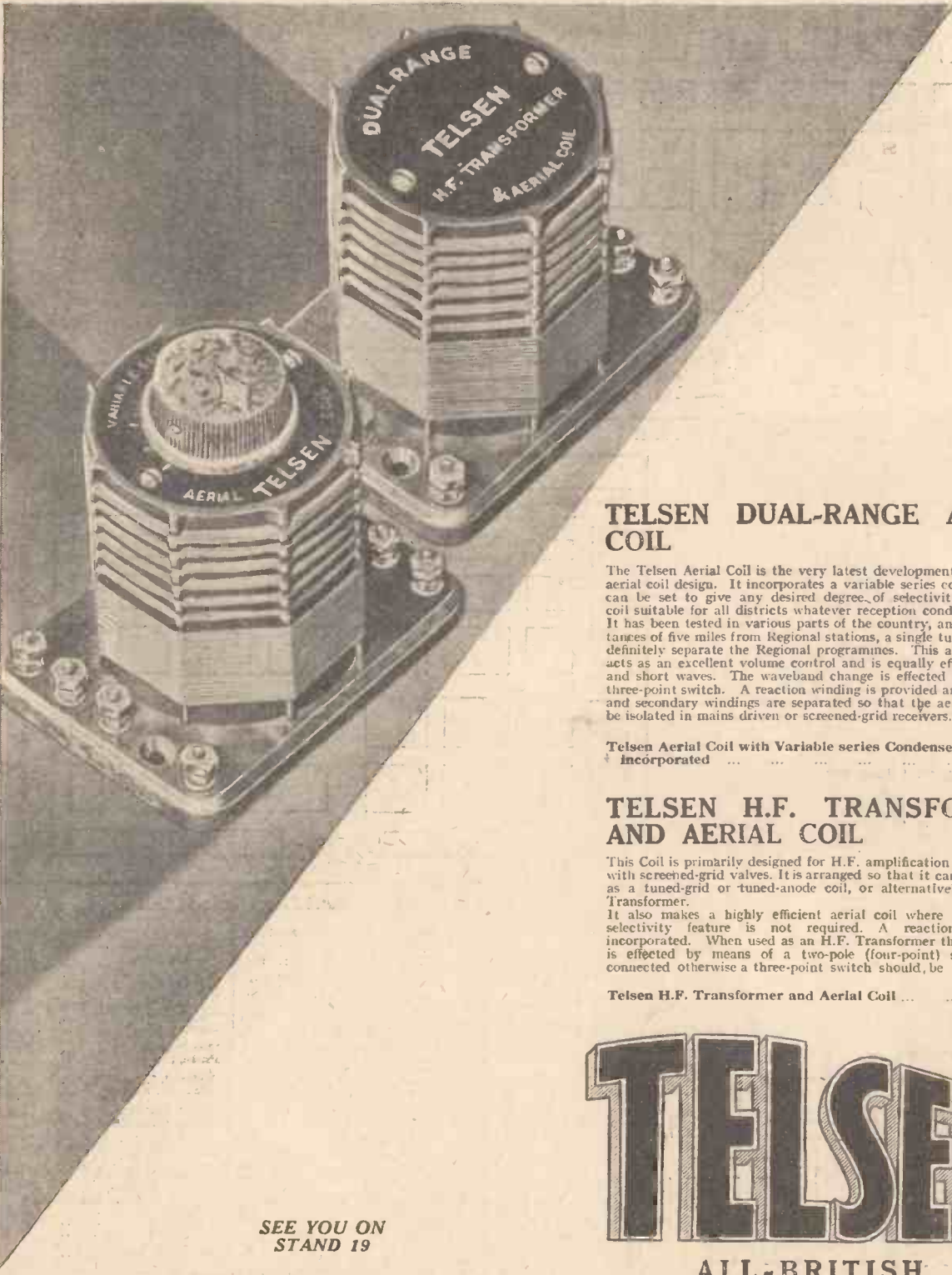
THE SECRET OF PERFECT
RADIO RECEPTION

DON'T FORGET
STAND 19

Advt. of The Telsen Electric Co., Ltd., Aston, Birmingham.

Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention

Telsen Aerial Coils



TELSEN DUAL-RANGE AERIAL COIL

The Telsen Aerial Coil is the very latest development in dual-range aerial coil design. It incorporates a variable series condenser which can be set to give any desired degree of selectivity, making the coil suitable for all districts whatever reception conditions may be. It has been tested in various parts of the country, and down to distances of five miles from Regional stations, a single tuned circuit will definitely separate the Regional programmes. This adjustment also acts as an excellent volume control and is equally effective on long and short waves. The waveband change is effected by means of a three-point switch. A reaction winding is provided and the primary and secondary windings are separated so that the aerial circuit can be isolated in mains driven or screened-grid receivers.

Telsen Aerial Coil with Variable series Condenser incorporated

7/6

TELSEN H.F. TRANSFORMER AND AERIAL COIL

This Coil is primarily designed for H.F. amplification in conjunction with screened-grid valves. It is arranged so that it can be connected as a tuned-grid or tuned-anode coil, or alternatively as an H.F. Transformer.

It also makes a highly efficient aerial coil where the adjustable selectivity feature is not required. A reaction winding is incorporated. When used as an H.F. Transformer the wave-change is effected by means of a two-pole (four-point) switch. When connected otherwise a three-point switch should be used.

Telsen H.F. Transformer and Aerial Coil

5/6

SEE YOU ON STAND 19

TELSEN

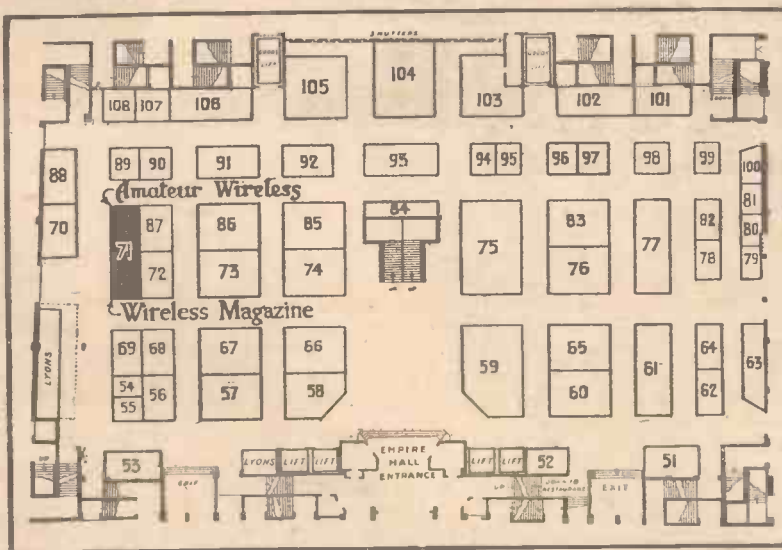
ALL-BRITISH RADIO COMPONENTS

Advt. of The Telsen Electric Co., Ltd., Aston, Birmingham.

To Ensure Speedy Delivery, Mention "A.W." to Advertisers

THE EXHIBITION AT A GLANCE

PLANS OF STANDS AND LIST OF EXHIBITORS

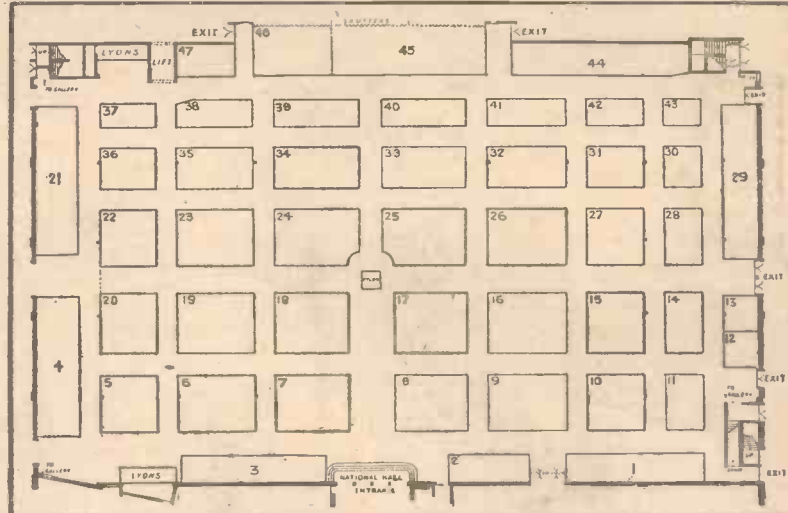


Plan of Stands on Ground Floor, Empire Hall

Name	Stand No.	Name	Stand No.
Flinders (Wholesale), Ltd.	204	Lamplugh, S. A., Ltd.	108
Formo Co.	61	Lectro-Linx, Ltd.	202
Franko, F.	224	Lissen, Ltd.	17
Fuller Accumulator Co. (1926), Ltd.	36	Lithanode Co., Ltd.	249
Fultonone Gramophones (1929), Ltd.	201	Lock, W. & T., Ltd.	160
Gamaze, A. W., Ltd.	185	London Electric Wire Co. & Smiths, Ltd.	178
Garratt Stores	240	Lotus Radio, Ltd.	23
Garrard Engineering & Manufacturing Co., Ltd.	178	Magnavox (Great Britain), Ltd.	108
General Electric Co., Ltd.	24	Mains Power Radio Co.	229
Goodmans	230	Mains Radio Gramophones, Ltd.	53
Graham, R. F., & Co.	189	Manufacturers Accessories Co. (1928), Ltd.	186
Graham Amplion, Ltd.	75	Marconiophone Co., Ltd.	4
Graham Parish, Ltd.	92	McMichael, L., Ltd.	5
Greatrex, R. G., & Co.	197	Montague Radio Inventions & Development Co., Ltd.	47
Gripso Co.	81	Mullard Radio Valve Co., Ltd.	221
Grosvenor Electric Batteries, Ltd.	72		18, 80, 199, 221
Gutta Percha Co.	196	Murphy Radio, Ltd.	59
Hacker, H., & Sons	95	National Accumulator Co., Ltd.	15
Halycon Wireless Co., Ltd.	98	New London Electron Works, Ltd.	35
Harlie Brothers (Edmonton), Ltd.	84	Oldham & Son, Ltd.	66
Hayward, F. G., & Co.	68	Oliver, Fell Control, Ltd.	58
Henderson Wireless & Electrical Service	170	Ormond Engineering Co., Ltd.	34
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Huxton, Ltd.	233	Park Royal Engineering Co., Ltd.	194
Huxley, Simpson & Webb, Ltd.	88	Paroussi, E.	158
Iranic Electric Co., Ltd.	28	Partridge & Mee, Ltd.	177
Iliffe & Sons, Ltd.	57	Partridge, Wilson & Co.	43
Itonia Gramophones, Ltd.	187	Pegasus, Ltd.	238
Jackson Brothers, Ltd.	62	Peritrix, Ltd.	39
Jewel Pen Co., Ltd.	158	Peto Scott Co., Ltd.	179
Johnson Talking Machine Co., Ltd.	180	Pioneer Manufacturing Co., Ltd.	188
Junit Manufacturing Co., Ltd.	97	P.R. Products	187
Kalisky, S. (Aldgate), Ltd.	151	Prestley & Ford	69
Kolster-Brandes, Ltd.	25	Primus Manufacturing Co., Ltd.	193
L.E.S. Distributors, Ltd.	88	Pritchard & Simpson, Ltd.	243

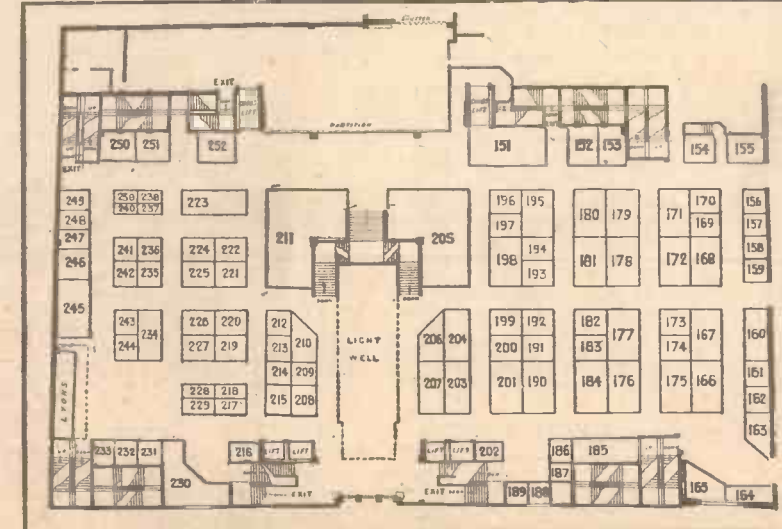
Name	Stand No.
Adie & Co., Ltd.	189
Amalgamated Press, Ltd.	67
Arding & Hobbs, Ltd.	171
Atalanta	191
Audiovisor, Ltd.	228
Auto Electric Devices, Ltd.	159
Automatic Coil Winder and Electrical Equipment Co., Ltd.	207, 208
B. & S. Electrical Co., Ltd.	181
Baird Television Co., Ltd.	167
Bakers Selhurst Radio	216
Beaver Electrical Supply Co.	185
Belling & Lee, Ltd.	13
Benjamin Electric, Ltd.	99
Bernard Jones Publications, Ltd.	71
Beta Electric Motors, Ltd.	218
Bird, Sydney S., & Sons, Ltd.	172
Birkbys, Ltd.	206
British Blue Spot Co., Ltd.	65
British Broadcasting Corporation	211
British Ebonite Co., Ltd.	153
British General Manufacturing Co., Ltd.	30
British Hard Rubber Co., Ltd.	182
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Erooks, Ltd., Kenneth	225
Brown Brothers, Ltd.	105
Brown, S. G., Ltd.	2
Brownie Wireless Co., of Great Britain, Ltd.	37
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Bulphone, Ltd.	12
Burton, C. F. & H.	31
Cadisch, R., & Sons	184
Carrington Manufacturing Co., Ltd.	51
Catesby, Ltd.	245
Celestion, Ltd.	40
Chloride Electric Storage Co., Ltd.	8
Churchmans, Ltd.	200

Name	Stand No.
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Cole, E. K., Ltd.	28
Columbia Graphophone Co., Ltd.	7
Colvern, Ltd.	38
Concordia Electric Wire Co., Ltd.	248
Cussor, A. C., Ltd.	16
Crawford Wireless	242
Crypio Electrical Co., Ltd.	235
Danipad Rubber Co., Ltd.	70
Darwins, Ltd.	101
Dayzite, Ltd.	251
De la Rue, Thos., & Co., Ltd.	164
Dew, A. J., & Co., Ltd.	104
Dibben, Wm., & Sons, Ltd.	1
Donolone (Regd.) Loud-Speaker	161
Downing, John S., & Sons, Ltd.	54
Dubliler Condenser Co. (1925), Ltd.	92
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Dyson, J., & Co. (Works), Ltd.	78
East London Rubber Co., Ltd.	176
Eastick, J. J., & Sons	252
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Economax Co., Ltd.	241
Edison Bell, Ltd.	41
Edison Swan Electric Co., Ltd.	21
Electric Gramophones, Ltd.	89
Electrical Devices, Co.	185
Electrical & Radio Products, Ltd.	1
Electro-Dynamic Construction Co., Ltd.	228
Ensign, Ltd.	85
Epoch Radio Manufacturing Co., Ltd.	106
Every Ready Co. (G.B.), Ltd.	76
Falk Stadelmann & Co., Ltd.	87
Faudels, Ltd.	192
Fay Home Recorders, Ltd.	229
Ferranti, Ltd.	45



Plan of Stands on Ground Floor, National Hall

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R.O. Radio Electric, Ltd.	237	Tanoy Products	83
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Radio Instruments, Ltd.	29	Telegraph Condenser Co., Ltd.	14
Radio Service (London), Ltd.	182	Telsen Electric Co., Ltd.	19, 213
Radio Society of Great Britain	246	Thompson, Diamond & Butcher	210
Radio Trade Review	247	Tonex Co.	231
Ready Radio (R.E.), Ltd.	6, 83	Turner & Co.	82
Rees Mace Manufacturing Co., Ltd.	215	Ultra Electric, Ltd.	10
Redfern's Rubber Works, Ltd.	183	Umelio, Ltd.	73
Regentone, Ltd.	22	Vanderrell, C. A., & Co., Ltd.	91
Rolls Caydon, Ltd.	56	Valtron Electric, Ltd.	227
Rooke Brothers, Ltd.	79	Watmel Wireless Co., Ltd.	100
Sel-Ezi Wireless Supply Co., Ltd.	190	Westinghouse Brake & Saxby Signal Co., Ltd.	44
Selectors (1931), Ltd.	83	Whiteley Electrical Radio Co., Ltd.	46
Selridge & Co., Ltd.	234	Whiteley, William, Ltd.	198
Shapland & Pether, Ltd.	217	Whittingham, Smith & Co.	103
Siemens Electric Lamps & Supplies, Ltd.	74	Wilkins & Wright, Ltd.	80
Six-Sixty Radio Co., Ltd.	20	Wiregrove & Rogers, Ltd.	90
Smurthwaite, F. W.	107	Wireless Retailers Association of Great Britain	174
Sovereign Products, Ltd.	64	"Wireless Trader"	55
Standard Battery Co.	94	Wright & Weaire, Ltd.	152
Stratton & Co., Ltd.	98	Yagerphone, Ltd.	222
Sun Electrical Co., Ltd.	203		
Swain, Charles, Ltd.	244		
Swift Leveck & Sons, Ltd.	52		



Plan of Stands on First Floor, Empire Hall

You can find any stand by reference to the list of exhibitors and the plans



I

[It is one way of celebrating her birthday and for the greater part of the afternoon HE has piloted the SWEET YOUNG THING over the two floors in search of the one receiver she is to choose as a gift.]

HE (mopping his brow): "Here we are, darling. You've seen all the best ones. What's your choice?"

SWEET YOUNG THING (abstractedly): I have not yet quite made up my mind, dear, but . . .

HE (consulting leaflets): How does this Automatic Hyper-booster Radiophone strike you?"

SWEET YOUNG THING: Mmm. Yes, but that wasn't the one I—it was the . . ."



His eyes are all for the girl

HE (always anxious to please): "And the Receptive Audion Five? This one, the beauty in the rosewood case?"

SWEET YOUNG THING (wrinkling her brow): "Yes, perfectly dinky, but if I could . . ."

HE (making a final effort): "I suggest the Non-Static Humpodyne Straight Eight. You know, that thing with the chromium fittings and autumn tint oojahs."

SWEET YOUNG THING (as association of ideas has jogged her memory): Was that the name, darling? The one I want, I remember is the—I know, he had lovely blue eyes and such glossy hair!"

II

[A number of exhibitors are simultaneously tapping the canned music supplied by the B.B.C. amplifier. Loud-speakers to the North, South, East, and West, from the modest type of naked cone to the ultra-

luxurious cabinet radiogram are participating in the general din. At this stand one of the largest models has been unleashed and the volume of sound emitted staggers the passers-by. Conversation in its vicinity is impossible; the assistants cup their ears with their hands to pick up shouted inquiries fired at them at two-second intervals by curious sightseers. You could not hear the bottom drop out of the market, let alone a fall in prices.]

FIRST VISITOR (sucking at empty pipe to elderly neighbour who clutches at counter as that evergreen number, the Overture to William Tell, starts up): "This is the goods, eh?"

ELDERLY NEIGHBOUR (still holding on for support, but leaning towards him): "What's that you say?"

FIRST VISITOR: "I say, this is the goods. Fine production, what?"

ELDERLY NEIGHBOUR: "Fine. what? Speak up, man."

FIRST VISITOR (shouting): "This is the—well, never mind. (Yells at the top of his voice) Lovely tone, this speaker?"

ELDERLY NEIGHBOUR (shrugging his shoulders, in despair): "I can't hear a word you say with this confounded row going on." (Snorts and staggers over to another stand.)

III

SCENE: An important display close to Exhibition entrance. During the last ten minutes THE GIRL has stood in front of the ultra-modern instruments arrayed on the richly decorated counter. Pretty? Yes, rather. An ASSISTANT some yards away has noticed her, but his services have been monopolised by an elderly, prosaic, and very unattractive couple to whom he has dished out at intervals a full collection of pamphlets, circulars and price-lists. He beckons to a junior, hands over to him the uninteresting job and makes for THE GIRL.

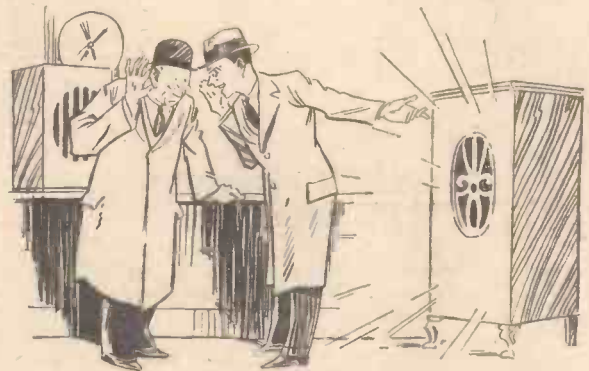
ASSISTANT (switching on the Exhibition smile): "Is there anything I can show you, Moddom?"

THE GIRL: "How very nice of you! Er—would you mind explaining this wireless set because I'm afraid I know nothing about . . ." (A daintily-gloved hand rests lightly on the Pride of the Stand).

ASSISTANT (enthusiastically): "The best in the Show, Moddom. There is nothing equal to it. (Exhibition smile increases in intensity).

THE GIRL: "How lovely! You see, I've been asked to, that is, my brother is so interested in wireless and wants . . ."

ASSISTANT (fully alert): "I am sure this is just what he would choose for himself."



"Lovely tone, this speaker"

THE GIRL: "Has it got a cut out?"

ASSISTANT: "I beg your pardon. A cut out?"

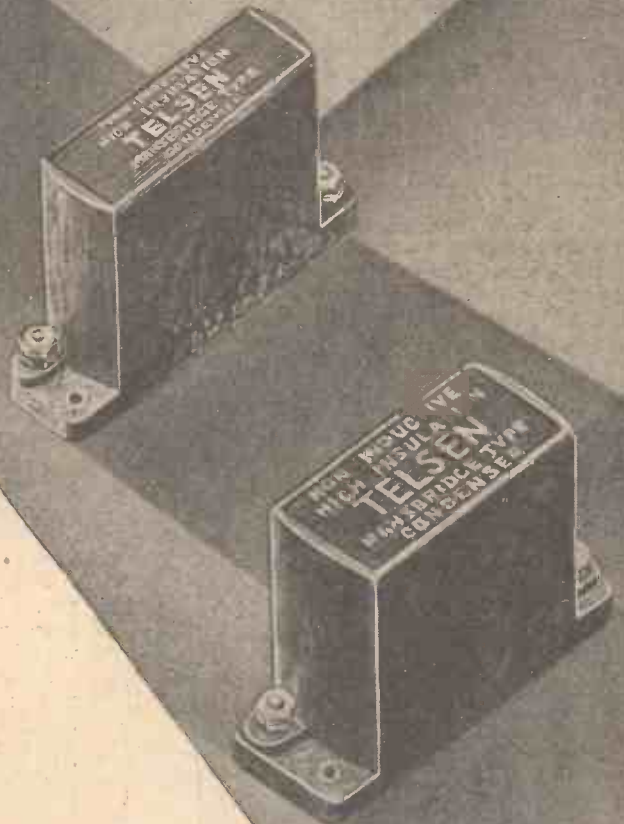
THE GIRL: "Yes, my brother says it must be able to cut out London and get Muck or something. Those foreign names are so difficult."

ASSISTANT (relieved): "Oh, I see, you mean Mutlacker—or is it Moolhacker. Yes, most certainly. You can cut out anything you like easily." (THE GIRL is decidedly attractive.) "All you have to do is to turn this knob which controls a—er sort of filter as I do." (He is not looking at the (Continued on page 556)



"Ah—there you get me chum"

Telsen Mansbridge Type Condensers



TELSEN MANSBRIDGE TYPE CONDENSERS From **1/6**

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

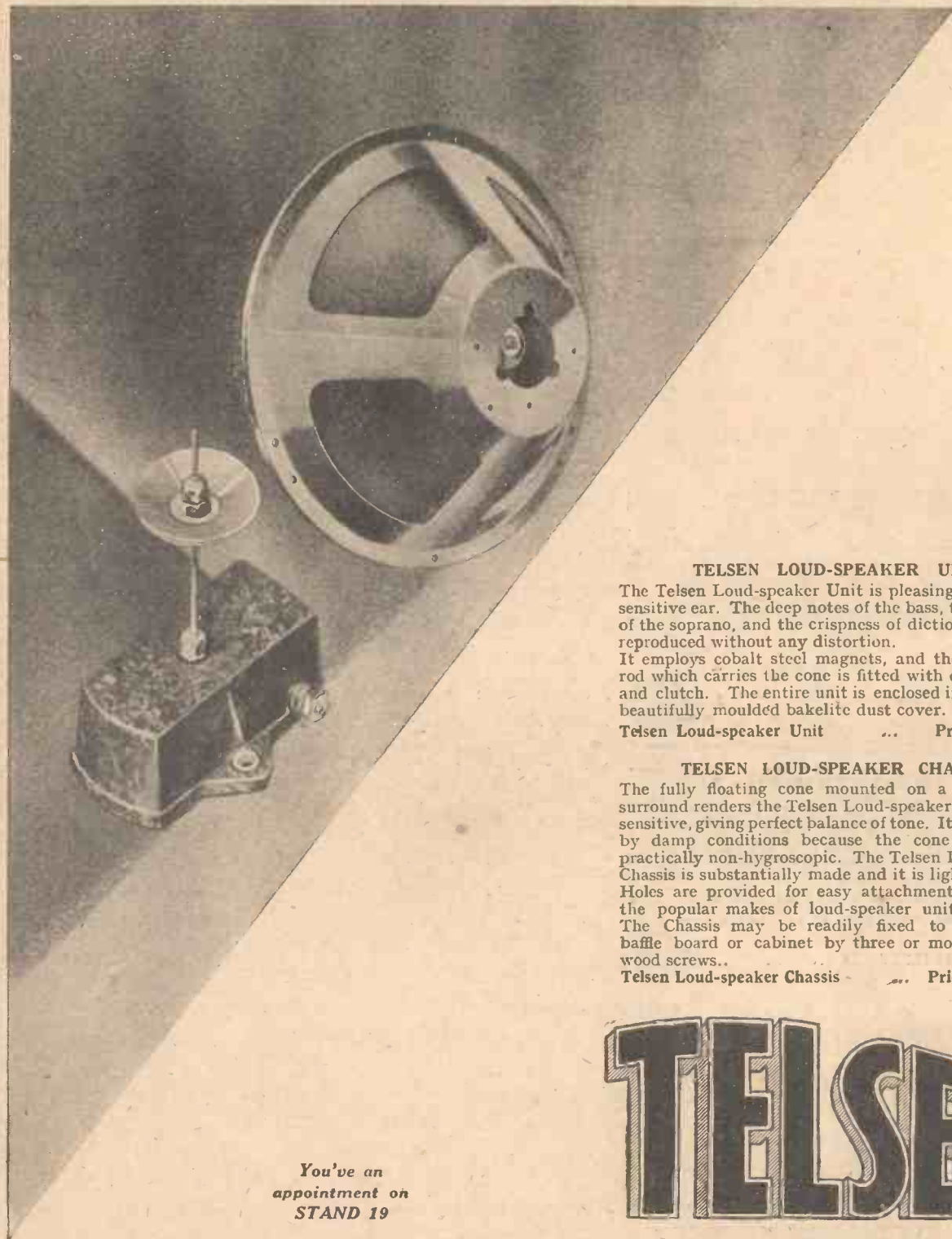
THE SECRET OF PERFECT RADIO RECEPTION

Our reputation stands on STAND 19

Advt. of The Telsen Electric Co., Ltd., Aston, Birmingham.

Advertisers Appreciate Mention of "A.W." with Your Order

Telsen Loud-speaker Unit & Chassis



TELSEN LOUD-SPEAKER UNIT

The Telsen Loud-speaker Unit is pleasing to the most sensitive ear. The deep notes of the bass, the brilliance of the soprano, and the crispness of diction are clearly reproduced without any distortion.

It employs cobalt steel magnets, and the detachable rod which carries the cone is fitted with cone washers and clutch. The entire unit is enclosed in a beautifully moulded bakelite dust cover.

Telsen Loud-speaker Unit ... Price

5/6

TELSEN LOUD-SPEAKER CHASSIS

The fully floating cone mounted on a flexible felt surround renders the Telsen Loud-speaker Chassis very sensitive, giving perfect balance of tone. It is unaffected by damp conditions because the cone material is practically non-hygroscopic. The Telsen Loud-speaker Chassis is substantially made and it is light in weight. Holes are provided for easy attachment to most of the popular makes of loud-speaker units.

The Chassis may be readily fixed to a baffle board or cabinet by three or more wood screws.

Telsen Loud-speaker Chassis ... Price

5/6

You've an appointment on STAND 19

TELSEN

ALL-BRITISH
RADIO COMPONENTS

Advt. of The Telsen Electric Co., Ltd., Aston, Birmingham.

You Will Help Yourself and Help Us by Mentioning "A.W." to Advertisers

Telsen H.F. Chokes



TELSEN BINOCULAR H.F. CHOKE

An inductance of 180,000 microhenries . . . a self-capacity of .000002-microfarad . . . figures which prove that the Telsen Binocular H.F. Choke fulfils its purpose to the utmost and meets the demand of modern set designers and builders. Owing to the binocular formation the external field, and therefore unwanted reaction effects, are reduced to an absolute minimum. It covers the whole broadcast band and it is free from parasitic resonances. Resistance 750 ohms.

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

TELSEN STANDARD H.F. CHOKE

The Telsen Standard H.F. Choke utilises the minimum baseboard 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 **2/-**

TELSEN

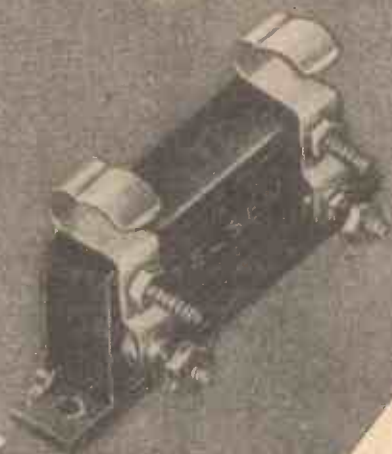
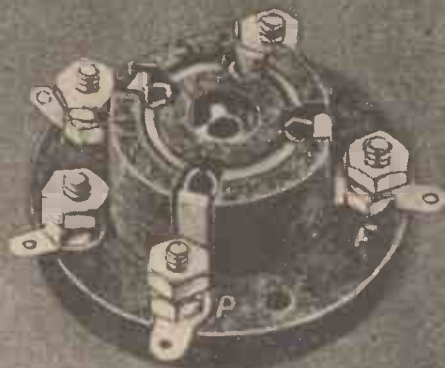
THE SECRET OF PERFECT
RADIO RECEPTION

Remember the
number—
STAND 19

Advt. of The Telsen Electric Co., Ltd., Aston, Birmingham.

Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention

Typical of Telsen Value



6d
each

TELSEN VALVE HOLDERS (Prov. Pat. No. 20290/30)
The Telsen four and five-pin valve-holders embody patent metal spring contacts, which are designed to provide the most efficient contact with split and non-split valve legs, and are extended in one piece to form soldering tags. Low capacity and self-locating.
Telsen 4-pin Valve Holder Price 6d.
Telsen 5-pin Valve Holder Price 6d.

TELSEN FIXED MICA CONDENSERS
(Prov. Pat. No. 20287/30)
Telsen Fixed Mica Condensers are made in capacities from .001-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. All Telsen fixed mica condensers are tested at 500 volts.
Telsen Fixed Mica Condensers Price 6d.

TELSEN GRID-LEAK HOLDER
The Telsen grid-leak Holder will hold firmly any standard size or type of Grid-leak. Ample clearance is provided between the terminal screw leads and the baseboard (underneath), preventing any surface leakage upsetting the value of the grid-leak. The terminals and fixing holes are accessible without removing the grid-leak.
Telsen Grid-leak Holder Price 6d.

TELSEN SPAGHETTI FLEXIBLE RESISTANCES
These are made in a range of values from 300—200,000 ohms with a maximum current varying from 42 m/a. to 1½ m/a. The terminal tags are firmly fixed to the wire and clearly marked with their respective resistance values; they are impregnated with special insulating compound which renders them proof against corrosion.
Telsen Spaghetti Flexible Resistances from 6d.

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

You can't afford
to miss
STAND 19

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ALL-BRITISH
RADIO COMPONENTS

Advt. of The Telsen Electric Co., Ltd., Aston, Birmingham.

You will Help Yourself and Help Us by Mentioning "A.W." to Advertisers

NEW RECEIVER IDEAS



Set Tester reviews some outstanding features of the new sets

ROAMING round this immense Radio Exhibition at Olympia is certainly a thrilling experience, especially to one whose work centres largely on testing British-made sets? In this article I mention some of the points to be noted during a tour of the stands featuring broadcast receiving sets. Naturally I cannot mention even half of the interesting exhibits, but I can record some outstanding impressions.

At Stand 7 is the array of Columbia sets produced by the Columbia Graphophone Co., Ltd. Outstanding in interest is the new model 351, claimed to be the cheapest self-contained high-grade set in existence. Certainly you get a lot for a five-pound note, this being the inclusive price of the Columbia model 351.

It is a self-contained two-valver including the two valves, all the necessary batteries

and a cone loud-speaker with an adjustable unit. This set should prove very popular among listeners wanting cheap reception in regional areas. The cabinet is pleasing in appearance and the controls seem easy to work.

Simple Control a Feature

I think the Columbia model 352 will attract a good deal of attention. This is a four-valve mains set, price twenty-three guineas, with a handsome cabinet containing a moving-coil loud-speaker. This set has very simple controls, because the action has been eliminated and the volume control is also the on-off switch. Evidently Columbia engineers have concentrated on the popular price market, for the model 333 Columbia pedestal set, with three A.C. screen-grid valves and four tuned circuits is

only twenty-nine guineas. This includes a moving-coil loud-speaker in a walnut cabinet designed on severe but pleasing lines. Columbia radio is self-contained radio at really popular prices.

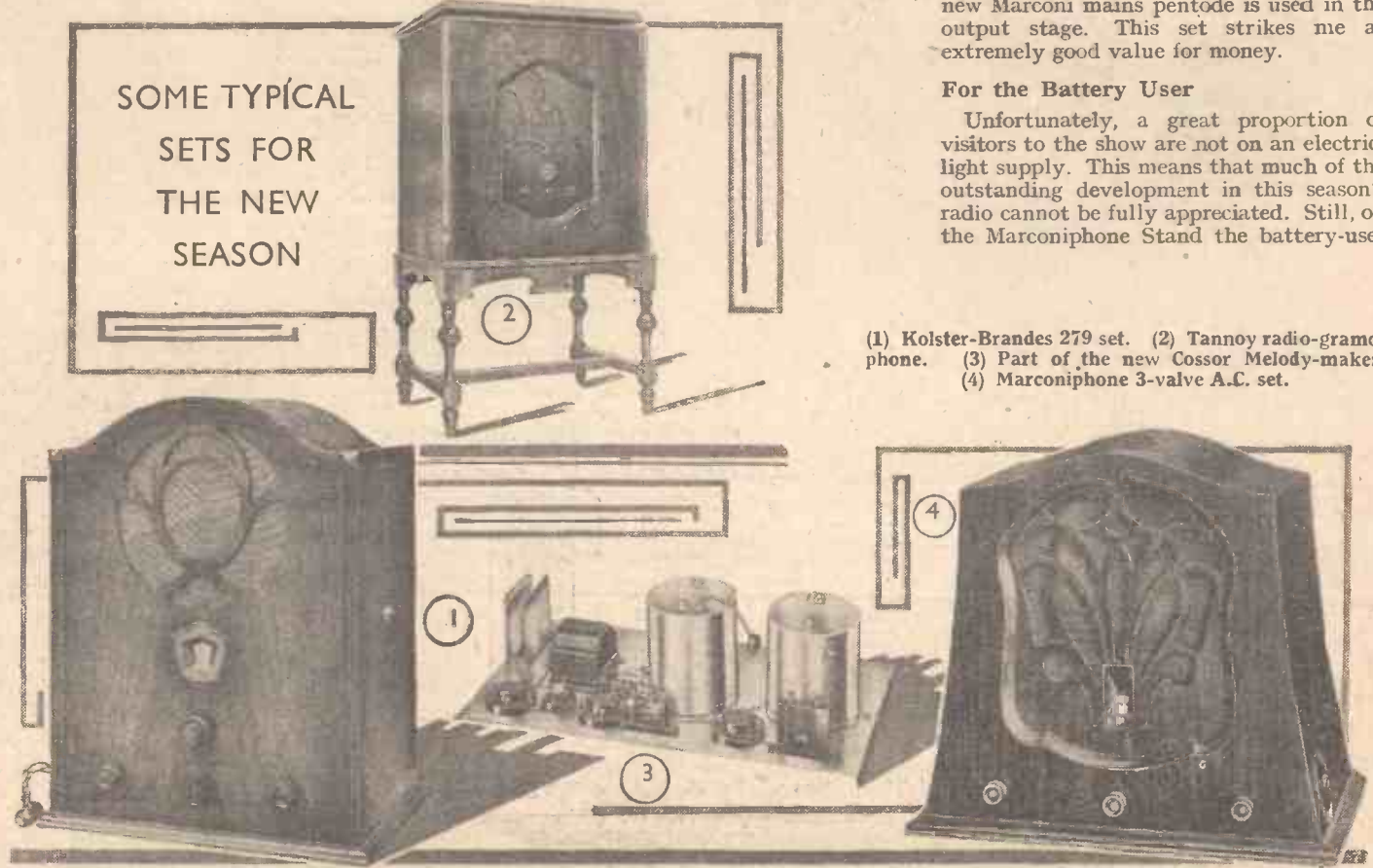
No set-buyer should fail to call at Stand No. 4, where the Marconiphone Co., Ltd., show a very attractive range of new sets. I think probably the Marconiphone model 42 at twenty guineas will attract most attention. This is an A.C. mains transportable housed in a delightfully shaped cabinet of walnut.

Three control knobs are arranged in a line along the bottom of the cabinet, which contains a moving-coil loud-speaker in addition to the chassis for A.C. or D.C. mains. Looking inside the A.C. model one sees that the screen-grid and detector valves are both metallised and that the new Marconi mains pentode is used in the output stage. This set strikes me as extremely good value for money.

For the Battery User

Unfortunately, a great proportion of visitors to the show are not on an electric-light supply. This means that much of the outstanding development in this season's radio cannot be fully appreciated. Still, on the Marconiphone Stand the battery-user

SOME TYPICAL
SETS FOR
THE NEW
SEASON



(1) Kolster-Brandes 279 set. (2) Tannoy radio-gramophone. (3) Part of the new Cossor Melody-maker. (4) Marconiphone 3-valve A.C. set.

OUTSTANDING SET FEATURES AT OLYMPIA

will find in model 66, price sixteen guineas, a four-valve portable of great interest. This is so designed that the total anode-current consumption is not more than seven milliamperes. The four-valve circuit provides selectivity for modern requirements, but by the use of specially compensated ganging one-knob tuning is virtually obtained. It is interesting to note that the Marconi PT2 pentode output valve is included.

Super-hets

An outstanding development is model 535, called the Marconiphone Super Heterogram, a six-valve super-het circuit for radio and gramophone reproduction. The price of this is forty-five guineas, which is remarkably low in view of the specification. This set can be used on A.C. or D.C. mains, thanks to the new range of D.C. valves giving equivalent efficiency to the A.C. range. Gramophone enthusiasts will not fail to see the automatic record-changing mechanism, which, when fitted to the instrument just mentioned, makes model 536 the Radio Autogram at fifty-two guineas.

Graham Amplion, Ltd., show on Stand 75 the Amplion Six, a neat A.C. mains job selling at the popular price of twenty guineas. Looking into this Amplion product one finds that there are two high-frequency stages, a detector and a push-pull output stage. The sixth valve is a rectifying valve, so the Amplion Six is really a four-stage set.

All the controls are mounted on the sides of the cabinet. The single knob on the right tunes the set, working a calibrated tuning scale fitted behind a small escutcheon plate on the front of the set. This set obtains its good quality from the self-contained Amplion moving-coil loud-speaker, which is energised by the D.C. flowing in the mains smoothing circuit. I note with interest the inclusion of a local-distance switch. For local-station reception, anode-bend detection is obtained, but

for distant reception the detector can be switched over to power grid working.

This year Regentone, Ltd., on Stand 22, should prove a centre of attraction for those looking for an inexpensive two-valve A.C. mains set. Price £6 15s. complete, the Regentone A.C. two-valver is housed in a walnut-finished bakelite case. There are three controls on the front, for tuning, volume and wave-changing. A Westinghouse metal rectifier is used and in spite of the low price there is obviously no skimping in the quality of the assembly.

Stand 26 is the location of E. K. Cole, Ltd., where the much talked-of Ekco console set four-valver, price twenty-four guineas, is outstanding. This table cabinet set is housed in a figured bakelite cabinet available in three shades—dark jade, mahogany or walnut. The chassis, which is also on view, is a remarkable tribute to the progress made in British set production.

A New Idea in Dials

The layout of the four valves will appeal to everyone. At the top is mounted the moving-coil loud-speaker. Around the periphery of this loud-speaker is the patent Ekco station-finding dial. One simply turns the pointer to the names of the stations on the dial without worrying about dial degrees or wavelength calibrations.

This set is a good example of how control has been simplified by making one knob do two jobs. The wave-change and radio gramophone switches are combined in the

volume control. An additional control is a tone filter, enabling the pitch of the reproduction to be varied. Often the high-pitched heterodyne interference can be eliminated from reception by cutting off the top notes of the reproduction with this tone control.

The Ekco four-valve Consolette by no means exhausts the newcomers to the Ekco range. For forty-three guineas you can obtain the chassis of the Consolette as a radio-gramophone or for thirty-two guineas as a pedestal type of set.

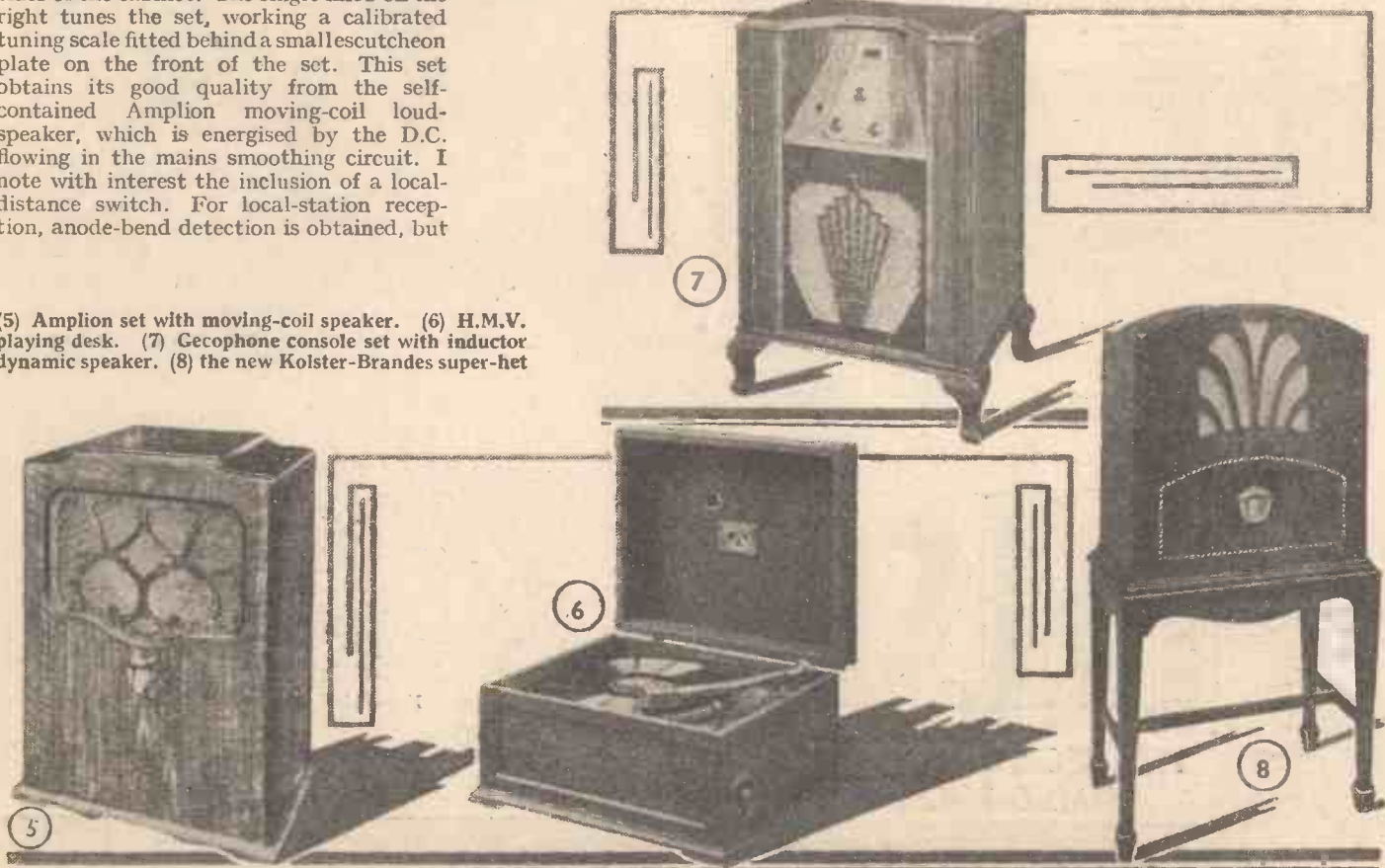
To appeal to the more popular-priced market, the three-valve Ekco Consolette at fifteen guineas has been produced. This also includes a very up-to-date chassis with a self-contained balanced-armature cone loud-speaker. The circuit consists of a screen-grid, detector, and pentode combination.

On Stand 24 the General Electric Co.'s great array of new sets should certainly be examined. One of the most attractive is model BC.3235, a compact A.C.-mains job, price eighteen guineas. The cabinet is very pleasing and the controls certainly look very simple to work. This set includes a Gecophone inductor-dynamic loud-speaker and a powerful three-valve circuit.

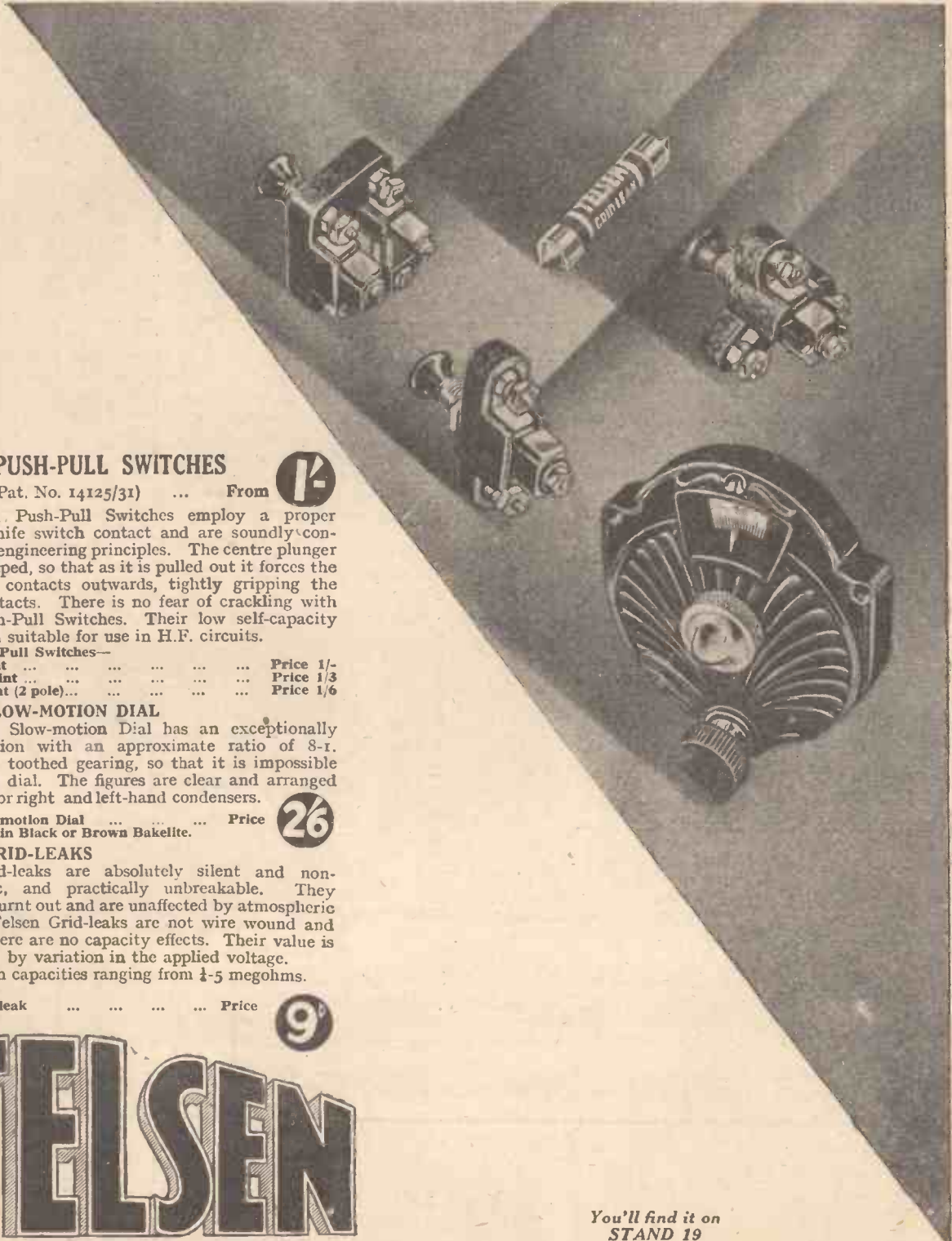
The new Gecophone BC.3240 four-valve A.C. set at twenty guineas is sure to attract the notice of the connoisseur. There are two stages of screen-grid high-frequency amplification, a detector and the new Osram mains pentode output valve. Con-

(Continued on page 540)

(5) Amplion set with moving-coil speaker. (6) H.M.V. playing desk. (7) Gecophone console set with inductor dynamic speaker. (8) the new Kolster-Brandes super-het



Switch over to Telsen



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 GRID-LEAKS

Telsen Grid-leaks are absolutely silent and non-microphonic, and practically unbreakable. They cannot be burnt out and are unaffected by atmospheric changes. Telsen Grid-leaks are not wire wound and therefore there are no capacity effects. Their value is not affected by variation in the applied voltage.

Made in capacities ranging from 1-5 megohms.

Telsen Grid-leak Price **9**

TELSEN

THE SECRET OF PERFECT RADIO RECEPTION

You'll find it on
STAND 19

Telsen Output & L.F. Chokes



TELSEN L.F. CHOKES

TELSEN L.F. INTERVALVE COUPLING CHOKE
 Specially designed for use as a coupling choke in the L.F. stages of a modern radio receiver.
 Made in a range of three inductances:—
 40, 100, and 125 henrys Price **5/-**

TELSEN HEAVY DUTY POWER GRID L.F. CHOKE
 Most modern Radio Circuits now employ some form of Power Grid Detection. The Telsen Power Grid L.F. Choke fulfils this need.
Telsen Heavy Duty Power Grid L.F. Choke,
 40 henrys Price **8/-**

TELSEN OUTPUT CHOKES

TELSEN OUTPUT CHOKES (TAPPED AND PLAIN)
 Designed for use as Output Filter Chokes, and should be used with a Coupling Condenser of not less than 2 mfd. capacity. For last stage valves of 3,000 ohms or less the plain Choke should be used with all Loud-speakers having impedances of about 3,000 ohms.

Telsen Output Choke, 20 henrys Price **8/-**

Telsen Tapped Output Choke, 20 henrys... .. Price 8/6

TELSEN OUTPUT TRANSFORMERS

Telsen Multi-Ratio Output Transformer, giving three Ratios of 9-1, 15-1, 22.5-1 Price 12/6
 Telsen Output Transformer, Ratio 1-1 Price 12/6
 Telsen Pentode Output Transformer Price 12/6

OLYMPIA
 National Hall
 Ground Floor
 STAND 19

TELSEN

ALL-BRITISH
 RADIO COMPONENTS

THE HOW AND WHY OF TUNING—III

INDUCTANCE AND CAPACITY EXPLAINED

The third of a short series of articles on tuning, specially written for newcomers to Wireless. Here the first ideas about tuning are presented. In the articles that follow, "Hotspot" will deal with all the difficulties about tuning that the beginner is likely to meet

SHALL we briefly go over what we have so far learned of inductance and capacity? First, we saw last week that capacity is the property of a condenser. When a condenser is stated to be charged, we know this means that it is storing electrical energy in the form of an electric field of force around the two plates of the condenser.

Inductance

Secondly, we also saw last week that inductance is a property that may, under suitable conditions, be exhibited by a length of wire, even when it is not coiled. This inductance, we saw, is a sort of electrical inertia. And it is therefore manifested whenever the current flowing through the wire is varied, that is increased or decreased in value. Inductance in electricity tends

For radio work the farad is much too large a unit. This unit capacity is therefore divided into smaller and more convenient units. The most commonly used is the microfarad. Some idea of the smallness of the microfarad can be gauged from the fact that there are 1,000,000 microfarads to the farad. For measuring very small capacities, such as that between the electrodes of a valve, the micro-microfarad is used. This is a billionth part of a farad.

Let us see how these units are found in practice. We have many different capacities in a radio set, quite apart from the condensers used for tuning. The average value for a tuning condenser capacity is .0005 microfarad. Note that this means that the maximum value of the capacity is .0005 microfarad, with a progressive variation towards a minimum that should approach as nearly as possible to zero.

Small though the microfarad is, the maximum capacity of a tuning condenser is only a small part of one microfarad. We could call the capacity 500 micro-microfarads, but as everyone seems to prefer to deal in diminutive fractions of the microfarad unit we must stick to .0005 microfarad!

The very largest condenser used in a set is 4 microfarads capacity, as in the smoothing circuit of a power supply. This is only .000004 farad. So even the largest condenser we use does not even remotely approach the capacity required to create a potential difference of one volt when the amount of electricity is one coulomb. In practice we are not often concerned with the actual amount of electricity, being more interested in the rate of current flow and the potential difference.

The capacity of a condenser is greatly influenced by the nature of the dielectric. We note the different effects of the dielectric by reference to its specific inductive capacity. The S.I.C. value of air is assumed to be one, and the corresponding dielectric effects of other intervening plate mediums, such as mica and paper, can then be indicated. The S.I.C. of air is one and of mica five.

Other factors govern the capacity of a condenser. The capacity is directly proportional to the area of the dielectric strained. If there are a number of interleaved plates, as shown by the diagram, the total capacity is found by the number of dielectric areas, always one less than the total number of plates (see Fig. B).

The capacity is also inversely proportional to the distance of the plates apart. As the plates are more separated the capacity becomes less.

Now for a few more facts about inductance. The unit of inductance is the henry. A coil is said to have an inductance of one henry when one volt is induced across it as the current changes at the rate of one ampere per second. This is simply the working statement arising from the fact, already learned, that when the current through a coil is changing an induced and opposing voltage is set up.

As with the farad, the henry is too large a unit for many of the coils used in radio-frequency work, so suitable sub-divisions are used. Of these, the micro-henry is most common, this being a millionth of a henry.

The formula for finding inductance in henries is too complicated to be dealt with in this series. For our purpose it may be taken that L henries represents the inductance of the coil in the tuning circuit and that C farads represents the capacity of the condenser. Next week we will see the way in which L and C together form an oscillatory or tuning circuit.

HOTSPOT.

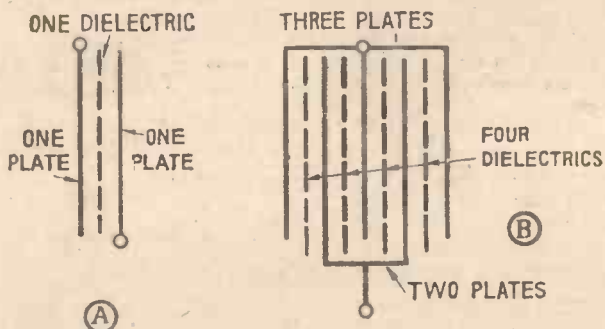
A BROADCASTING HOUSE EXPERIMENT

THE experiment of making one wall of the children's studio at Broadcasting House of glass has turned out to be a failure. Now an excellent decorative scheme for this studio is in process of completion. There will be an arched roof with pale grey battens. The question arose as to whether these battens would keep clean. Apparently they will, because of the great purity of the air in the Control Tower. Three of the six windows in this studio will appear to look out on to a delightful orchard, and the other three will be mirrors.

EARLIER TELEVISION

UNTIL now the Baird Television transmissions have been sent out on Tuesday and Friday after midnight, but in the near future there will be a half-hour transmission during one of the dance periods, starting at 10.30 p.m. The dance music will continue from the Regional station and the picture signals of the dance band will be sent out on the National wavelength. This should enable amateurs interested in Baird television to obtain more convenient reception on their televisions. It is understood, also, that Baird is to make tests through North Regional transmitters.

Schubert lovers will be interested to know that a recital of Schubert songs by Robert Maitland is the outstanding feature of Midland Regional programmes on September 27.



A. The simplest possible condenser arrangement. B. How the condenser plates are interleaved with the dielectric

to oppose change, just as inertia does in every day mechanical actions.

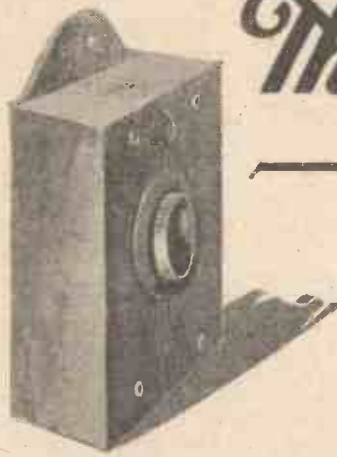
Having grasped the nature of inductance and capacity, readers ought to know something of the units of these two ingredients of tuning. Let us make a start on capacity. All we know as yet is that a condenser consisting of, say, two aluminium plates separated by air as the dielectric, has the ability to store electrical energy.

One of the two plates is at a higher potential when the condenser is charged, so that if the two plates are connected together a current will flow. Obviously, the greater the ability of the condenser to store electrical energy the greater is its capacity.

Capacity

Capacity in condensers is measured in farads. The farad shows the relation between the quantity of electricity and the potential difference across the two plates. The unit for electrical quantity is the coulomb. This is equivalent to one ampere of current flowing for one second. When one coulomb of electricity causes a potential difference of one volt between the two opposite plates, the condenser capacity is one farad.

The CRYSTAL SET for 1932



Here are full constructional details of a crystal set which has been designed for utility and efficiency. It is a set that once installed will not require any attention and it is built in a convenient form to hang on a wall

DO you want a really good crystal set? Is your own set out of date or incapable of separating stations? Would you like a crystal set as a stand-by to your main loud-speaker set, so that if anything goes wrong, or if you do not want the loud-speaker working, you have a receiver at hand as a stand-by.

If you can answer "Yes" to these questions, then the simple little wall-type crystal set shown by the accompanying photographs will fill the bill.

You present crystal-set users will like it. It is really efficient, it will separate stations where your present set with (very possibly)

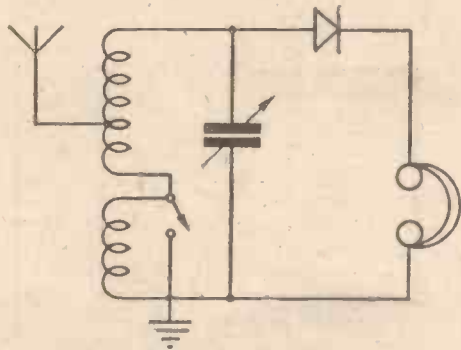
denser. The aerial lead plugs into a socket at the top of the box and the earth connects up at the bottom. There is a plug and socket arrangement at the top of the box, so that the set can be switched instantly from long waves to medium and vice versa.

The preset crystal detector is carried inside the box, where it is out of the way and is not likely to be disturbed after preliminary adjustment.

Using a preset crystal detector in a set of this kind gets over the old bugbear of crystal reception—catwhisker tickling. The special contacts used in a preset detector ensure that one adjustment lasts for a considerable time and there is no need to search for a sensitive spot on the crystal surface.

From the photographs and blueprint (a full-size edition of the latter being obtainable from the Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4, price 6d., post free), you will see how the parts are arranged.

The two coils, the condenser, and the crystal detector are all carried on the ply-



The theoretical circuit; the layout and wiring diagram is on the next page

wood board which forms the front of the box—the "panel," if such you like to call it. The framework of the box at the back does not carry any of the components and therefore can be made up in almost any shape you like.

A rear view of the set; note the coils for dual waveband reception: the change over is by means of a plug and pair of sockets

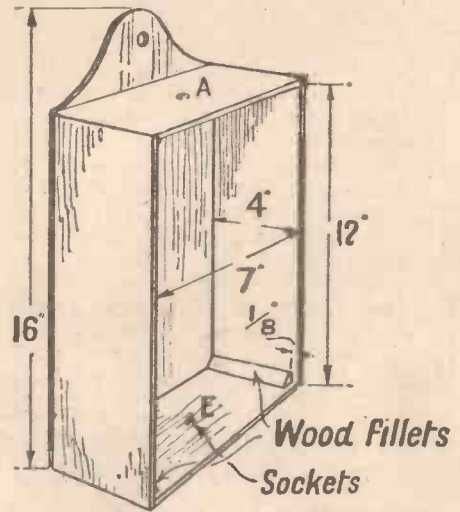
inefficient coils, causes station jamming, and, as it hangs on the wall out of the way, it will appeal to the man who does not want to give too much space to a set.

This new set uses plug-in coils, and as most constructors have one or two coils by them, this means that the expense involved in building the little set is trivial.

Look at the photographs and see how the parts are arranged.

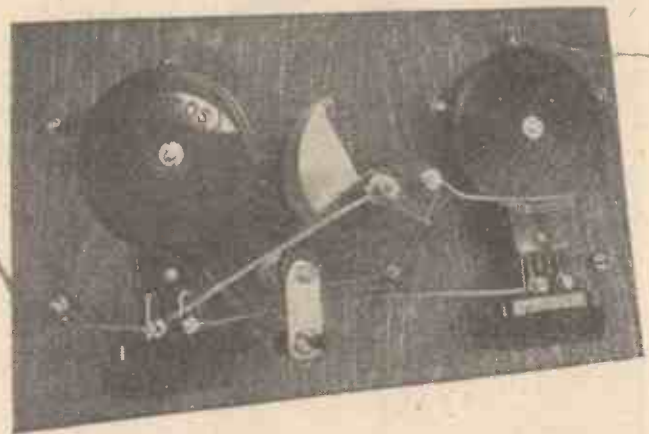
The general idea of the outfit is that it is totally self-contained and on the panel the only knob is that of the main tuning con-

- COMPONENTS REQUIRED**
- 3-ply panel, 12 by 7 in. (Readi-Rad, Peto-Scott).
 - Two plug-in coils, No. 69 and 150 (Lewcos, Atlas, Tunewell, Igranic).
 - Variable condenser, .0005-mfd. (Telsen, Lotus, Readi-Rad, J.B., Lissen, Utility, Formo, Ormond, Burton, Polar).
 - Two coil-holders (Lotus, Lissen, Igranic, Eddy-stone).
 - Permanent crystal detector (Jewel Pen).
 - Six sockets (Clix, Belling-Lee).
 - One wander plug (Clix, Belling-Lee).
 - Jiffifix (Readi-Rad).
 - 4-in. ebonite dial (Bulgin).



Details of the wall cabinet

of wood. These blocks should be screwed to the plywood front and the coil-holders are then mounted at right angles on these.



The tuning condenser is mounted on the panel by means of its one-hole fixing nut and the crystal detector is supported on a small metal strip from one terminal of the variable condenser.

This strip is a connection as well as a support, therefore metal and not plywood or ebonite must be used for this. It connects the crystal detector to one side of the tuning circuit.

The plugs and sockets for aerial, earth, (Continued at foot of next page)

A plain rectangular box, with a hook at the top so that the set can be hung on a wall is, without a doubt, the most convenient way. The two coils are carried in ordinary holders which are mounted on their sides, screwed to two small blocks

For the Newcomer to Wireless : FILTER CIRCUITS

I HAVE often noticed recommendations to make use of a filter circuit between the last valve of a receiving set and the loud-speaker. Frequently, though, the advice is difficult if not impossible to carry out, since there is not room in the cabinet for such a circuit.

Why not put it outside the cabinet? Can that be done?

Yes, quite easily. You can, as a matter of fact, fit an output filter to any set at very small cost and make a neat job of it.

I'd be glad to know how it's done.

You require only two components: a suitable low-frequency choke and a good quality 2-microfarad condenser.

Roughly, what should be the inductance of the choke?

For most ordinary purposes a 20-henry choke answers very well indeed, so long as it is designed to carry a load amounting possibly to 20 or 30 milliamperes without any great drop in the inductance value.

Do you mean a constant-inductance choke?

That is certainly the most desirable type for triodes. If you have a pentode valve in the output, I would recommend a choke specially designed for these

valves. This will have a tapping so that valve and loud-speaker impedance may be pretty well matched.

Tell me how these components are arranged?

On the receiving set are two output terminals marked L.S.+ and L.S.—. The first is connected straight to high-tension positive; the second to the plate of the output valve. Wire the choke across these.

And what next?

From the L.S.— terminal make a connection with one terminal of the 2-microfarad condenser. And there is your filter complete.

How is the loud-speaker connected up?

One contact goes to the unoccupied terminal of the condenser, the other to the L.S.+ terminal of the set.

Does it matter which loud-speaker lead goes to which?

Not a bit, since there will be no direct current flowing through the loud-speaker windings.

You said just now that a very neat job could be made of an outside filter. Would you mind telling me about this?

A small box will house both the choke

and the condenser. Provide the box with two pairs of terminals, one pair for connection to the output terminals of the set and the other for connection to the loud-speaker. The box can then stand either behind the set or beside it, and there will be nothing to offend the eye.

Is that system suitable for extension wiring in a distant room?

For extension wiring you should always have a filter circuit or an output transformer, for it is most undesirable to allow the line wires to carry direct current at a voltage of 100 or possibly a great deal more. This filter system may be used quite well but actually you can improve upon it to some extent for extension wiring.

How exactly?

So long as long-tension negative of the set is earthed it is easy. We want impulses that have done their work in the loud-speaker windings to get away to earth. Therefore a single wire will suffice for the extension. This wire runs from the second terminal of the 2-microfarad condenser to one terminal of the loud-speaker. The other loud-speaker terminal is then connected to a suitable earthed point, such as a water main or the central heating system.

"THE CRYSTAL SET FOR 1932"

(Continued from preceding page)



A view of the front of the panel of "The 1932 Crystal Set"

phones, and wave-changing are mounted direct on the woodwork and do not need any further insulation.

When you have mounted these parts, wire them up with the few leads as shown in

the blueprint and then plug in the medium and long-wave coils.

In most districts a No. 60 X-tapped coil should be used for medium band reception and a No. 150 plain coil (without any tapping) for the long wave-band. You do not have to move these coils. The little plug is simply moved from one socket to any to change over from Daventry 5XX to the medium band.

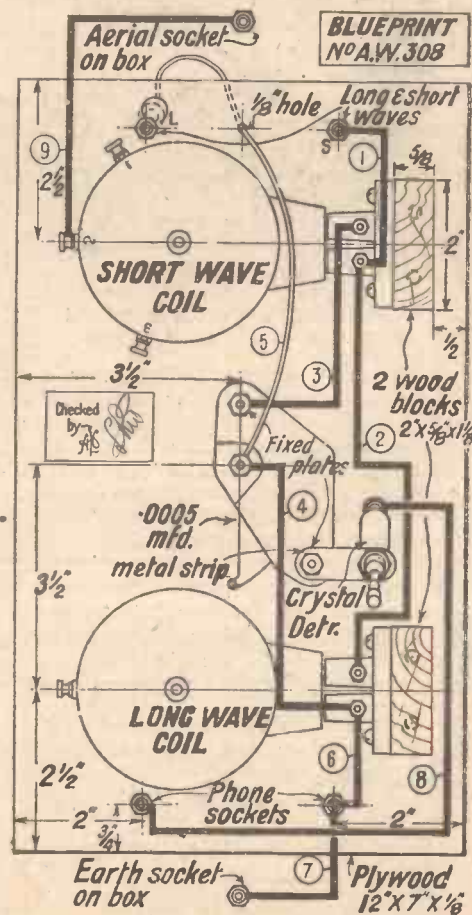
It is advisable not to have the phone leads too long, for this may cause a drop in signal strength. No condenser is placed across the phones in this set, for the mutual capacity between the phone leads is generally sufficient. In some cases, though, it may be an advantage to have a fixed condenser of about .0003 microfarad or even a trifle more across the phone leads to by-pass H.F. currents.

Remember that in this set as with any other crystal sets you must have a good aerial and earth. Hang the set so that the lead-in from the aerial is short and direct.

Be careful that the set is not hung up on any large conducting surface so that the fields of the two tuning coils are upset. If the set were hung up on any metal partition, for instance, the tuning range of the set would be altered because of the metal near the coil.

If it is a choice of having either long aerial and earth leads, or long phone leads, then choose the latter and make the aerial and earth leads as short as possible.

The X-tapped coil improves the selectivity and unless your aerial is of an exceptional length, or unless you are right under the shadow of a big station, then you will have no trouble with one station forming a background to another.



The layout and wiring diagram. A full-size blueprint is available price 6d.

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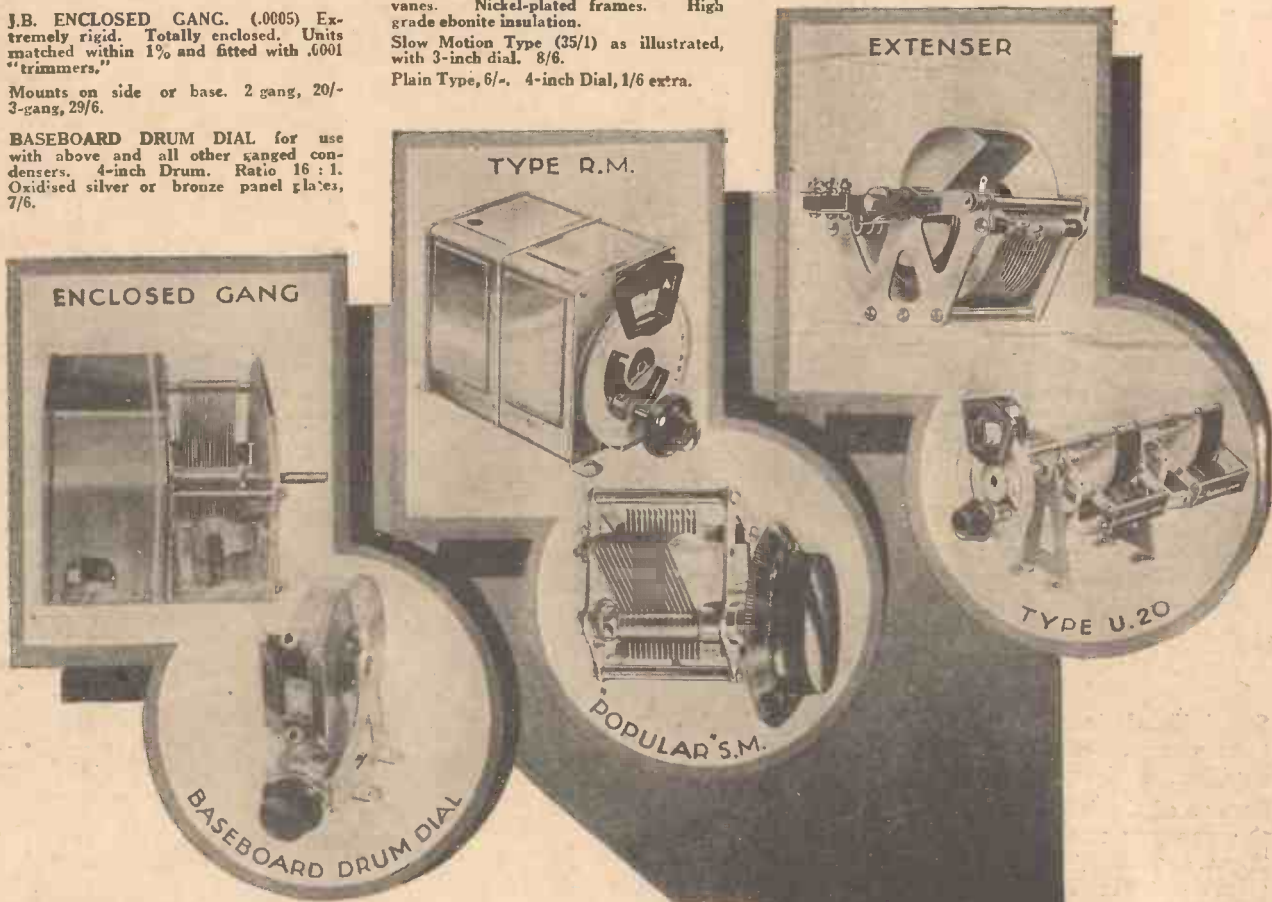
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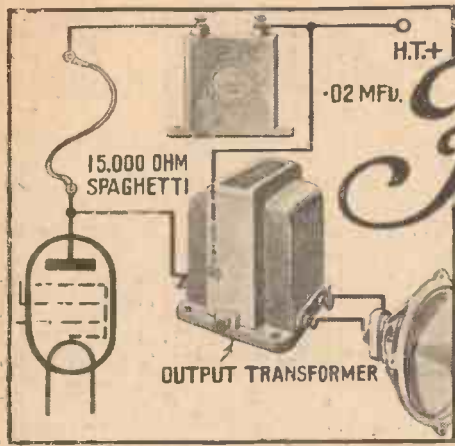
Scores of the biggest electrical undertakings in the country use Varley coil-windings. Among them are the great Electric Railway Systems, where extreme accuracy and reliability are first essentials.

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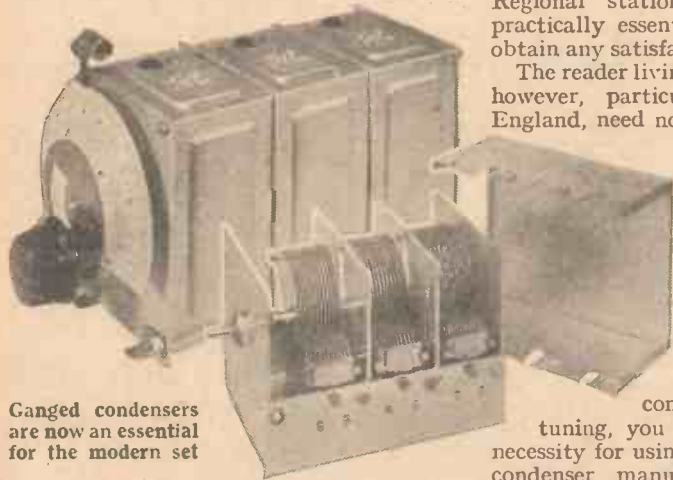


VARLEY (OLIVER PELL CONTROL LTD.), 103, KINGSWAY, LONDON, W.C.2
IRISH FREE STATE REPRESENTATIVE: D. R. WOOD, 41, MERCHANT ST., CORK.



An output arrangement for a pentode valve

WHEN you go to the Radio Exhibition or read the Exhibition numbers of AMATEUR WIRELESS do you just take pot-luck as it were, or do you adopt some definite plan. The wise man, undoubtedly, has in mind some idea of what he wants to see before he goes to the Show. Unless this is done the general effect is so bewildering that one comes away with very muddled impressions. If, on the other hand, one has been on the look-out for certain particular features, then the enjoyment derived is correspondingly greater.



Ganged condensers are now an essential for the modern set

I do not mean that one should decide to see certain exhibits only. It is clearly necessary to be on the look-out for novelties presented by different manufacturers, but there is no reason why this should not be done even if the suggested plan is adopted.

The novelties likely to be present at the Show have been dealt with elsewhere in this issue. I want in this article to suggest possible lines of thought to have in mind when visiting the Show or, if this is impossible, when reading the reports. Let us consider the matter from the point of view of the man who already possesses a set, and does not wish to incur the expense of a completely new receiver, but is willing to make small modifications here and there if he can improve the performance by so doing.

Let us work our way through from the aerial. Undoubtedly, the most outstanding introduction of the present season will be the range of band-pass tuners which

Features Your Set Should Have

Our Technical Editor here gives a résumé of the developments in receiver design of the last few months and suggests modifications that can be made to your present receiver

will be exhibited. If your set is not already fitted with band-pass tuning then I should strongly recommend you to consider it, if you live anywhere within reasonable hail of a powerful station. Do not forget that interference is not confined to our own local stations. Some of the best Continental programmes are interfered with by other European transmissions, and a more selective tuner is of use in obtaining clear-cut distant reception, as well as in cutting out the local station.

Band-pass Tuning

If you live within, say, 20 miles of a Regional station, band-pass tuning is practically essential to-day if you are to obtain any satisfactory reception.

The reader living well out in the country, however, particularly in the West of England, need not trouble with band-pass tuning, and his requirements are more in the nature of distance-getting properties which will be discussed in a moment.

You will do well, therefore, to keep your eyes wellopen for the various band-pass tuners which will be available, and at the same time, if you are contemplating this form of

tuning, you must bear in mind the necessity for using a dual condenser. The condenser manufacturers are gradually appreciating the call for this class of condenser, and as public interest grows, so the price and the performance will both become more satisfactory. So look around for a good dual condenser at a good price. Trimmers are not actually essential, but most dual condensers incorporate a small built-in trimmer, which increases the price very little—certainly less than the cost of an external trimmer.

On the other hand, if you are not interested so much in band-pass tuning for the reasons already stated, you may be interested in adding a high-frequency stage to your receiver. If such is the case you should keep your eye open for H.F. transformers, preferably with aerial coils to go with them, because if you can buy a match-

ed pair of coils you can use gang-control and obtain simplicity of tuning.

Generally speaking a high-frequency transformer that has a separate primary winding or tapping for both wavebands is to be preferred. The simpler types use a centre-tapped arrangement on the short waves, and the full coil on the long wave. Long-wave selectivity is becoming quite a problem to-day, and for best results the long wave should at least be centre-tapped. There are a number of coils which give this effect, and it is for the user to decide whether he will pay the extra cost usually necessary.

Similar remarks apply to an aerial coil. Here it is most important that the tapping for the aerial or the coupling winding shall be specifically designed for each waveband, and shall be changed over when the coil connections are changed. The use of one aerial winding has been shown by experience to be unsatisfactory. It is not practicable to design any one coil which will give the required degree of coupling on both wavebands. Many ingenious means are adopted to overcome this trouble and the prospective purchaser will find con-



The Varley "Square Peak" coil—an excellent type for band-pass tuning

siderable interest in the analysis of the various methods.

What about your detector? Are you still using an R.C. valve for your detector? Under modern conditions this is not a satisfactory proposition because an R.C. valve cannot handle sufficient grid swing.

(Continued at foot of next page)

PHILIP RIDGEWAY TALKS ABOUT THE NEW "PARADES"

"WHEN do the Ridgeway Parades start again, what will they be like, and how will they differ from last year's productions?"

Philip Ridgeway stood up to my bombardment of questions!

"As a matter of fact," he said, "I've only just come back from a short holiday before starting on the 1932 series of vaudeville shows. There's plenty of work to be done, believe me, before we face the 'mike' on October 7—the opening night.

The Same Style of Show

"I have stage and film stars in large numbers as well as hundreds of others, wanting to be in the Ridgeway parades. One reason is that they want work; a very important reason is they want to be the success of the show, and another is they want to be 'produced' by me.

"I have heard, and I am still hearing hundreds of people at auditions. They not only have to sing in and dance *via* the microphone to me, but also have to utter with great feeling and emotion words of affection, love, comedy, and farce, and then to cry! I often have to make a girl cry before rehearsing her. No, it is not cruel, I am a child-sentimentalist. I dare not see a sad play or film. I cry my eyes out!

"I must have only those artistes who are sufficiently sensitive so that I can work through them to give listeners the atmosphere and personality they are entitled to.

"Laughter and crying go together, and in order to make people laugh one must be able to make them cry. It is laughter that I am really aiming at, and one of the successes of the 'Ridgeway Parade' is that we are all a happy hard-working family. I suppose I may now be called the clown. If I can continue to be a successful clown, I shall be happy."

"Is the style of show to be changed much for the autumn series?" I asked.

"I have been asked by numbers of the public of all classes I have come in contact with not to change my style of show," said Ridgeway. "For my own pleasure and for professional benefit, I will say it is always nice experimenting, but I feel we should be deluding listeners if we did not give a typical cheery 'Ridgeway Parade.'

"I can well understand that people like to know what style of show they are going to hear or see, no matter whether it is a Cochran Show, a Hulbert Show, a Charlot, de Beare, or a Ridgeway Show and so on. They are all different, but all reviews and one must change the songs and sketches to the formula and personality of the producer. These make the show—and different



from the others. It is for the broadcast producer to consider and study the likes of his public, not necessarily his own likes.

"I will not depart from my existing type of show. I have refused a very tempting offer from one of the West End managements to do important work apart from broadcasting this autumn, but I have turned it down in order to give time to radio." K.U.

"FEATURES YOUR SET SHOULD HAVE"

(Continued from preceding page)

If you live within ten or fifteen miles of a Regional station you will get well over a volt on your first grid, and if you use a high-frequency stage, the same remarks will apply even at distances of 60 to 100 miles. In fact, foreign stations will probably cause overloading when they are coming in well.

The Detector Valve

The modern tendency is to use at least an HL and preferably an L valve for the detector. The signal strength is not by any means reduced to the extent one anticipates, and the quality is considerably improved because the valve is capable of handling a larger grid-swing. Your detector circuit should be arranged so that the voltage actually on the anode is at least 50 volts and preferably 100. The higher the voltage on the anode the greater the ability of the valve to withstand overloading, and to a small extent the better the performance. The use of a high voltage on the anode with the grid-condenser rectification system is known as power-grid detection, and this gives very little distortion. You will find a number of chokes specially designed for use in a circuit of this type, and you will find them at various prices.

Valves, of course, have improved tremendously, and you will do well to work

out for yourself the possible difference in amplification which you can obtain even from your existing set without any alteration whatever except the substitution of new valves for the older types. If you do not feel very happy about working this out, go and worry one of the attendants on the valve makers' stand. You will be surprised at the result.

Output Improvements

When we come to the output side of the set there is room for considerable improvement if you are still working without any output arrangements. One system is the choke-capacity output, in which case your requirements will be a 20- or 30-henry choke capable of carrying the anode current, and a 2-microfarad condenser. A constant-inductance choke is preferable in this position because of the very large voltage variations the choke has to handle. The ordinary type of choke varies its inductance under these conditions, and amplifies the two halves of the speech wave differently. Constant-inductance chokes cost little more than the ordinary type and are distinctly worth while.

An alternative is to use an output transformer. In many cases this will cost you less than a choke-output arrangement, and will give you the additional advantage of being able to match your loud-speaker to your output valve, and so obtain the greatest possible undistorted power output. I discussed the relative merits of the two systems a week or two back, the essence of

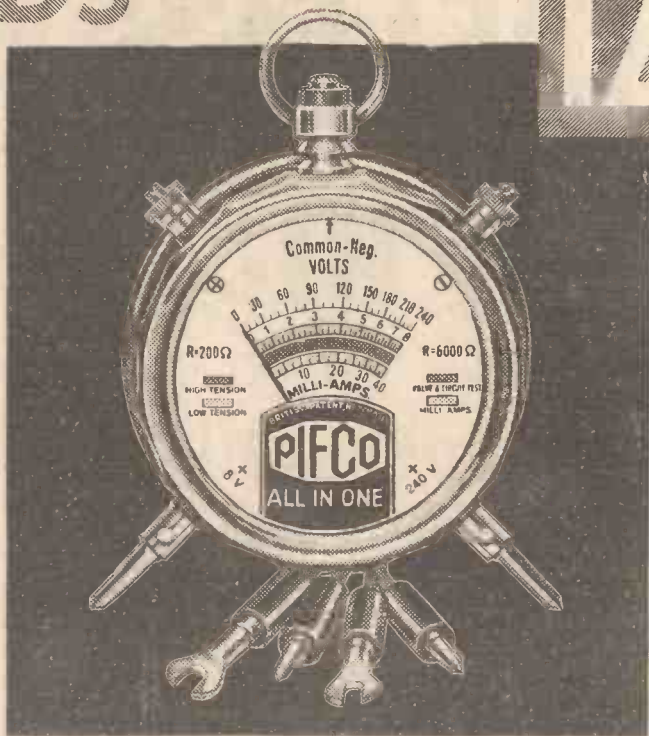
the argument being that a choke output avoided battery feedback, but did not enable matching to be carried out, whereas the transformer enables one to match the valve and the transformer and also gives distinctly better reproduction of transient terms. Thus drums, cymbals, piano music, and percussion instruments generally are better reproduced with a transformer-coupled output.

A point to be borne in mind is that the resistance of the windings must be low, particularly in the case of an output transformer. Other things being equal, the transformer with the lowest resistance windings gives the best performance. A high resistance in the windings causes the voltage on the output to fall off appreciably, giving a definite drop in signal strength when the transformer is inserted. This, of course, is most undesirable, but there are a number of output transformers on the market now which, rather than giving a drop in signal strength, cause a definite increase in the power output obtainable from the set.

These are just a few random ideas on which the reader can work. There are, of course, numerous accessories like gramophone pick-up, tone control, remote control, etc., which cannot be discussed in any detail. Generally speaking, however, look at your set and decide in what respect it requires to be brought up-to-date. You can then visit Olympia with the express intention of seeing what is available in these directions.

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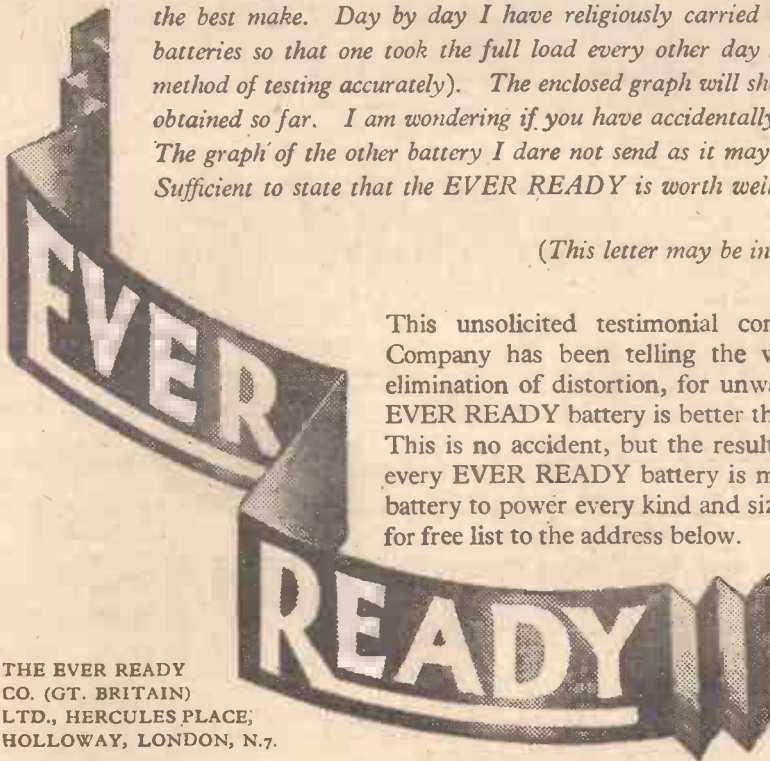
You may be interested in an experiment I am at present making, the details of which I will supply you with from time to time. In March last, I built Mr. James' magnificent set, the 'Super 60,' and I had a doubt as to what batteries to use. I finally decided on a 60-volt EVER READY and a 60-volt '—————' my intention being to test them and then carry on with the best make. Day by day I have religiously carried out the tests, each day changing the batteries so that one took the full load every other day: (this in my opinion being the only method of testing accurately). The enclosed graph will show you the almost unbelievable results obtained so far. I am wondering if you have accidentally stored a mains unit in this battery! The graph of the other battery I dare not send as it may get me into trouble with the makers. Sufficient to state that the EVER READY is worth well over double the price.”

Leonard Foley, Manchester.

(This letter may be inspected at the office of the Company).

This unsolicited testimonial confirms what the EVER READY Company has been telling the wireless public for years—that for elimination of distortion, for unwavering power and for long life, an EVER READY battery is better than any other battery on the market. This is no accident, but the result of the exclusive process by which every EVER READY battery is made. There is an EVER READY battery to power every kind and size of set, portables included. Write for free list to the address below.

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IN MY WIRELESS DEN

Weekly Hints — THEORETICAL
CONSTRUCTIONAL & BY
W. JAMES

Band-passing

BAND-PASS tuning is now being included in various commercial receivers and the better selectivity is very noticeable.

A good band-pass tuner does not greatly reduce the strength in comparison with a single circuit properly adapted to the aerial circuit used. But the improvement in selectivity is very noticeable.

Amateurs sometimes find difficulty in obtaining good results over the whole tuning range. This is usually because the circuits are not properly ganged. To gang circuits is easy enough for those who know how, but is really a rather difficult matter unless an instrument is available.

Thus if you have a milliammeter and it is connected in the plate circuit of the detector valve, the signal strength can be noted. Adjustments can be made to the circuits and the change in the signal strength can be seen by watching the pointer of the meter.

Slight changes do not always produce an audible difference in volume. When a meter is used, however, accurate tuning is possible.

These Cheap Condensers

Cheap condensers cannot always be relied upon to withstand high tensions in excess of about 150.

Those who use dry batteries generally have a voltage not exceeding 120, but when a mains unit is employed the voltage may be well above this figure. The result is that breakdowns often occur.

It is true that the mains unit may be rated at only 150 volts or so, but the pressure may exceed this on occasions, such as when switching on and when adjustments are being made.

A fixed condenser that is breaking down will usually cause noises to be produced at first. After a time the wax will probably run from the condenser and it is possible that the mains unit will be overloaded and start heating.

Condensers having a reasonably high working voltage cost but little more than foreign ones and are well worth having from all points of view. Use the non-inductive type when possible, especially in high-frequency circuits.

They are better than the ordinary rolled type when properly used. Sometimes a noticeable improvement in the tuning is obtained, owing to the greater stability of the circuits.

Shortening the Aerial

I was trying a set a few days ago with the object of noting differences in the results as the aerial was made shorter.

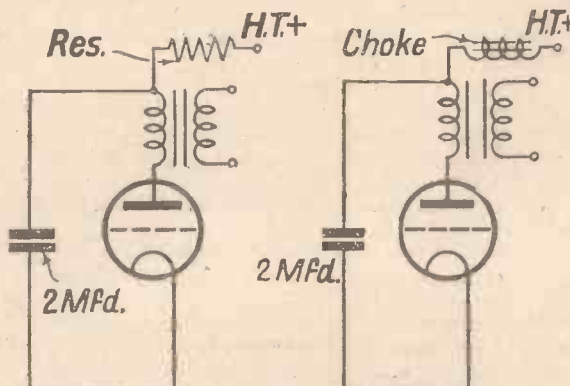
Halving the length of the top part of the aerial made no great difference. The aerial was made shorter and presently the aerial earthing switch was opened. To my surprise the results were best with the short length of wire from the set to the switch.

There was a slight coupling across the contacts of the switch, the aerial being joined to the centre contact and the set to

signals and a reduction in strength is sometimes noticed when a valve having a high magnification factor is fitted after one of moderate impedance.

Care must therefore be taken in using the new valves or you may feel disappointed with the results. They will not deal with strong signals and the maximum voltage must be used.

The so-called power-grid method of detection is not suitable when the valve has too high a magnification factor and no attempt should be made to deal with other than weak signals.



Here are the arrangements described in the paragraph "Curing Motor-boating"

one of the outside contacts. This was shown by the reduction in volume when the aerial was earthed.

I feel that many amateurs use too large an aerial and that some at least of their troubles would vanish were a really short wire used. Alternatively, a very small condenser may be connected in the aerial circuit.

This also helps matters. A capacity of .00005 microfarad is not too small in many instances, but the effect of also reducing the length of the aerial should be tried. This is much cheaper than fitting a special coil or tuner.

New Valves and Old

About this time of the year we generally find there are new valves, or old types improved, whichever way you look at it.

I have been trying as detector valves having steep slopes and high amplification factors. Speaking generally, these are satisfactory when the input is small. They are sensitive and deal very well with weak signals. The maximum high tension should be applied in order to reduce the chance of overloading, which spoils the quality.

These valves are not good for strong

Curing Motor-boating

A point worth remembering when trying to cure motor-boating and the value of the usual resistance cannot very well be increased because of the loss in high-tension involved, is that a choke may be used.

It is connected as shown in the accompanying diagram. A good choke is necessary, having as large a value of inductance as possible at the current being passed. The choke may also be used in series with the resistance, but this will only be necessary when its inductance value is small.

The advantage of a choke coil in the case of a resistance is that the D.C. voltage drop across it is quite small and that therefore the actual anode voltage of the valve is greater because of this.

In some circuits a large de-coupling resistance cannot be used owing to the limited amount of the high-tension available. With a small resistance and a larger condenser than usual, such as 4 microfarads, effective de-coupling may be obtained. But when this arrangement fails the choke method should be adopted.

Illuminating Dials

Many tuning condenser dials have a fitting for a small bulb which will illuminate the scale. This is a feature which adds to the attractiveness of a set and in the case of a mains driven arrangement the lighting of the bulb presents no difficulties.

There are bulbs rated at 4 volts and taking currents of as little as .1 ampere up to .5 ampere. The bulb may be wired across the heater circuit and as the current is relatively little in comparison with that taken by mains valves, the extra load upon the transformer is negligible.

Ordinary flash-lamp bulbs may burn out quickly if used, as they are rated at 3.5 volts as a rule.



EXIT THE SIX-VOLT VALVE

Considerable changes have been made in the characteristics of valves within the past few months, with the result that many one-time popular types are becoming obsolete. This article is a review of the present position by J. Pross

THIS is the time of year when valve manufacturers launch the majority of their new types, and examples which have already been issued show that we are to have still higher efficiencies for next season. For instance, there are 2-volt power valves with conductances of 3.85 and 4 milliamps per volt, general-purpose types reaching 2.0 ma/v, A.C. valves having the extraordinary figure of 7.5 ma/v, an A.C. pentode at 4 ma/v, and by the time these notes appear it is likely that we shall see one or more 4-volt super-power triodes, designed chiefly for A.C. operation, passing the 6-ma/v mark.

These advances serve to emphasise the remarkable change which has occurred in the distribution of valve efficiencies. Ask the average man which range of valves he would choose for performance and he will probably say "six-volt"—an almost instinctive thought created by the fact that from the earliest days, 6-volt valves have been used by the experts.

The Passing of an Old Favourite

But, although two years ago he would have been correct, to-day he is hopelessly wrong—the 6-volt valve is now in most cases behind its 2- and 4-volt rivals, to say nothing of the new A.C. mains types.

The war is not confined to the general purpose or small power types, but is carried right into the very stronghold of the "sixes"; the higher power class, in which they stood alone, is now commanded very overwhelmingly by a host of new "fours," and when we turn to pentodes, the downfall is complete—there are no 6-volt pentodes with characteristics as good as those of their 4-volt equivalents.

An analysis of the position is given here in the form of a simple table. In the first section the valves are grouped in four recognised classes and the figures quoted for the best specimens under each filament heading. As a basis of comparison the mutual conductances and impedances are given.

Since the mutual conductance, or "slope," is simply the ratio of the magnification factor

(M) to the impedance (R), it is a simple matter to calculate M if desired. Its value is given by

$$M = \frac{\text{Conductance} \times \text{Impedance}}{1,000}$$

Power valves (and pentodes) are grouped in a slightly different manner. The basis of comparison here is the available undistorted output, rather than the impedance, for a power valve's job is the conversion of the input voltage swing into power in the loud-speaker winding, whereas in previous stages we are aiming at a voltage magnification from one grid to the next. The mutual conductance, however, remains a useful criterion of efficiency as between valve and valve in the same class.

The main features which emerge from these figures are:—

(a) In the screen-grid, general-purpose, and small power classes the indirectly heated valves are far ahead of the battery types in efficiency, being followed by the 2-volt class (a long way behind), the 4-volt class (not much behind the 2-volt), and the "sixes" last.

(b) In the larger power types, the 4-volt class is well ahead of the 6-volt, the others being nowhere.

The reasons for the higher efficiency of the I.H.C. types are fairly well known, but why should the hitherto humble twos shine so brightly, and whence come the super fours?

The Changes in Brief

The main clues to the change are three in number.

1. The popularity of 2-volt valves in this country, and of the 4-volt types on the Continent, has concentrated the work of development on these classes.

2. The popularity of A.C. valves is increasing, and since for these 4 volts has been standardised, there is a concentration on corresponding power valves.

3. The resulting filament techniques favour the lower voltages as against the 6-volt and 7.5-volt types.

The last is really the outcome of the other two, being the natural result of the experts' following of popular opinion. In order to obtain higher characteristics in the 2-volt series, the filament has steadily been lengthened, until in the majority of cases it takes the form of an "N" or "M". This is necessary in order to obtain the maximum amount of surface area. Obviously a long, fat filament is going to run cooler than a short, thin one with the same energy consumption, so this change is only made possible by the new processes of coating which provide a copious emission at comparatively low temperatures. In certain valves, where rigidity is important (i.e., valves for use as detectors), a long V filament is used as this is rather easier to support and tension to any required degree.

Now, these filaments are already so long for 2 volts that their use for 4 and 6 volts presents serious mechanical difficulties. Consequently other techniques are necessary, and until the demand for these higher voltages—in the battery types, of course—justifies the work, it looks as if the main trend of improvement will still be in the popular 2 volt series.

The 4-volt class is better off than the 6-volt because of its popularity on the Continent, and it therefore competes with our 2-volt range very closely in the smaller types. It is doubtful, however, if it will ever oust the "twos."

When we come to mains valves and high-power valves, a moment's inspection confirms the feeble state of health of our old 6-volt friends and the exceeding robustness of their 4-volt rivals. It is all due to the arrival of the I.H.C. class with its 4-volt heater, for although we were willing at first to put an extra winding on the power trans-

former in order to get 6 volts for the existing output valves, it is obvious that manufacturers would not do this indefinitely. So again work has been devoted to 4-volt super-power development, and as these are specially for the mains, they can be designed with more liberal H.T. and L.T. consumption, thus making possible higher M/R values than ever.

Type	2-volt	4-volt	A.C. and D.C.	6-volt
Screen-grid	1.75—200,000	1.0—250,000	3.75—200,000	1.0—200,000
High Impedance (over 25,000)	1.2—41,600	1.4—25,000	—	.8—60,000
Medium Impedance (over 12,000)	2.0—14,000	1.4—18,000	5.0—17,000	1.3—20,000
Low Impedance (over 6,000)	2.0—7,500	3.0—8,000	2.5—8,000	2.0—7,500
Small Power (under 200 m.watt)	4.0—150	3.0—170	—	3.0—170
Power (under 500 m.watt)	3.7—350	3.5—330	4.2—350	3.5—330
Power (up to 1,500 m.watt, 250 volts max. H.T.)	—	5.5—1,000	7.5—1,250	2.7—1,100
Power (up to 5,000 m.watt and 500 volts H.T.)	—	6.0—5,000	—	2.6—5,000
Pentodes (under 500 m.watt and 200 volts)	2.0—400	2.0—400	—	2.0—400
Pentodes (under 1,500 m.watt)	2.5—1,100	2.0—1,500	—	1.8—1,500
Pentodes (over 1,500 m.watt)	—	3.0—4,000	4.0—1,900	—
	—	4.0—8,000	—	—

Note: A.C. and D.C. class includes only indirectly heated types.



OUR BROADCAST CRITIC

TALKS ABOUT—RADIO PLAYS

DEPRESSION Over *Fairyland*! It was timed for 8.50, but Mr. Snowden came to the microphone that evening and the play was broadcast earlier. Even so, surely 8 o'clock is a little late for children of four and five years of age? I say, B.B.C., you must not keep the babies up to that hour. I am surprised at you.

But wasn't it a scream? I think that play was the funniest thing I ever heard broadcast.

I roared at the funny man who said "Don't poke me in the ribs," but I nearly passed away when the other funny man said, "Don't poke me in the ribs." He said it quite differently from the first funny man.

Then he said—I roared again at this—"Ribs? I don't believe you've got any ribs." I think he called him a great, fat thing, but I was so overcome that I scarcely heard what he did call him.

I simply loved the bit where the first funny man said something about giving the second funny man a nice pair of fairy wings like a red admiral.

And then the second funny man pretended to cry, and said he didn't want any fairy wings, because he couldn't get his clothes over them. Oh, dear! I thought I should never get over it.

I feel it my duty as a critic to beg the B.B.C. to give us a lot more of these funny fairy plays; they are just the thing for our intellect!

I nearly went upstairs and woke my little boy. He is ten. I decided not to in the end; I think he would have found it a little too juvenile.

Talking of plays, I was genuinely held by Laurence Housman's *Consider Your Verdict*. Congratulations, sir! You evidently understand microphonic writing.

I am sorry they did not play it better for you, but your characterisation and strong lines overcame their defects.

I think Mr. Snowden used his opportunities as he should have used them. He made me awfully sorry about the Budget, and I felt I wanted to pay the deficit out of my own pocket.

It was a splendid speech. There was something English about the sentiment of it that must have found response in many homes.

Thelma Tuson's voice appealed to me very much, but I can only give her fifty out of a hundred for her words; every other one missed. Will she please do something about it for her next broadcast?

The Haydn Wood programme was also quite attractive as music. I hate ballads, really; but I do honour H.W. for his gift of melody. I think an occasional broadcast of his works should be very acceptable.

Another singer who is not very high in my diction class is Gladys Ancrum. I like her voice, and I think she took some trouble over her words. All the same, they did not come through.

One of the purest voices I have heard lately is that of Astra Desmond, to whose singing I have always listened with pleasure. She also scored quite well in the matter of her words; about 80 per cent came through.

Still, if broadcast song is to give the pleasure it is intended to give, the standard must be higher than that. I should like the B.B.C. to make experiments; I could devise a good many that would subject each singer to a searching test.

How did you get on with the Twenty-five Minutes of the Vaudeville Instruments? Vibraphones, Wobblyphones, Infernophones, all did their deadliest. I stood up to twenty-five seconds of each of them, and considered I did well.

Syncopated piano solos, I find, have a very bad effect on me; I cannot imagine anything more boring. Still, I suppose *someone* was pleased.

Talking about piano playing—I mean of the right type now—something ought to be done about the position of the piano at Queen's-Hall. It is too near the microphone.

Not for one moment, though, do I suggest that this fact is responsible for all the bad tone we have had through from the Proms. this season. There has been some very noisy playing.

As a devoted student of Pachmann's method of playing, nothing sends the blood to my head quicker than the thumper. I am going to have a "broadcast hospital" in these columns for pianists infected with *crashbangococcus*.

While I think of it, I want more of Cyril Smith as a pianist. He seems to possess a technique withal, and certainly has ideas of what piano tone should be. He does not emulate the child who, when asked what the sign *fff* meant, said, "Fump, fump, fump." For all of which I, personally, am duly thankful.

A word on such dance bands as I have been able to hear. I think I will not mention names this week, as I do not wish to appear discourteous to any individual singer.

On the other hand, I wish to register a vow to be very rude if *all* our dance refrains continue to be sung with these adenoidal voices.

Why, also, must they all have a touch of American twang in their announcements—and in their text, too? Why cannot we have standard English in these things?

In my notes in the September 5 issue, I commented upon Miss Megan Thomas's voice and spoke of her interpretation of Tchaikovsky. In a sense, I must confess that I owe Miss Thomas an apology, not for anything I said about her singing, but because I was criticising her in my capacity of a broadcast critic, whereas on the actual occasion I was comfortably seated at the "Prom." itself. In committing my impressions to the written word two days later I entirely overlooked that I had heard Miss Thomas in person, and by a curious trick of the memory supposed that I had listened to her over the broadcast. By the strangest of coincidences, Miss Thomas's song was not broadcast on that occasion. And why? It had been cut off to give time for Mr. Ramsay Macdonald's speech on the National Crisis. What apologies I owe, I tender freely.

WHITAKER-WILSON.



Miss Ella Retford in cartoon



CHEAP in initial outlay, extremely easy to build, economical in running and capable of fine results; that is how one must sum up the "Olympian Three," the "A.W." special production to coincide with the National Radio Exhibition at Olympia.

That it is cheap in initial outlay can be seen from the list of components given and from the photographs which show the general arrangement of the parts.

This week it will be explained how the "A.W." Technical Staff justifies its claim of extreme simplicity in construction for the "Olympian Three." As "construction" in this set simply implies screwing the various parts down to the baseboard and connecting a few wires, this job is certainly well within the capabilities of every handy man who can use a screwdriver and a pair of pliers.

No Panel Required

There is no real panel, and this again simplifies the construction. In most sets there is an ebonite or heavy plywood panel which has to be drilled and in the case of ebonite this often presents difficulties to a novice, who finds that the material splits if too much pressure is applied to the bit.

A plywood panel is a much easier thing to work with, but the difficulty is that it is not always easy to get a good finish on the woodwork, at least comparable with that of a shiny ebonite panel. Here both troubles have been overcome.

The actual wooden front of the special cabinet used supports the on-off switch, reaction condenser, and volume control. The spindles of the wave-change rod of the

the escutcheon plate of the main tuning condenser.

On the blueprint and scale plan there is a small plywood panel indicated which is for the purpose only of supporting these parts while the set is wired up. It is then removed and used as a drilling template, if necessary, for the wooden front of the cabinet to which the various components are clamped direct. Any piece of scrap plywood will therefore do for this front "panel" while the set is being wired.

If you have not yet bought all the parts for this set then see the detailed component list in which the first-mentioned parts are those used in the set shown by the photographs and the alternatives are parts chosen of approximately the same electrical value and having as near as possible the same drilling and mounting centres.

The full-size blueprint, which can be obtained price 1s., post free, from the Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London,

Our new Exhibition receiver has cr readers and old. Here is more i
Three," and many han

two coils and of the three-ganged condenser are carried through the wooden front which also supports

E.C.4, will be found of great assistance to intending constructors.

The small-scale reproduction can be used provided you do not mind the slight additional trouble of measuring off the parts from this by means of a scale, but, of course, it is much easier to work with the full-size print.

With the print for the "Olympian Three" you have only to place this on the baseboard and prick through the holes for the mounting screws. At a later stage the print is also a help in showing exactly where

COMPONENTS

Three-ply wood panel, 11 in. by 7 in., and seven-ply baseboard, 16 in. by 10 in. (Camco, Peto-Scott, Readi-Rad).

.0005-mfd. triple gang variable condenser with slow-motion dial (J.B., Utility, Lotus, Polar).

.0003-mfd. reaction condenser (Lotus, Telsen, Readi-Rad, Polar).

50,000-ohm potentiometer (Sovereign, Watmel, Lissen, Colvern, Wearite).

Three valve holders (Wearite, Telsen, Lotus, Goltone, Lissen, W.B., Formo, Graham-Farish, Benjamin, Clix).

Dual range Square Peak aerial coil, and dual range H.F. inter-valve coil (Warley).

Special .04-mfd. fixed condenser (Dublie.).

S.G. valve screen (Peto-Scott).
Binocular high-frequency choke (Telsen, Watmel).

Three .0002-mfd. fixed condensers (Lissen, Telsen, T.C.C., Goltone, Dublier, Formo, Graham-Farish).

Grid leak holder (Readi-Rad, Wearite, Bulgin, Goltone, Lissen, Dublier).

2-meg. grid leak (Dublier, Telsen, Lissen, Sovereign).

Filament switch (Busco, Bulgin, Telsen, Graham-Farish, Goltone, Readi-Rad).

High-frequency choke (Readi-Rad, Telsen, Goltone, Lissen, Bulgin, Lewcos, Wearite, R.I., Graham-Farish, Sovereign, Burton, Varley).

Low-frequency transformer ratio 7 to 1 (Telsen "Radiogrand," Lissen, Gra-



This plan view shows all the components accompanying li

WIRING

ce

AN THREE

created immense interest among new constructors about the "Olympian" body constructional tips

the wires are placed, and how they are connected from point to point. Experienced constructors may be able to wire directly from the circuit diagram, but beginners will most certainly prefer to use the blueprint, where they will find each lead in its proper position and not merely indicated in theoretical form.

There is nothing like carrying out the construction in a systematic fashion. Having purchased all the parts, lay them out on the blueprint in order to gain a general idea of the layout of the set. The

three-gang condenser you will see is in the centre and stands on supports which lift the main control spindle approximately three and a quarter inches from the top of the baseboard.

To the right, looking at the set from the back, are the band-pass and H.F. coils, the screen-grid valve, and its associated components.

To the left are the detector and power valves, together with all the related components, such as low-frequency transformer, H.F. choke, condenser bank, and small by-pass condensers. At the back of the baseboard also is the pick-up jack.

In the centre is the three-gang condenser control, while on the right are the reaction condenser and on-off switch. The aerial and earth are connected to a terminal block at the back of the baseboard, the batteries are connected by twisted flex groups, and the loud-speaker is connected to a terminal block at the right-hand side of the set looking from the front. So much, then, for the general arrangement.

There should be no difficulty in following this from the photographs and from the blueprint. Now the parts can actually be mounted in their correct positions. Every part can be put in place with the exception of the three-gang condenser and the pick-up jack.

Assembling the Components

Take care in the mounting of the band-pass coil, which is supported on a right-angle bracket screwed at the front of the board. The aerial band-pass coil gangs up with the H.F. coil and by adjustment of the switch rod you will find that the two coil switches move in conjunction.

The reason for not mounting the three-gang condenser at this stage is that some of the wiring passes underneath it and it is better to complete this before mounting the central condenser on its supports. The pick-up jack is also best mounted at a later stage when part of the wiring has been done because the grid leak, one of the fixed condensers, and the detector valve holder come very close to it.

Wiring should be carried out on the point to point system, for in a set of this type, where the components are widely spaced, it is difficult to make a neat job of square-corner wiring. Also there are a number of flex leads and flexible spaghetti resistances.

The three-gang condenser is mounted on right-angle brackets which have several holes, allowing a number of heights for the centre spindle. The photographs show how the condenser is adjusted for height. This is quite a simple job and can be carried out with a pair of pliers.

COMPONENTS—Cont.

ham-Farish, R.I., Burton, Ferranti, Varley, British General).

Condenser bank comprising two 2-mfd. and two 1-mfd. fixed condensers (Formo).

Two 10,000, two 20,000, and one 30,000-ohm spaghetti resistances (Lewcos, Telsen, Bulgin, Lissen, Read-Rad, Goltone, Graham-Farish, Tunewell, Sovereign).

Fuse and holder (Bulgin, Telsen, Read-Rad)

Gramophone jack (Lotus JK5).

Seven wander plugs marked: H.T.—, H.T.+1, H.T.+2, H.T.+3, C.B.—, C.B.—1, C.B.—2 (Clix, Belling-Lee, Ealex).

Two spade terminals, marked: L.T.—, L.T.— (Clix, Belling-Lee, Ealex).

Four terminals, marked: A, E, L.S.—, L.S.— (Belling-Lee type R, Ealex, Bulgin, Burton).

S.G. Anode connector (Belling-Lee, Clix).

Two terminal blocks (Sovereign, Junit).

9-volt S.G. bias cell (Siemens).

Four yards thin flex (Lewcoflex).

Connecting wire (Bulgin Quickwire).

Cabinet (Camco "Windsor" model).

L.S. unit (Hegra, Blue Spot, Telsen, Undy).

Conc. and chuck (Weedon).

Accumulator (Exide JZ3, C.A.V., Drydex, Pertrix, Ever-Ready).

H.T. battery (Pertrix, Ever-Ready, Fuller, Palaba, Lissen).

G.B. battery (Pertrix, Ever-Ready, Fuller, Palaba, Lissen).



Components required as shown in the list of components

"BUILDING THE OLYMPIAN THREE" (Continued from preceding page)

Part of the wiring goes underneath the condenser, and the three connections to the vanes are made to terminals accessible from the outside of the rectangular screens.

In some earlier models of the condenser, variable-height feet were not fitted, and in this event small blocks of wood may be placed underneath the feet to bring the condenser up to the required height and to clear the wiring.

Flexible spaghetti resistances are used in certain parts of the circuit and these facilitate the wiring. Be careful not to damage the ends of the resistances when connecting up.

It is not worth going to the trouble of making square-corner connections in a set of this kind and the point to point system is much easier and quicker.

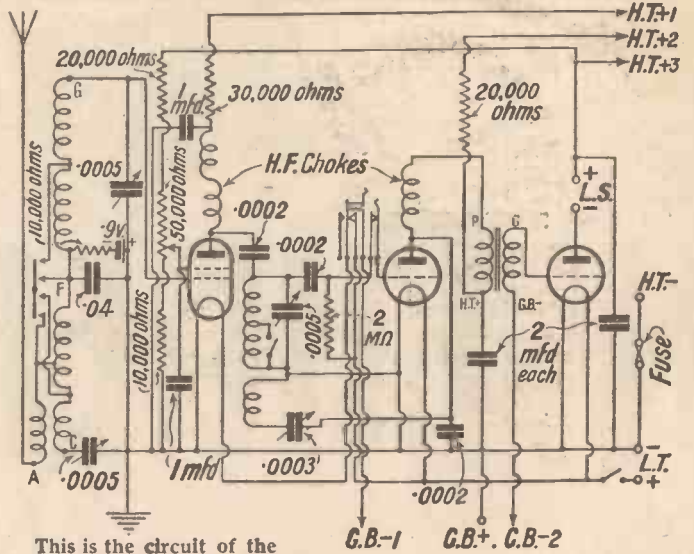
Be very careful to get the connections correctly to the pick-up jack. The terminals of this should be carefully compared with the connections shown on the blueprint.

When you have done all the wiring then

the temporary plywood panel may be removed. Very carefully undo the fixing nuts of the on-off switch, reaction condenser and volume control, and leave these parts hanging on their wires.

Unless the cabinet is already drilled, the plywood panel should be used as a template and the necessary holes cut. The hole for the scale of the main tuning condenser necessitates a certain amount of care.

The special Carrington cabinet shown by the photographs and which houses the



This is the circuit of the "Olympian Three"

speaker in the top portion is a Cameo registered design, No. 764138.

Put the baseboard of the set with the parts mounted and wired into the lower portion of the cabinet and slide it forward, engaging the spindles of the wave-change switch and the ganged tuning condenser in the holes in the cabinet front, and putting the volume control, on-off switch, and reaction condenser in their proper positions.

Next week the operation of the "Olympian Three" will be dealt with in detail and valves and batteries will be recommended.

See the set on our Stand 71 at Olympia, and in the Radio Department windows of Selfridge & Co., Ltd., of Oxford Street.

TIGHTENING THEM UP

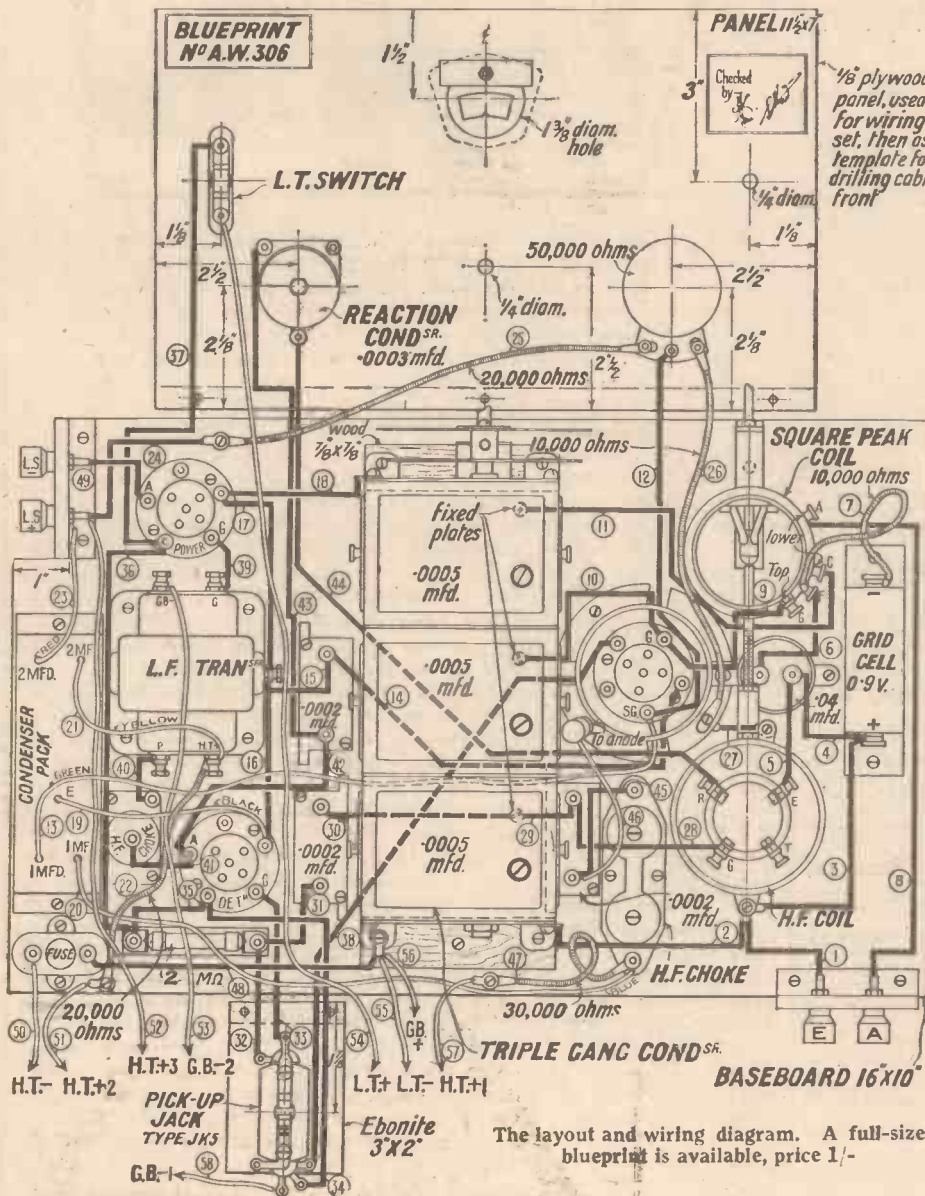
UP till recently the Federal Radio Commission prohibited any U.S. broadcasting station to deviate more than 500 cycles per second from its advertised frequency. Now, no U.S. Station must deviate more than 50 cycles per second under pain of losing its licence.

American broadcasting stations are, however, finding some consolation in the fact that this somewhat drastic measure will not be enforced for a year! And in the meantime, interference goes on.

HALLÉ CONCERT BROADCASTS

ALTHOUGH the Hallé concerts from Queen's Hall will not be broadcast by the B.B.C. and although Sir Hamilton Harty will not conduct any of the B.B.C.'s Symphony Concerts a truce has evidently been made, for the B.B.C. has now arranged to broadcast ten of the Hallé concerts from the Free Trade Hall, at Manchester. Eight concerts will be broadcast from the North Regional and at least one Nationally.

We have news that Lance Sieveking has adapted Gulliver's Travels as a radio play, which will be heard some time in November. The microphone version is to be called Voyage to Lilliput and the music is by Robert Chignell.



The layout and wiring diagram. A full-size blueprint is available, price 1/-



Tested & passed

G.P. Kendall
CHIEF ENGINEER
READY RADIO

THE
OLYMPIAN
THREE

Mr. G. P. Kendall, B.Sc., has now joined the staff of Ready Radio as Chief Engineer. He was, for many years, Assistant Technical Editor and Chief of Research at "Popular Wireless" and "Modern Wireless."

Meet him at Stand No. 6, National Radio Exhibition, Olympia.

If you do not need the complete Kit you can buy any of the parts you require separately. See page 537 for prices of Kits, etc.

	£	s.	d.
1 Plywood Panel, 11½ in. by 7 in., drilled to specification	2	5	0
1 Polished Walnut Cabinet, to specification	1	9	6
1 J.B. .0005-mfd. R.3 Triple-gang Condenser, with S.M. dial	3	6	6
1 ReadRad .0003-mfd. Brookmans Reaction Condenser	4	6	6
1 Sovereign 50,000-ohm Potentiometer	1	6	6
34-pin Valve Holders	15	0	0
1 Varley Dual-range Square-peak Coil	8	6	6
1 Varley Dual-range H.F. Intervalve Coil	2	0	0
1 Dubilier .04-mfd. Fixed Condenser (non-inductive)	2	9	0
1 S.G. Valve Screen	5	0	0
1 Telsen Binocular H.F. Choke	4	6	6
3 T.C.C. .0002-mfd. Fixed Condensers	1	4	4
1 ReadRad 2-megohm Grid Leak and Holder	1	10	0
1 ReadRad Filament Switch	4	6	6
1 ReadRad H.F. Choke	10	6	6
1 R.L. Transformer, ratio 7-1, type G.P.	9	6	6
1 Formo Condenser Bank (2 1 mfd. and 2 2 mfd.)	2	0	0
2 Lewcos 10,000-ohm Spaghetti Resistances	3	0	0
2 Lewcos 20,000-ohm Spaghetti Resistances	1	6	6
1 Lewcos 30,000-ohm Spaghetti Resistance	1	3	0
1 ReadRad Fuse and Holder	3	0	0
1 Lotus J.K.5 Double Filament Jack	2	0	0
1 Lotus J.P.1 Plug	1	2	2
7 Belling-Lee Wander Plugs	2	3	3
2 L.T. Spade Terminals	1	0	0
4 Belling-Lee Indicating Terminals, type "R"	1	0	0
1 Clx Anode Connector	1	0	0
2 Sovereign Terminal Blocks	1	0	0
1 Siemens S.G. Cell	2	6	6
1 Packet Jifflix for wiring	1	19	0
3 Mullard Valves to specification, S.G., det., and power	8	8	8
Flex, Fixing Screws, etc.			
TOTAL (including Valves and Cabinet)	£10	8	9

RECOMMENDED ACCESSORIES

	£	s.	d.
1 Fuller 120-volt Super Capacity H.T. Battery	15	3	3
1 Fuller 9-volt G.B. Battery	1	0	0
1 Fuller 2-volt 30-amp. L.T. Accumulator	10	3	3
1 Blue Spot L/S Unit, 66K	1	5	0

IMMEDIATE DESPATCH ORDER FORM

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

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Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention



A weekly review of new components and tests of apparatus conducted by J. H. Reyner, B.Sc., A.M.I.E.E.

Telsen Aerial Coil

WE are reporting this week on the new Telsen dual-range aerial coil and H.F. transformer. These two coils are practically identical as far as the windings are concerned, the difference being that the aerial coil has a small solid-dielectric variable condenser mounted at the top of the former. This condenser, which is normally connected in series with the aerial, serves as a variable selectivity control and also as a quite useful volume control.

The ribbed former on which the coils are wound is of brown bakelite and is moulded



The new Telsen aerial coil

in one piece with the base, the whole job being well made and of neat appearance. The long-wave aerial and reaction coils are wound in slots at the top of the former, while the short-wave section is wound as a solenoid at the bottom. Reaction windings are provided on both coils.

An interesting feature is the arrangement for avoiding the break-through of short-wave signals on the long-wave band. If this trouble is experienced the makers recommend the connection of a .0003 condenser across the long-wave aerial coil, when the trouble will be greatly reduced, if not entirely eliminated.

For tuning purposes .0005 condensers are necessary when the wave-range is approximately 230 to 550 metres and 1,000 to 2,100 metres. Wave-change switches are not incorporated, as it is felt that the user will prefer to supply these himself. According to the method of using the coils, the switches required will be either a 2- or 3-point short-circuiting switch.

On test the coils were found to be well up to standard, and unusually well matched when used with a gang condenser, a trimmer

being found to be unnecessary. Reaction control was quite smooth and nice to handle. The tests were conducted within five miles of Brookmans Park and the variable selectivity control was found to be most useful. At a price of 7s. 6d. for the aerial coil, and 5s. 6d. for the transformer coil, these coils are good value.

Mullard PM202 Valve

THE name of Mullard requires no introduction to the reader, and when this firm places a new valve on the market, it is always with considerable interest we receive one for test.

The new PM202, a three-electrode output valve which we have tested this week, follows the usual Mullard practice, and has the electrodes arranged horizontally inside the fairly heavily silvered glass bulb. The valve is quite small, the overall height being 4 in., and has been developed for use in the output stage of small amplifiers, being capable of giving several hundred milliwatts for all normal purposes, while its H.T. consumption is moderate. This valve has a low impedance, and it is very necessary to ensure that sufficient grid-bias is used if the life of the valve is to be prolonged, and economy of high-tension supply to be affected.

On test the valve was found to be excellent, the amplification factor being 6.6, mutual conductance 2.7, and the internal impedance of the valve 2,430 ohms, these figures being taken at 100 volts high tension and zero grid volts. Measurements of the actual power output obtainable and the optimum load to use with this valve were made from the characteristics and gave a maximum undistorted power of approximately 300 milliwatts when using a load of 3,300 ohms. Full instructions are enclosed with the valve as to the correct value of grid bias to use, and these should be carefully noted before putting the valve into service.

Lotus Coil Holders

FOR those requiring a plug-in coil holder for mounting in a receiver, that manufactured by Lotus is worth considering. This holder is for a single coil only, and is arranged for baseboard mounting. The plug and socket are nickel plated, while the body of the holder is of moulded bakelite. Dielectric losses have been minimised by putting a minimum of insulation around the plug and socket, leaving an air-space between them for the greater part of their length.

Connections to the holder are made by means of screws fitted with terminals and

passing right through the bakelite insulation and the metal of the socket. The holder was found to be quite satisfactory in use, the coils fitting in smoothly and firmly.

T.C.C. Electrolytic Condenser

AN interesting component which we have tested this week is the T.C.C. 10-microfarad electrolytic condenser. This is in the form of a copper cylinder, 1½ in. in diameter and 3¼ in. high. As readers will probably know, these condensers consist essentially of an aluminium electrode immersed in a suitable electrolyte. Before such a condenser can be used it has to undergo a process known as forming. During this process a very thin film is formed over the aluminium electrode, and this acts as the insulation.

When the forming is complete, we have the aluminium electrode coated with a very very thin layer of insulation, and surrounded by a conducting liquid in contact with the external casing.

Electrolytic condensers must not be used on a voltage greater than the original forming voltage, otherwise the film on the aluminium electrode breaks down, and before the condenser can be used again it has to be re-formed. Also, the condensers cannot be used on A.C. and even on D.C. they must be connected the right way round.

In the present instance the positive lead must be connected to the terminal at the



A T.C.C. electrolytic condenser

top of the can, the other connection being made to the container.

On test the condenser was quite satisfactory, the capacity being just over 10 microfarads. It stood up to the working voltage quite satisfactorily, actually withstanding 450 volts before breakdown occurred, while the leakage current was less than 2 milli-amperes at 400 volts.



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See also pages 535 and 539

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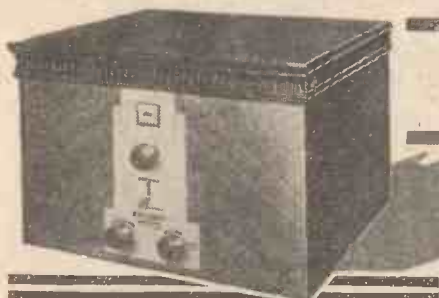
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SETS OF DISTINCTION



SIX-SIXTY CHASSIKIT

Makers: Six-Sixty Radio Co., Ltd.
Price: £6 17s. 6d.

AMONG the kit sets of the new season the Six-Sixty Chassikit is bound to attract a considerable amount of attention, because it departs a good deal from the standard layout. Moreover, the mode of assembly has been tackled in an original way. The Chassikit consists essentially of three sections, a tuning condenser, a coil assembly and a valve unit carrying the remaining components, such as valve holders, resistances and condensers. Each section is factory assembled and wired.

The constructor's work is simple. All he has to do is to connect the three sections together by means of plugs inserted in appropriate sockets. The whole assembly is then contained within an all-metal chassis. This method of construction eliminates the possibility of failure and enables the constituent sections to be factory tested.

Although the constructor is naturally limited by this scheme of assembly, the final interpretation of the set as a piece of furniture is very much in the hands of the constructor. A wide range of extremely attractive cabinets has been designed and produced for the Chassikit. These cabinets represent a wider diversity of ideas than any other range I have yet examined. They vary from the standard table cabinet container to the most ornate cubist designs.

Easy Construction

Although I was supplied with a completely assembled Chassikit, a brief examination shows very clearly that the constructional work is extremely simple. The veriest novice should be able to follow the simple instructions for connecting together the three parts.

As might be expected, the three-valve circuit of the Chassikit comprises a screen-grid high-frequency amplifying valve, a leaky-grid detector and a transformer-coupled pentode output valve. Around this popular circuit the designers have added most of the refinements demanded by modern conditions.

For example, preceding the high-frequency valve is a band-pass tuning system of the latest type. This provides pre-selection of signals before amplification and so to a large extent combats the present congested state of the ether. The coupling between the high-frequency and detector valves is well tried, consisting of a choke in the anode circuit of the high-frequency valve, capacity coupled to a tuned-grid circuit connected to the detector valve.

In the circuit diagram two volume controls are shown. One is a filament

rheostat in the screen-grid circuit, providing pre-detector control of sensitivity. The other volume control is a potentiometer across the pick-up terminals, the slider connection going to one of the pick-up switch terminals. In the set itself there is only one volume-control knob, but this has a dual action, being rotated clock-wise as a radio volume control and anti-clockwise as a pick-up volume control.

The layout of the Chassikit is impressive because it is so simply arranged. The top part of the metal chassis carries the three-gang condenser unit and below this is the valve platform, underneath which is the coil assembly. From the back of the valve platform comes a neat battery connecting cord.

The three valves used in the Chassikit are Six-Sixty SS215SG for the high-frequency stage, Six-Sixty SS210-HL for the detector, and Six-Sixty SS230Pen for the output. The high-frequency and detector valves are both metalised. Many constructors will be interested to know that an A.C. mains version of the Chassikit is also available, price £7 6s. 6d.

My first act before testing the Chassikit on my standard aerial was an examination of the controls. Altogether, there are four on the front escutcheon plate.

The main control is, of course, the knob for tuning, which rotates the three sections of the gang condenser and also an illuminated dial.

In the lower left-hand corner of the escutcheon is the reaction control knob, and to the right of this is the Six-Sixty Multi-stat, which is not only a dual volume control, but also switches the set off. The remaining control is a handy lever for medium and long waves fitted just under the tuning knob.

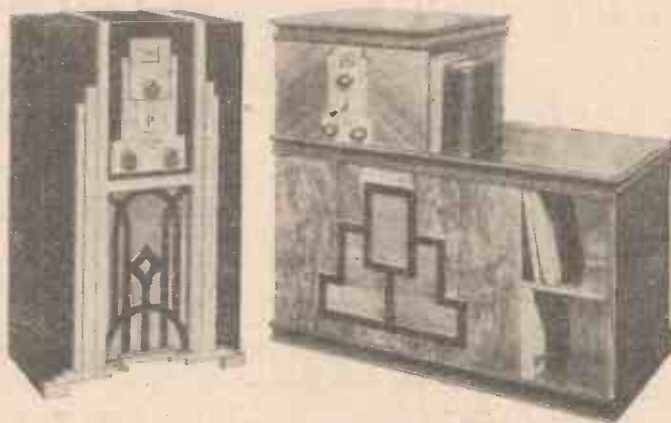
In testing this kit I had first to adjust the trimmers on the gang condenser. This was an easy task and I was very soon bringing in foreign stations by the simple rotation of the single tuning control. I must say the selectivity is extremely good.

The London National station, for example, was tuned in at 36 degrees, but was entirely cut out at 32 and 40 degrees. This spread of only 8 degrees is a good indication of the way the Chassikit elimi-

nates local interference. The London Regional was even more easily disposed of. Maximum at 62 degrees, all trace of it had gone at 59 and 66 degrees, a spread of only 7 degrees.

Good Selectivity

The high degree of selectivity holds good over the whole tuning range. I must admit I was surprised to find that Mühlacker, at 64 degrees, was actually louder than the interference from the London Regional only 2 degrees below it. Another good illustration of the selectivity was provided by the clear reception of Söttens, the high-power Swiss station, which, on many three-valvers, suffers interference from Midland Regional just below it on wavelength. Langenburg was brought in loud



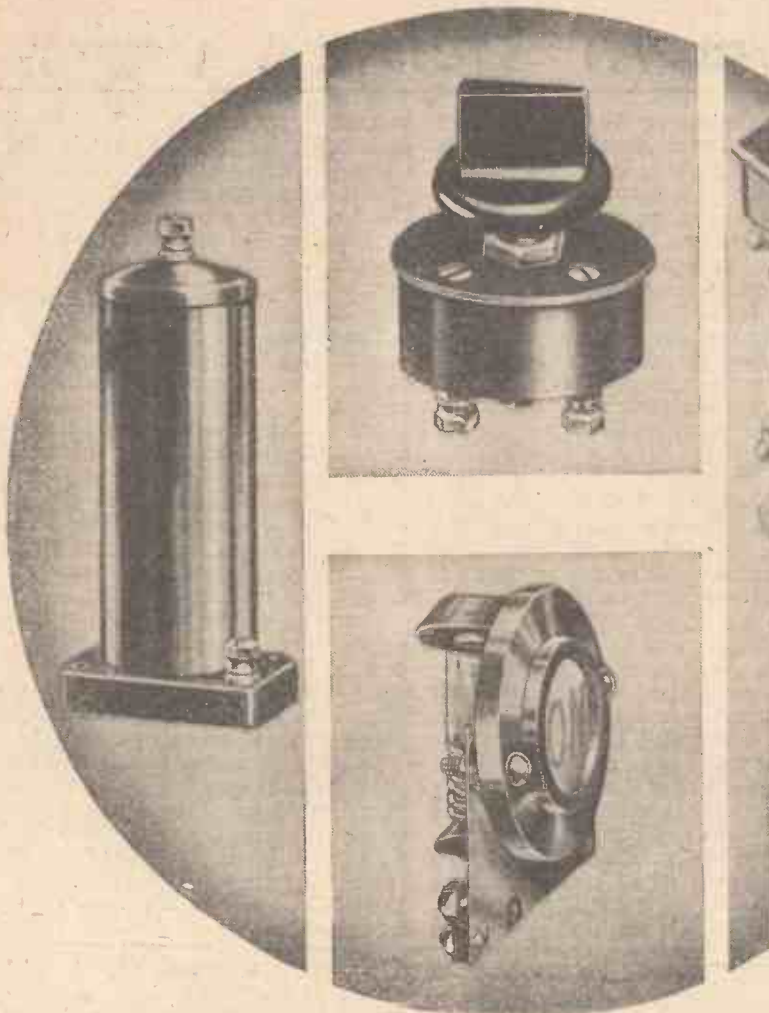
The Six-Sixty Chassikit in two of the many outstanding cabinets available

and clear, without the slightest trace of North Regional.

These examples are but a few from my log. Of course, conditions vary tremendously with location, but it is clear that the Chassikit will readily cope with the most trying selectivity problems. That this highly desirable degree of selectivity is not obtained at the expense of volume on distant stations was clearly proved by the fact that I got no less than twenty stations within an hour. This is a tribute to the efficiency of the valves and the careful design of the tuning system.

The makers say the anode current consumption is between 7 and 8 milliamperes with a maximum of 120 volts and 15 volts negative bias on the pentode. The total consumption of the set tested was 10 milliamperes.

I can say that control generally is simple. An interesting kit, likely to be very popular. SET TESTER.



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6
OLYMPIA

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NEW RECEIVER IDEAS AT OLYMPIA (Continued from page 517)

trols on this set are very advanced in design. There is a rotary wave-change switch, which also automatically disconnects the mains. The dual-volume and reaction control also works a gramophone volume control when the pick-up is switched in. This is a refinement that is all the more welcome because it is so seldom provided. The local-distance switch overcomes the difficulty of controlling the volume of overpowering loud local stations.

Constructors should not overlook Stand 16, where A.C. Cossor, Ltd., are showing the Cossor Empire Melody Maker model 234. This is a good constructor's kit, price £6 15s. The layout is simple but efficient. I like particularly the coil-switching arrangement, whereby the wave-change switch knob is brought out to the side of the cabinet. This set includes the latest Cossor metallised screen-grid and detector valves.

Kolster Brandes, Ltd., long known for their moderate priced radio, are well worth a visit at Stand 25. I am attracted by the Kolster Brandes Kobra set at £9 17s. 6d. This is a self-contained three-valve set with a three-valve circuit comprising a detector and two low-frequency amplifying stages. Included in the simple but pleasing cabinet is an adjustable cone loud-speaker. The price just mentioned includes the valves and batteries. This is one of the few new sets specially designed for battery users.

Among the sets of Tannoy Products on

Stand 63 is the Tannoy Midget super-het set. The price of this for mains operation is twenty-eight guineas and I am glad to see that there is a corresponding model for battery operation, the price being twenty-five guineas. Tannoy Products seem to have concentrated on the super-het circuit, for on this stand are junior and senior super-het radio-gramophones.

One of the new kit sets can be seen on Stand 20, where the Six-Sixty Chassis kit, reviewed elsewhere in this issue, can be seen with its remarkable range of cabinet designs.

Console Sets

Ferranti, Ltd., on Stand 45, have such faith in their existing Console sets that no new models are being shown. The three-valve A.C. model 31 at twenty guineas will appeal to all who put quality of reproduction above all things. The moving-coil console model, housed in a rexine metal container, is worth considering at twenty-eight guineas. Although these sets look the same as last year several small refinements have been added, including a device for using the mains as an aerial.

Owing to the luck of the ballot, or rather lack of luck, the Gramophone Co. could not get enough space in Olympia to show the H.M.V. radio sets. Consequently, the H.M.V. Modern Hall of Music has been arranged opposite the Exhibition buildings. Here are many radio sets that cannot fail

to interest the set-buyer. I would like to draw particular attention to the model 501, which is a three-valve table radio-gramophone. The price is twenty-nine guineas, which ensures a wide public interest. This loud-speaker, of the moving-coil type, amplifier and gramophone pick-up are well matched. In every way this is an outstanding instrument.

The twenty-two guinea model 435 is the first H.M.V. "straight" radio set. This is an A.C. three-valver with a really beautiful cabinet and a control escutcheon mounted below the loud-speaker. On this are three control knobs with the exceptionally smooth actions. A double band-pass tuning system is incorporated to cope with modern conditions. I understand the output is almost two watts, which means that more than enough volume to fill a large room can be obtained without distortion.

Everyone will be interested in the automatic record-changing mechanism incorporated in the forty-five guinea H.M.V. radio-gramophone and in the more elaborate nine-valve super-heterodyne radio-gramophone selling at seventy guineas.

In this brief survey of sets to be seen on the stands at Olympia I realise I have mentioned only a few of the hundreds of models on view. I hope I have whetted the appetites of all set-buyer readers to such an extent that they will make a tour of the Exhibition and see the wonderful array for themselves.

Striking Examples of

OTHER ALL-MAINS SETS.

- Three Valve S.G. Band Pass Table Model
Price Including Roy. 19 gns.
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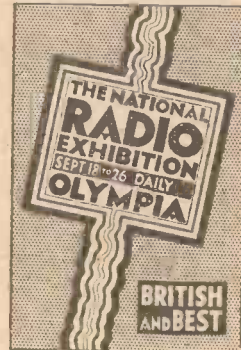
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Fil. volts	- - -	2 v.
Fil. Current	- -	0.2 amps
Max. Anode volts	- -	150 v.
Max. Screen volts	- -	150 v.
Mutual Conductance		2.5 m.a./v.
Grid Bias	-	-3 to -4.5 v.

PRICE 20/-

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V.132

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OUR LISTENING POST

By JAY COOTE

A RECENTLY published report to the effect that a 20-kilowatt station has been erected at Skoplje (Uskub) in the south-east of Jugoslavia has led some listeners to believe that through this channel (2,300 metres) it will be possible to hear the Belgrade and Ljubljana wireless programmes. I am afraid that listeners may be doomed to disappointment, as I am informed that the station is not a broadcaster in the true sense of the word, but may be used for commercial purposes only.

As a matter of fact, notwithstanding a recent increase in the cost of licences, the Jugoslavian broadcasting system is having a bad time from the financial point of view. If this condition is to improve, it can only be achieved by increasing the number of licensed listeners, and so long as the stations in that country remain on medium power they are not attracting people to radio.

Possibly within the next few days you may hear a whisper from Marseilles on 315 metres, as, pending the construction of the new 25-kilowatt transmitter, the French P.T.T. has volunteered to install a small broadcasting plant of some 200 watts in order to transmit local programmes during the Annual Trade Fair.

On one or two nights last week between 11 p.m. and midnight I picked up some tests carried out by the Dutch station at Kootwijk with a view to one of its multiple transmitters taking over the broadcast service of commercial news and reports at present put out by Scheveningen Haven on 1,071 metres. For the purpose of these experiments, well-known gramophone records are used, so if your ears

are assailed by Maurice Chevalier in, "You Brought a New Kind of Lo-o-ve to Me," don't blame Oslo without closer investigation.

Something apart from revolution appears to be taking place in Spain, as I have logged two new calls. Radio Catalana seems to have made way for Radio Valencia on the same wavelength namely, 268.5 metres. Try for it towards midnight, or even 12.30 a.m. The station usually closes down towards that time with the conventional Spanish formula of "Buenas noches, Señores; hasta mañana." So far, the programme has been a mixed one of both fresh and canned music.

A Newcomer

The other Spanish newcomer which has puzzled me is what I take to be Radio España (Madrid). I have personally heard announcements in that language on about 404 metres, or almost on top of Söttens, and more clearly when the Swiss station had closed down. The speech, however, was still too distorted to make sure that the call was that of España. Recently the transmitter had been reported on 424 metres, namely, approximately Madrid's wavelength, but I doubt whether the capital would run two transmitters in this manner.

You would do well to stand by on October 28 for the official opening of the new Trieste station. From what I gather, this transmitter is to be launched as befits any celebrations in which "el Duce" is keenly interested. Famous artistes from Italy's equally famous opera houses have been specially engaged for the occasion and the musical programme promises to be an exceptional one. The inaugura-

tion of the station is made to coincide with the anniversary of Italy's entry into the Great War, and doubtless will offer the opportunity for stirring patriotic speeches so deeply loved by the Latin race.

I find from experience that in Söttens and Beromuenster the Swiss listener does not necessarily always get an alternative programme. On two recent dates when I tuned in these transmissions I discovered that both were relaying a concert from Basle. Generally speaking, however, of the two, Beromuenster is the better signal, as broadcasts relayed from Lausanne and Geneva to Söttens invariably suffer from a noisy accompaniment liberally supplied by Midland Regional, and also now and again, to a lesser degree, by Katowice. If the Spanish station I have mentioned also remains in that vicinity its presence will not improve matters.

The power of the Radio Maroc (Rabat, North Africa) station will shortly be increased to 6 kilowatts.

Although Söttens (Switzerland) has been on the air for several months, the Swiss broadcasting authorities officially state that the station is still on test and reports from foreign listeners regarding reception of its programmes will be cordially welcomed. Letters may be addressed to Société Romande de Radiodiffusion at Lausanne, or to La Société des Emissions Radio-Genève at Geneva.

The official inauguration of the Trieste station will take place on October 28 when a special programme with famous Italian singers and instrumentalists will be relayed to Milan, Turin, Genoa, Rome, and Naples.

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Stand No. 182

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Don't Forget to Say That You Saw it in "A.W."

BEING "AUDITIONED"

An amusing account by WHITAKER-WILSON of a typical B.B.C. artiste audition

THAT is the term in loose usage at Savoy Hill. Being *audited* would seem more correct.

Being auditioned is a gruesome business at the best. If you are anxious to try it you must apply for a form; if the B.B.C. thinks you are all you say you are, and that your referees are to be believed, you may be invited to a *séance*, and in due course you will present yourself at the north entrance at Savoy Hill.

Everything will be done to make you feel at home and to prevent you wishing you had stayed there. You can do all that later, when it is over and you are actually on the return journey.

Sound-Sopping!

The usual procedure is to usher you into a charmingly decorated studio in which everything is covered with some sound-sopping material.

Any scientific knowledge of the properties of sound under certain conditions (if you possess it, that is) had better be discarded as useless. The silence—you can feel it, smell it, and taste it.

The official in charge—a lady very often—is perfectly charming. She will ask you if you have brought a confederate to assist

you to do your deed, or whether you would like the B.B.C. tame accompanist. If you are a singer, you stand before the microphone. The lady official has by this time disappeared; she is outside somewhere to be with the auditor, who sits in a little box with earphones on, and you are left alone with the microphone and the accompanist. You want to cough, but daren't, and as you cannot find anything better to do, you nod at the pianist and await events.

As the first chords of the prelude to your song assail your ears, you wonder why they put eiderdowns in pianos. This nearly makes you late on your cue, but you hastily snatch a gulp of the atmosphere and squeak at (or else into) the thing in front of you.

Your voice sounds like nothing in this world or the next, and you come to the conclusion that you were never intended to sing. You *have* no voice. That much is quite clear to you. Having "done your stuff," you wipe the perspiration from your noble brow. The heat in the studio is never less than ninety in the shade; in the winter, when the radiators are on full blast, it is usually a trifle higher.

You now wait for a bell to ask for more. If the auditor emulates *Oliver Twist*, you conclude that either he likes your singing or

else that he considers you on the border line and is giving you another chance.

All you can do now is to thank your accompanist, thank the microphone, thank the lady official, thank the boy who conducts you to the lift, thank the lift man who takes you down to the street level, thank the commissionaire who opens the door for you, and then thank Heaven for your release.

You now go out into the Strand and think things over. After that—well, the rest of the day is yours; you can do what you like with it.

Northern listeners know that short plays by F. A. Carter have become a feature of the Northern dramatic programmes. On September 25 a comedy in two scenes, entitled *More Ways Nor One*, will be staged. It will be performed at Leeds by the Yorkshire Comedy Players.

A Nave service will be relayed from the Cathedral, Bristol, on September 27, when the sermon will be given by the Dean of Bristol.

Edgar Wallace is to give a series of talks entitled "Stories for Broadcasting," the first of which will be heard on October 10.



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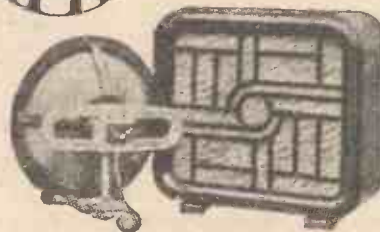
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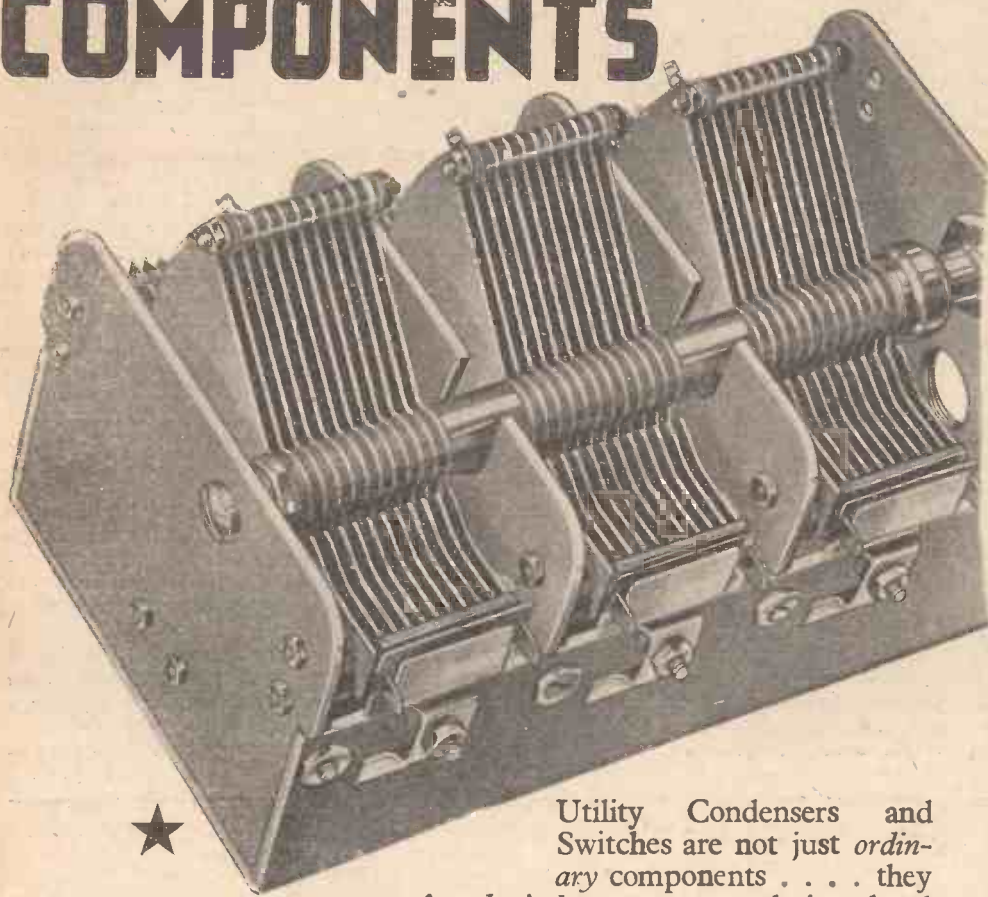
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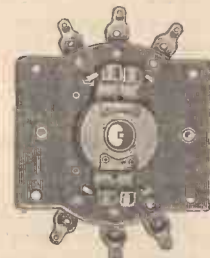
Utility Condensers and Switches are not just ordinary components . . . they are perfected wireless components, designed and assembled by craftsmen. The correct application of modern theory and careful attention to detail of construction plus a series of definite improvements in design, have placed Utility components the first in their class.

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MICRO DIALS

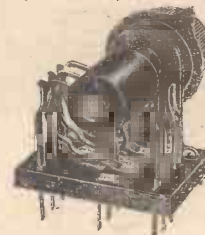
These dials are imperative for "knife edge" tuning particularly short wave and superhet work. True micro control is given without backlash and with a 100-1 ratio. Two models are available, as illustrated with a fixed aluminium dial surveyed by a hair line and cursor, or with a revolving bakelite dial. Price 7/6 each.



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Panel mounting or baseboard type. Two-pole change over 2/- each. Three-pole change over 3/6 each. Extra Switch units (Two-pole change over) for ganging 1/6 each.

These switches have been specially designed for ganging if required and ganging rods are available at 6 in. 6d., 12 in. 1/-, 18 in. 1/6.



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LECLANCHÉ CELLS FOR LOW-TENSION SUPPLY

THOSE listeners residing in remote districts have a problem to solve as to which is the best form of L.T. supply. It is very unlikely that they have electric mains available. In the case of a large L.T. accumulator, this would need re-charging but rarely: on the other hand, on account of its weight, it would be very tiring to carry, perhaps several miles, to the nearest charging station. The case for the small L.T. accumulator is the reverse, so whether the battery be large or small it is a nuisance to get it re-charged.

It may be interesting for country readers to know the advantages the Leclanché cell offers. There are a number of Leclanché cells on the market by battery makers of repute, suitable for our purpose. The writer has obtained every satisfaction from the cells made by Siemens; these are not really standard type Leclanché cells as they employ an active form of "salt", as the excitative instead of the usual sal-ammoniac. During a recently completed series of tests upon three different makes of Leclanché cells, one being the Siemens mentioned above, the cells were discharged through a 10-ohm resistance, and when the voltage of the cells was 1.5 volts (that is their nominal voltage) they delivered 150 m/A of current, and they were discharged continuously, without any break at all, until the voltage fell to .75 volt per cell, by which time the current had fallen to 75 m/A. In actual use, the cells would

not be subject to such a continuous discharge, but more likely be used about four hours a day, giving the cells 20 hours in which to recuperate, by which time they would have attained their nominal voltage once more.

The continuous discharge test is a good one to apply since it shows quite distinctly what may be expected. From the result of the tests, a conservative figure to state for the life of a pair of cells under such a load as applied is 1,200 hours, the capacity then works out under continuous load at approximately 100 amperes. This figure, of course, would be much more when the cells are discharged intermittently, as they would be when supplying filament current to a radio set.

In plain language, you may expect fully twelve months life from a pair of cells when supplying filament current to a one-valve receiver, and *pro rata* for a greater number of valves. It would, though, be advisable to restrict the number of valves to three.

When the cells are in need of re-charging a zinc will cost about 1s. 6d. and a sac 5s., also 3d. worth of sal-ammoniac is required.

Roughly, therefore, you can obtain filament current for a three-valve set, using modern valves, from a pair of these cells for little more than ½d. per day, which is very reasonable.

R. E. B.

WATER-PROOFING LOUD-SPEAKER CONES

ONE of the finest waterproofing media for loud-speaker cones is common linseed oil, and if properly applied will render paper or linen so immune from moisture that one could literally throw a bucket of water over the whole speaker without any harm resulting.

The oil can be applied in the ordinary manner with a brush, but sufficient time should be allowed for it to soak right through the paper, which then assumes a translucent appearance. In a dry and fairly warm atmosphere some twenty-four hours must elapse before the oil coating has completely dried out, which should take place in a room free from dust, as otherwise the tacky surface will become speckled.

A more refined type of linseed oil commonly known as "blown oil," is somewhat better and dries a little more quickly. It is, unfortunately, not always easily obtainable.

All amateurs are familiar with "Empire cloth," or varnished linen as it is sometimes called. This material is prepared by treating the cloth in the first place with the linseed oil plus a few dryers, much after the fashion described above. Thus it is no wonder that paper treated with linseed oil in this manner is totally resistant to the action of water. Varnished sleeving, used for wiring, is also prepared from cotton sleeving impregnated with linseed oil.

J. V.

Demonstrating During Radio Exhibition at—
67 HAMMERSMITH ROAD (facing Olympia)

176 POLE SPEAKER !!!

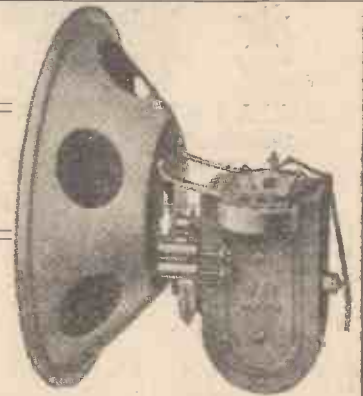
The Cifel Multipole speaker, made under American licence on the Inductor principle—is not a 4 pole—8 pole—60 pole or 100 pole, but a 176 pole unit. However, never mind about the poles: the essential thing about this new Loudspeaker is its purity of tone, its true response—treble or bass—and combined with its wonderful qualities as a loudspeaker is the high standard of workmanship. It is definitely superior to the majority of loudspeakers on the market, and equal to the best. Take advantage of our offer and judge for yourself in your own home—make certain that the Cifel Multipole Loudspeaker is superior to the one you have at present.

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The above illustration gives some idea of the excellent workmanship and clean finish of the Cifel Multipole Inductor Speaker.

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Osram "FOUR"

NEW MUSIC MAGNET

Stations without limit . . . Amazing power and purity of tone . . . Reliable GECOPHONE components and OSRAM VALVES . . . Attractive design with handsome polished walnut cabinet . . . Ease of assembly . . . Simplicity of control . . . Low selling price of £10 15 0. These, as you will see by the Constructor's Instruction Chart, are a few of the special features of the OSRAM "FOUR"—the set that has introduced an entirely new and improved conception of home-assembled circuits.

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The OSRAM "FOUR" can be built for A.C. All-mains operation by means of the new GECOPHONE A.C. All-Power Unit and Conversion parts. This Unit can also be used to convert last season's "Osram Music Magnet 4."

WRITE for OSRAM "FOUR" Constructor's Instruction Chart which will be sent you **POST FREE**. **FILL IN THE COUPON BELOW**. This chart gives simple and clear instructions how to assemble and wire the various parts, is crammed with useful hints and tips, and contains a rapid guide for getting, on the OSRAM "FOUR," practically all Home and Continental stations. Send for a copy **TO-DAY**.

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To Ensure Speedy Delivery, Mention "A.W." to Advertisers.

THIS BABEL OF TONGUES!

By E. S. HODGSON

NOW that listeners have sets which will bring in most of the European stations, the only problem, unless they are experienced hands at logging, is to identify the stations as they roll in at every degree or so of the dials.

"Is that Johnny French?" you have often asked in despair, or "I'm sure this fellow is Stockholm!" (when he is Rome or Beromuenster) you insist; or "That may be Hilversum, or perhaps it's Turin."

Distinguishing French from German, and Italian from Swedish is a comparatively easy matter when you train your ear to catch the vowel sounds, the gutturals, or the strange mixture that sounds like *isdvitchoukokovsky*.

The Long Waves

Start first with the long waves, and log Radio Paris, which is two (or sometimes three, if Moscow is working) stations up from Daventry 5XX. Listen for five or ten minutes to the voice, note how the words seem to flow into each other so that they sound like one long one; and, listen for the nasal "on," "an," "ain." Then you have a fair idea of what French sounds like. When you have checked up from the programme that it is really Paris that is broadcasting, go over to the medium waves, tune in London Regional, and go down two or three stations until you hear announcements in two languages (one by a woman, the other by a man). You are now on to Strasbourg. Compare the woman announcer's speech, intonation, etc.,

with that of Radio Paris. Then listen intently to the German of the male announcer; hear the Scotch guttural "achs," and the broad North Country vowel sounds "ah," "ay," etc. When you have done this, tune in to Königswusterhausen (which you can easily find, as it is the next station to 5XX), listen awhile to speech there, and compare your impressions with those of Strasbourg. After a little practice and tentative logs of other German stations, you will get accustomed to the accent and intonation of each announcer.

Italian can be recognised because of its beautiful vowel sounds and the trilling of the "r's." Try to get Rome, then go down the scale until you think you have logged Turin and, still lower down, Trieste (which has a woman announcer with a beautifully clear voice). The best time to do this experimenting is later on in the evening, when the news bulletins are being given from these stations.

The Polish and Czech stations can be recognised because of the preponderance of the sibilants and the awkward conglomerations of sh-zh, ov, ish, and all sorts of consonants followed by "v." Just twiddle the knobs on the long waves in the early evening (about dusk), and a few degrees below 5XX you will find Warsaw, which the "Century Super" brings in clearly long before dark. Listen to a melody, besides speech, then turn to the medium waves, and a few stations above London Regional you'll find Lvov, which usually relays the Warsaw programme.

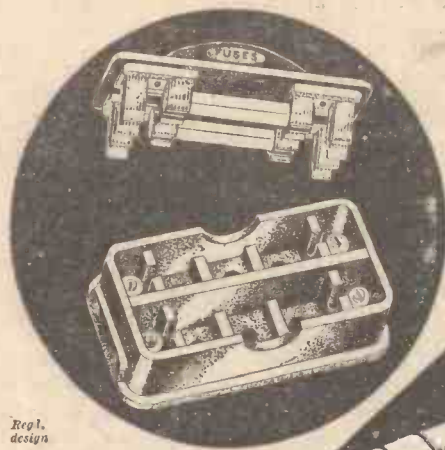
The Swedish stations can be recognised by the characteristic sing-song tones of their announcers and, once you have logged Rome, you know that Stockholm is next door lower down. Having listened to the Stockholm announcer (during the late news bulletin, prior to closing down), change down to Hörby, which you will find just below London National, compare with Stockholm, then switch over to Motala on the long waves. Compared to Swedish, Danish (and to a certain extent, Norwegian also) is a language in which certain words sound clipped off, or "gulped."

Identifying Spanish!

Spanish can be distinguished from Italian by the strongly trilled double "r" and the "ach"-like sound of the consonant "j," and the way the words seem merged into each other in one breath, rather like French. Start with Barcelona, about 11 o'clock at night, and when you have identified it Madrid should not be difficult to log at a later hour.

With these few hints it should be possible once you have logged some of the more important stations, to fill in the gaps. It is well to note that Beromuenster station uses German, and Söttens French.

As regards Budapest, he should not be difficult to pick up, because he is usually logged almost at the end of the medium waves (about 175° on a 180° dial on the "Century Super"). Bucharest (Romania) you can fill in when you have logged Frankfurt and Midland Regional.



Repl. design

TWIN BASEBOARD FUSEHOLDER, with two 1-amp. fuses for mains leads (illustrated above) ... 3/6
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STAND No. 13, NATIONAL RADIO EXHIBITION

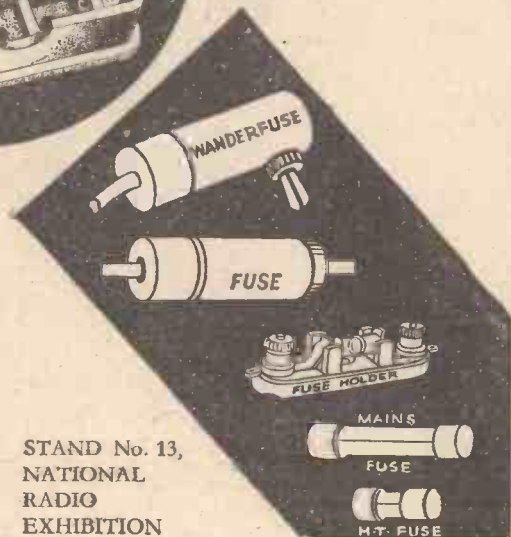
A COMPLETE RANGE OF FUSES for EVERY REQUIREMENT

TECHNICAL REASONS

A fuse in a mains lead is a totally different proposition from a fuse in a H.T. or G.B. lead. In the mains lead it is unsound to use a lower rating than 1 amp, because the mere switching on and off of current creates a surge which might easily blow a fuse of lower rating. Further, in a mains lead fuses should always be more than 1 in. long, to make arcing impossible. In H.T. and G.B. leads and rectifier circuits, on the other hand, it is unnecessary for fuses to go beyond 1/2 amp, even with multi-valve sets. Nor need they be any longer than 3/8 in., even with a powerful H.T. supply. H.T. fuses should be kept as short as possible, for the fine high-resistance wire is liable to act as a coupling between the circuits and to set up "motor-boating" if too long.

That is why Belling-Lee now make their fuses in two lengths: H.T. ratings, 60 m/a., 150 m/a., and 1/2 amp, 3/8 in. long; mains ratings, 1, 2, and 3 amp, 1 1/4 in. long.

Spare fuses of all ratings are sold at 6d. each



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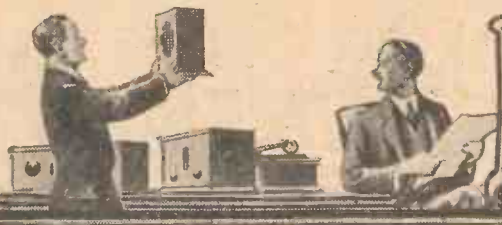
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READERS IDEAS



AND QUESTIONS

Shielding in Receivers

SIR,—I have been trying to build up a receiver which combines a number of features taken from several different published designs. I did not keep rigidly to any one particular design because none of them incorporated all of the features I wanted in my receiver. The task of actual building has been finished some weeks, but the results are far from satisfactory. Possibly I have made some silly error but as my chief complaint is instability and I have attended to all of the usual points, such as screening, de-coupling, and spacing of components, and still fail to overcome the trouble, perhaps you can suggest a remedy. "Worried" (Bath).

You appear to have overlooked a very important point and that is, metal screens are only of use for reducing electro-static coupling and do not stop electro-magnetic coupling to any extent. Therefore, when designing a receiver, it is essential to guard against electro-magnetic or inductive coupling.

All coils, whether H.F. tuning coils or H.F. chokes or H.F. or L.F. transformers, should be arranged so that the plane of their windings is at right angles to those nearest them and on no account should any H.F. coils be arranged

within 4 in. of each other, nor should an H.F. coil be arranged within 6 in. of an L.F. coil, i.e., L.F. choke or L.F. transformer. If it is impossible to arrange your set of components upon such "ideal" lines of layout, you will need to experiment with damping in your different circuits to overcome any instability you may experience.—Ed.

Ancient Receivers

SIR,—I have just read "Thermion's" note concerning "ancient" radio sets. I thought you might like to hear of a set I bought in 1925, a 3-valve A. J. Stevens. The farthest station I ever received was Vienna, at decent 'phone strength—in the middle of winter. I could rely on three stations for the loud-speaker until recently, viz.: 6LV, 2ZY and 5XX. I still use the set with the original H.P. and detector valves (Marconi D.E.R., I think they are). I am also using the original L.T. accumulators. The panel has *forty-eight* holes in it; the following items fill them: three valve holders, three resistances which have always been shorted (what they're for beats me), two switches—filament and loud-speaker—a gadget for cutting out one valve, a switch labelled "Short," "Broad-

cast," and "Long Waves," a voltmeter, variocoupler, two condenser dials, terminals, screws, and a plug-in coil holder. Phew!

Tuning to short waves has never yielded anything but a continuous howl all over the dials. I have given up trying to make a theoretical diagram as there are about ten coils, about six fixed condensers, two variable, and a choke, to say nothing of about a thousand soldered wires!

A. McW. (Liverpool).

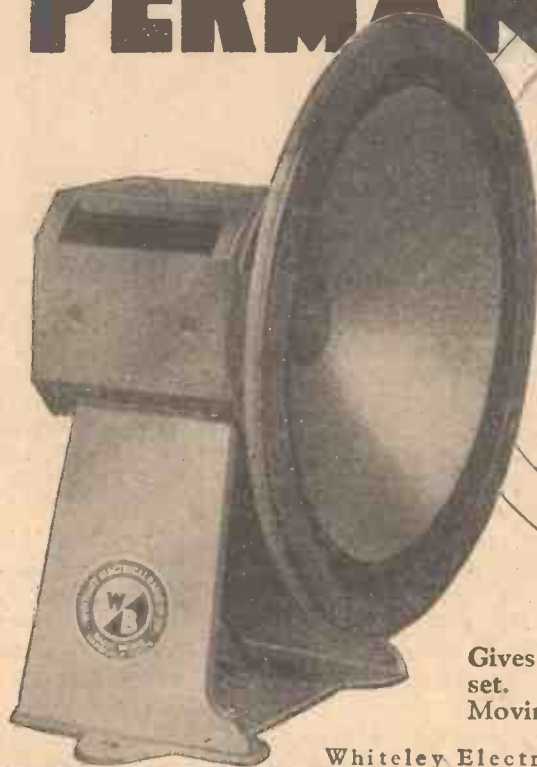
A 1918 Set and Still Going

SIR,—"Thermion" recently mentioned that he would be interested to hear from somebody who was using a set made before 1924. Well, I am. The set that I use for listening to North Regional and North National stations (I live only twenty miles away from them) is a short-wave tuner made by A.T.M. & Co. in 1918. The fact that I receive North Regional and North National on a short-wave set is that the tuning coil on this set goes up to seventy-six turns, and this coil is tapped every four

(Continued on page 552)

PERMANENT MAGNET

MOVING COIL



Gives true moving coil reproduction from any 2 or 3-valve set. Made by the PIONEERS in PERMANENT MAGNET Moving Coil Speakers—Write for "Speaking of Speakers"—FREE.

Whiteley Electrical Radio Co. Ltd., Nottingham Road, Mansfield, Notts.

Columbia

for 1932



Columbia has advanced ahead of the times . . . the new season's models include radio and radio-graphophones of super efficiency in performance and at amazingly low prices.

The best in technical skill and workmanship has gone to their making. Every purse and every requirement are met by radio sets from £5, and radio-graphophones as low as 32 Guineas.

In design and price Columbia has advanced ahead of the times . . .

NEW 4-VALVE RECEIVER WITH MOVING COIL SPEAKER



THE NATIONAL
RADIO EXHIBITION
OLYMPIA
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STAND 7
Demonstration Room
D.2.



A NEW RADIO-GRAPHOPHONE ADVANCED in DESIGN AND PERFORMANCE

Model 352

A long distance high power set of ultra modern design and appearance. One knob tunes three ganged condensers; no reaction. Volume control also acts as the "off" switch. Coil excited speaker. Provision for connection to a gramophone pick-up, and to an additional speaker. Mains aerial attachment. In Walnut Cabinet. For A.C. Mains.

23 Gns.

Model 602

A highly efficient Radio-Graphophone, embodying the latest 3 valve circuit with two screened-grid valves. Double band pass tuning for great selectivity. Single tuning control, illuminated and marked in wave-lengths. Mains aerial equipment. Coil excited speaker. Standard Columbia Graphophone equipment with electric motor. Dark oak cabinet. For A.C. mains.

32 Gns.

Also 4-valve Radio-Graphophone 40 Gns.
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You Will Help Yourself and Help Us by Mentioning "A.W." to Advertisers

"READERS' IDEAS AND QUESTIONS"

(Continued from page 550)

turns, so that by using sixty of the turns North Regional can be brought in, and Northern-National can be brought in a few turns lower. This set, I may add, can either be used with a carborundum crystal or perikon detector. E. W. (Manchester).

More Praise for the "Century Super"

SIR,—I am sorry I'm a bit late with my results obtained via the "Century Super," but I thought I'd wait till you've got through the shoals of letters that must have reached you concerning this remarkable set.

I have been closely following your circuits with S.G. valves since the days of the "Talisman" portable (a most remarkable set!), but, as you can guess, the "Century Super" has improved on anything I've actually dreamed of in the way of an ideal set.

The selectivity is already the talk of the day, so I needn't talk about that.

But the sensitivity is such that DX work becomes monotonous! The weakest of foreign stations "on the old set" can now be boosted up, without distortion, to any desired strength.

Who knows of a set better than the "Century Super"?

S. H. P. (London, S.E.).

Australia on the Portable "Century Super"

SIR,—I thought I would write you to express my great satisfaction with my

portable "Century Super." I have tried all the various models of this set (except the all-main A.C. model radiogram; I am on D.C. current), but I really think this design is the best, as it uses a minimum of H.T.appings, which enables the various voltages needed to be so easily manipulated. Of course, the long- and medium-wave stations are pretty easy to get, but I wish to write you about the short-wave capabilities of this set. The coil I am using is the Igranic nine turn. This coil is tapped on the sixth turn and there seems no need to alter it for the various

wavelengths. On a recent Sunday morning I received Sydney VK2ME from 5.30 a.m. to 7.30 a.m. at full loud-speaker strength on an Epoch moving-coil. This station was simple to receive as I always receive PCJ on Saturday afternoons, the wavelengths, of course, being the same. I may add that U.S.A. stations are easy to obtain on almost any evening commencing about 9.30 p.m., but for a real thrill I recommend any "Super Century" owner to try to receive Australia. E. G. W. (London, E.).

The "Century Super"

SIR,—Having been a reader of your journal since 1923, and having constructed several sets, including "The Forty-five Shilling Two" and "Britain's 1930 Three," I feel I must write of the best set I have ever had—the "Century Super"—which, from the moment I pulled out the switch, was an instantaneous success. I hasten to congratulate Mr. James on such a fine achievement. Stations roll in all over the dial and the quality is excellent (my loud-speaker being the AMATEUR WIRELESS improved linen diaphragm driven by a 66R Blue-Spot unit); all my friends marvel at the volume also. All my components are as recommended by you, the coil kit a Lewcōs and the frame aerial also. I think Lewcōs are to be congratulated on the excellence of their products, including the combined valve and coil base, which cuts out 80 per cent. of the wiring. Wishing your valuable journal all the success it deserves and once more thanking you for such an excellent receiver. C. M. (Retford).

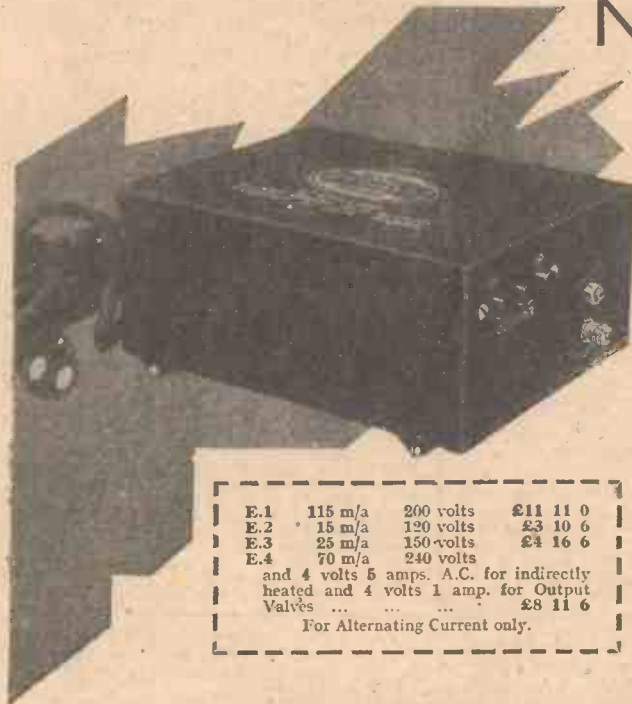
DO YOU KNOW—

THAT for your wavetrap coil sixty turns of No. 20 d.c.c. on a 3-in. former are suitable? Take tappings at every five or ten turns.

— that there is a whole field for experiment in underground aerials, particularly for long-distance working? As a start, enthusiasts may care to try two earth connections coupled up to the aerial and earth terminals of the set through pre-set condensers.

— that it is often very unwise to add a stage of low-frequency amplification to a set which was not designed for it? Two and three-valvers can often give more volume if a power stage is added, but one must be prepared for high anode-current consumption, and a large power valve must be used. With three-valvers a push-pull stage is generally advisable to prevent overloading.

NEW FERRANTI H.T. SUPPLY UNITS



Simplify the H.T. problem and ensure an adequate and constant supply of smooth and silent power for all types of sets, from the small 2-valver taking 15 m/a at 120 volts, to the big 4-stage Push-pull Receiver taking anything up to 120 m/a at 240 volts.

NOW IS THE TIME to overhaul your Radio.

Dispense with batteries that deteriorate and impair results, or accumulators that need frequent attention and ultimate replacement.

LET a FERRANTI UNIT provide from the mains adequate power at a trifling cost; power that never runs down and never shirks its job of driving your set without trouble or fuss. Built by engineers to last—not for weeks or months, but for years.

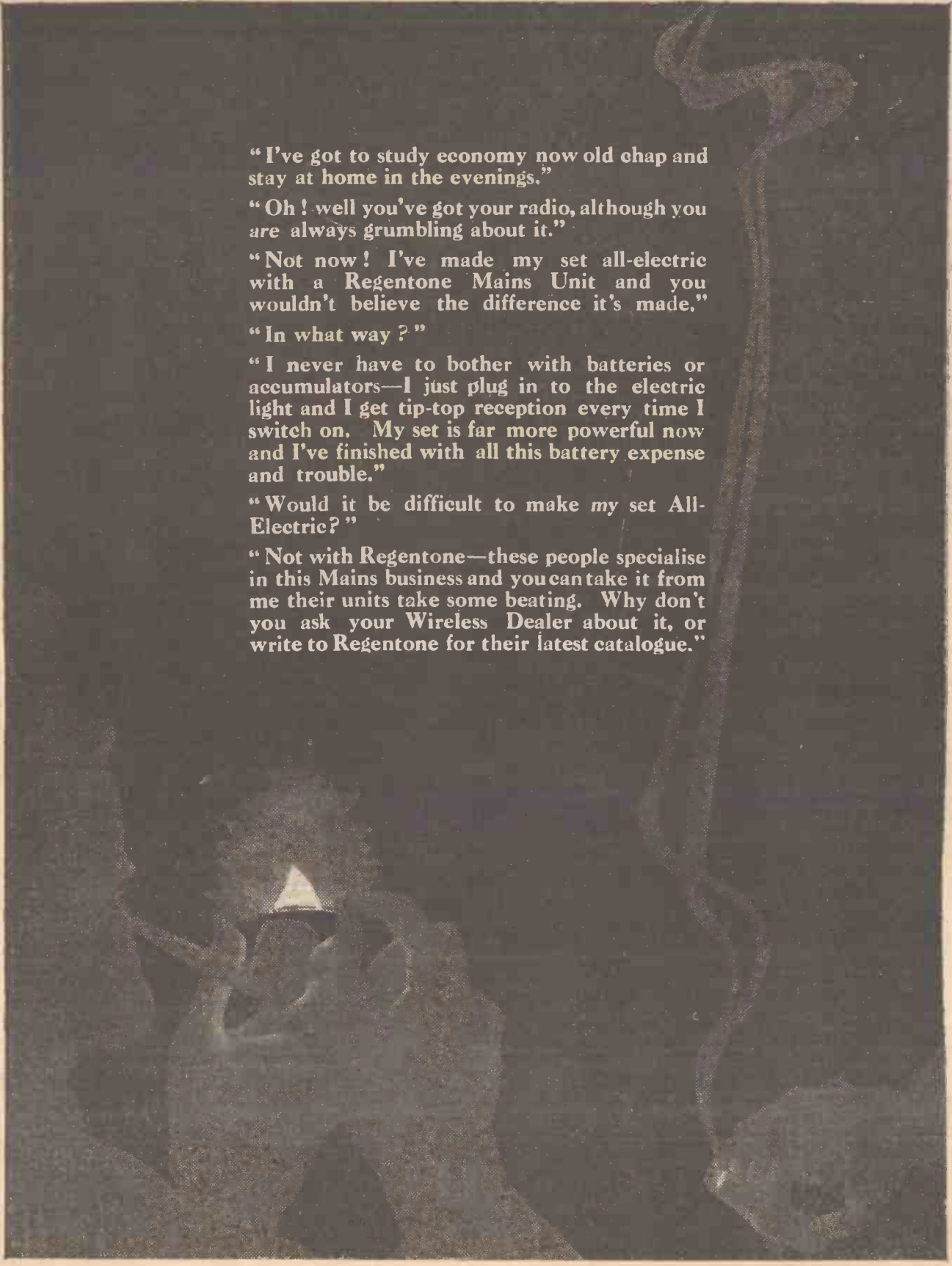
MAKE UP YOUR MIND to have better Radio now and get a Ferranti Unit to suit your set. If in doubt as to the most suitable unit, write to Hollinwood for advice.

E.1	115 m/a	200 volts	£11 11 0
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E.4	70 m/a	240 volts	
and 4 volts 5 amps. A.C. for indirectly heated and 4 volts 1 amp. for Output Valves £8 11 6			
For Alternating Current only.			

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"I've got to study economy now old chap and stay at home in the evenings."

"Oh! well you've got your radio, although you are always grumbling about it."

"Not now! I've made my set all-electric with a Regentone Mains Unit and you wouldn't believe the difference it's made."

"In what way?"

"I never have to bother with batteries or accumulators—I just plug in to the electric light and I get tip-top reception every time I switch on. My set is far more powerful now and I've finished with all this battery expense and trouble."

"Would it be difficult to make my set All-Electric?"

"Not with Regentone—these people specialise in this Mains business and you can take it from me their units take some beating. Why don't you ask your Wireless Dealer about it, or write to Regentone for their latest catalogue."

Write for Free Art Booklet to:—REGENTONE, LIMITED, Regentone House, 21 Bartlett's Buildings, E.C.4. Tel. Central 8745 (5 lines).

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E.W.G

You will Help Yourself and Help Us by Mentioning "A.W." to Advertisers

A NEW IDEA IN TUNING DIALS

EVERY year has seen a marked simplicity in set control and there are a number of designs now which can truthfully be said to be one-knob jobs.

The introduction of ganged condensers, in which two or more sets of moving vanes are controlled by one knob, has resulted in

a reduction of the number of tuning controls and Messrs. E. K. Cole are proud of the fact that way back in 1929 they were among the first to produce a popular-priced receiver in which one-knob tuning was achieved.

Now Ekco have marked a still further and even more surprising advance in the technique of control, for they have brought out a special type of illuminated control dial which not only does away with the somewhat tiresome business of translating from "degrees" into "wavelengths," and makes it instantly obvious what station is being received, but is a one-knob control in every sense of the word, for it does many other jobs, apart from actual wavechanging.

This special dial is part of the new Ekco multi-valve chassis which is incorporated in the type R.S.3 Consolette, the type R.C.4 Console, and the radio gramophones.

Two large scales are provided on which the actual names of the chief European stations are engraved, the medium-wave stations above and the long-wave stations below. The scale is as large as can possibly be accommodated in the cabinets and is actually placed around the loud-speaker opening. This means that one does not have to peer closely at the set to get an idea of the station reading.

As the moving part of the dial (behind the engraved front) covers the circumference, an indicator light shows the name of the station to which the set is tuned at any



One of the Ekco Console models fitted with the special indicating dial



The Ekco Radio Gramophone. Note the large indicator dial for tuning

one setting. Not only does this control the ganged condensers, but switches from the long to short waves and vice versa.

At one setting, which is clearly indicated, it switches off the radio side and connects up the gramophone pick-up. The exceptionally clear reading obtained with the Ekco dial, combined with the ease of operation, marks a really noteworthy step forward in set design.

In radio gramophones and sets such as the Ekco Console and Consolette it is obviously much more sensible to have actual station names shown, rather than confusing wavelength readings or even more meaningless dial degrees.

IGRANIC "ACME" TRANSFORMER



PRICE 2/1/-

The Igranac "Acme" Transformer is unquestionably the transformer "par excellence" for discriminating set builders. The Igranac patented bi-metal core is embodied, and it is supplied in two ratios, 3:1 and 6:1, and is housed in a neat, moulded bakelite case.

The weight of the "Acme" Transformer in either ratio is 12 ozs. and the dimensions are 3 3/4" x 2 3/8" x 2 1/4".



QUALITY

An efficient low-priced transformer for use in "parallel feed" circuits. Housed in a neat bakelite case, it is remarkably compact, being only 2 3/8" x 1 3/4" x 1 3/8", and weighs only 4 ozs. Alternative connection diagrams are supplied, to enable various step-up ratios to be obtained.

PRICE 7/6

IGRANIC ELECTRIC CO., LTD., 149 Queen Victoria Street, LONDON

COMPONENTS

IGRANIC "PARVO" TRANSFORMER



If you cannot obtain Igranac components locally write to Dept. D.155.

ENSURE 100% EFFICIENCY

PILOT AUTHOR'S KIT FOR OLYMPIAN 3 IS ADVERTISED ON PAGE 503 OF THIS ISSUE

The Easy Way TO PERFECT RADIO

POPULAR ACCESSORIES

PILOT PERMANENT MAGNET MOVING-COIL SPEAKER. In handsome oak french polished cabinet fitted with specially designed Epoch chassis, assuring a perfection of tone hitherto associated with speakers double the price. Cash price, £3 15 0. Balance in 11 monthly payments of 6/11.

EKCO H.T. UNIT, TYPE A.C.25 Send 7/1
For multi-valve sets requiring up to 25 m/a. Three tappings—S.G., detector, and 120/150 volts. For A.C. mains. Cash Price, £3 17 6. only Balance in 11 monthly payments of 7/1

ATLAS A.C. ELIMINATOR, TYPE A.C. 244. Three tappings—S.G., detector, power. Output, 120 volts at 20 m.a. Cash Price or C.O.D., £2 19 6. only Balance in 11 monthly payments of 5/6

EKCO K.12 A.C. COMBINED H.T. ELIMINATOR and L.I. TRICKLE CHARGER 12 m/a suitable for 1- to 3-valve sets. S.G. 80v. 120/150v. charging rate 1 amp. at 2, 4 or 6v. Cash or C.O.D. £3 : 19 : 6. Balance in 11 monthly payments of 7/4

EXIDE 120-VOLT W.H. TYPE ACCUMULATOR, in crates. Cash Price, £4 13 0. Balance in 11 monthly payments of 8/6

AMPLION MC.6 MOVING-COIL SPEAKER. Permanent magnet. With output transformer. Complete. Cash Price £3 : 7 : 6. Balance in 11 monthly payments of 6/2

NEW MODEL LAMPLUGH OR FARRAND INDUCTOR SPEAKER for perfect reproduction. Unit and chassis complete, ready mounted. Cash Price or C.O.D., £3 10 0. Balance in 11 monthly payments of 6/5

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As first specified for the "Century Super." Three-way lead and six spacers. Each wire is enamelled and covered overall, which ensures maximum results. Correct centre-tapped. Sent C.O.D. Pay the postman or from your usual dealer. **20/-**

KELSEY SHORT-WAVE ADAPTOR

Adds more stations to your set. Nothing more to buy—no valves or any extras. Plugs direct into your battery or eliminator-operated receiver. Receives short waves from all over the world. Easy to operate. Sent C.O.D. Postage free, or from your usual dealer. Pay the postman, Mahogany cabinet, 7 6. **37/6**



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VARLEY SQUARE-PEAK COIL Pay the postman. C.O.D. ... 15/-
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PETO-SCOTT S.G. VALVE SCREEN Beautifully finished. Pay the postman. C.O.D., each ... 2/6
FOR CENTURY SUPER
WEARITE OR LEWCOS SUPER-HET COILS Set of 4 coils, as specified by "A.W.," and included in Pilot Radio Kits. C.O.D. £2 10 0

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A.W. 26/9/31.

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Advertisers Appreciate Mention of "A.W." with Your Order

"COMPLETING THE NEW AMATEUR'S LINEN SPEAKER"

(Continued from page 500)

there is a thrust on the spindle, or if there is any looseness between the spindle and the chuck piece, then a rattling noise will be noticeable on loud notes.

A self-centring driving rod should be used in a speaker of this kind and these special universal joints and chuck pieces can be purchased at most wireless stores and are provided with many kits of parts for this new linen speaker.

Some types of driving unit necessitate rather a long length of rod between the unit and the chuck piece and in this event put a length of cycle valve rubber over the threaded rod in order to prevent resonance being set up.

Some driving units have a rather low natural tone and these require the diaphragm to be "tuned" to a high pitch in order to preserve a good balance of tone. By tightening up the four window-sash screws, each a fraction of a turn at a time, the tension on the diaphragm is increased. Remember that the tensioning crosspiece does not in any way act as a diaphragm and for that reason is not doped. If the diaphragm is not properly tensioned, the natural tone of the speaker will be too low, but take care that the diaphragm is not split by over-tightening.

Sometimes there is a bass "cut-off" caused by low-note leakage, and this is best cured by fitting the speaker in a baffle box, or behind a fairly large board. The front of the diaphragm lends itself to artistic treatment. Oil paints adhere fairly well to

the doped linen, but do not have too large a coloured surface or the doping and tensioning may be upset.

A large baffle board can generally be accommodated in the corner of a room, and is not in the way. It is essential to attach the actual framework of the speaker very firmly to the back of the baffle board, because the large area of plywood would rattle if there were any looseness. It is worth while fitting some kind of cover to the back part of the speaker so the dust does not get into the driving unit; but do not use a totally enclosed baffle box, because this would set up resonance.

"EXHIBITION CAMEOS"

(Continued from page 511)

receiver, but all his eyes are for the girl and by mistake he depresses the on and off switch. Of course, nothing happens so no harm has been done. With his hands touching in turn, all the dials and knobs he spends fully ten minutes in giving a flowery eulogy of the set in very untechnical terms. They have become quite chatty and he has become oblivious to any calls on his services from other sources.)

THE GIRL: "It is awfully good of you to explain in such a simple and clear way; I am sure that I am beginning to understand it all. Has it got a choke? My brother told me that he didn't want to listen to a lot of talks. They are so dry, you know." THE ASSISTANT (not committing himself): "We pride ourselves on the selectivity of this receiver. What he wants is the alternative programme and for this purpose this exquisite model is peculiarly suitable.

(He becomes quite chummy.) "Well, here's the programme for to-day. Now supposing, for instance. Ah, here it is—London National: Chamber Music. During this time THE GIRL'S eyes have been drawn to the Exhibition entrance and the appearance of "somebody" has distracted her attention from the Stand.

SOMEBODY (lifting his hat): "Hallo, Gwennie. Sorry I'm a few minutes late. Awful rush, detained and all that, you know, Let's have tea."

THE GIRL (to ASSISTANT): Thank you so much; it was sweet of you to explain. (To "SOMEBODY") Don't be annoyed, darling. I had to kill time somehow, didn't I?"

IV

SCENE: At any bar.

FIRST VISITOR: "Two bitters, Miss, please."

SECOND VISITOR: It was like this, yer see: I made it up, according to the blueprint diaphragm and I 'adn't 'ardly turned the dials when I 'eard a woman say things two or three times and then a man spoke 'is words two or three times. Foreign, they wos and you could 'ear the station very loud and I should say it was a big one ('ere's 'ow!) And I 'eard it loud on the loud-speaker as if you wos in the room and it come in as good as the National. And wot I wants ter know is who wos it?"

FIRST VISITOR: Ah, there you've got me, chum (Chin, Chin!). Now, with my set, I can get . . . " (Left bragging of the merits of their respective instruments.)

FOR BEST RESULTS WITH YOUR "CENTURY SUPER" USE THE "GOLSTONE" DUAL RANGE

& SHORT WAVE FRAME AERIALS

Constructed to rigid specification and recommended by AMATEUR WIRELESS for use with the "CENTURY SUPER" and "A.C. CENTURY SUPER."

Ideal for all circuits where a Frame Aerial is specified.

Wound with special Multi-Strand Double Silk covered wire. Neat Wave-change Switch mounted on base. Highly Selective. Superbly finished.

R22/21. Complete with simple connection details . . . **15/-**

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

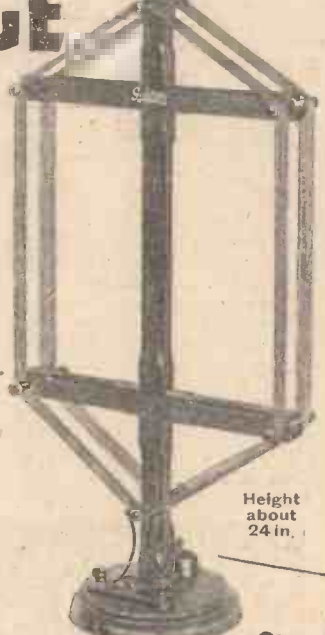
Large illustrated Radio Catalogue sent Post FREE on request



Height about 5 in.

GOLSTONE SHORT-WAVE MINIATURE FRAME AERIAL

Specially designed for reception of Short-Wave Stations with the "CENTURY SUPER" and other circuits where a Frame Aerial is specified. Wound with silk-covered multi-strand conductor, on ebonite air spaced former. R22/22. **5/6 EACH**



Height about 24 in.

15/- EACH

Ward & Goldstone
PENDLETON MANCHESTER LTD.

THE NEW TUNGSRAM POWER DETECTORS



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 μ 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.4 for full particulars of the complete new range. Prices from 5/6 to 19/-. Tungfram 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 Tungfram Electric Lamp

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

Lamp, Valve and Glass Factories : Austria, Czecho-Slovakia, Hungary, Italy and Poland. I.P.S. Organisation, Tungfram Lamps & Radio, Ltd., 11 Burch Quay, Dublin.

Tungfram photo-electric cells: Nava "E" (for scientific measurement), £2 17s. 6d.; Nava "T" Red sensitive cell (for colour matching devices), £3 3s.; Nava "EH" (for talkie work), £3 13s. 6d.



THE NEW 2 VOLT SUPER DETECTOR AND POWER VALVES

Don't Forget to Say That You Saw it in "A.W."



A CORNISH comedy by Bernard Walke, entitled, *The Little Ass*, will be relayed from the little church of St. Hilary, near Marazion, Cornwall, on October 7.

Another Ernest Longstaffe revue will be heard Nationally on September 30. It is called *Three-and-six Return: To the Beach and Back Again*, and it will be under the personal direction of Mr. Longstaffe.

Act I of *La Tosca* will be relayed from Covent Garden Opera House on October 5, in the Regional programme, and Act II of *Lohengrin* on October 8. National listeners will hear Acts II and III of *La Bohème* on October 6.

The Aga Khan is to broadcast the third talk in the series entitled, "What I Would Do with the World." This will be heard in the National programme on October 8.

The new Western Studio Orchestra gives its first performance on October 8 in a concert of light music. The orchestra will give a programme of "Old Favourites" on October 10.

Mr. Shannon Millin's second "Sidelights on Belfast History," on October 10, will deal with the Chamber of Commerce and the Harbour Commissioners.

Dean Inge is to broadcast in the Regional programme on September 27, when he will give an introduction to the new series of talks entitled, "The Modern Dilemma."

THINGS HEARD FROM ZEESEN

Democratic talks.
Modern history.
Pictures of the Great War.
Criticism of modern life.
A discussion of modern dancing.
Kindly references to England.
Unkind references to Wales and Scotland.
Art talks.
Philosophical treatises.
The latest psychology.
Theology and metaphysics.
Exceedingly high-brow stuff.

A Welsh recital is the first of a series of feature recitals which will be heard in the Midland programmes during the coming winter. This one, on October 2, entitled "Gems of Welsh Melodies," will be given by Haydn Evans, accompanied on the harp in the authentic Bardic manner.

The Midland Studio Chorus is presenting a special feature on October 2, when they will give a recital of part songs by Stanford.

A studio concert by the National Orchestra of Wales will be heard by West Regional listeners on October 7. The artistes will be Watcyn Watcyns and Ronald Harding.

Two of the latest recruits to Scottish school broadcasting are Professor J. Duncan Mackie and Dr. J. R. Peddie, who will broadcast courses on "Scotland and Her Neighbours" and "Masters of English Prose" respectively.

One of the best known of Gaelic singers is to broadcast a recital on October 5, when Miss Heloise Russell-Ferguson, with her Clarsach, will sing seven Gaelic songs.

The agricultural talks which have been given during the last few years have been very much a feature of Scottish broadcasting and have been one of the most successful broadcasts in the north. The winter series of agricultural broadcasts is to start on October 7.

The band of a famous regiment will broadcast on October 8. On that day Scottish listeners will hear music played by the
(Continued on page 562)

All Portable Sets need a spare -

Perfect
for all
Portables

C.A.V. Jelly Acid Cells are now offered at greatly reduced prices with still further improvements in design and additional types suitable for the latest popular sets. Buy a C.A.V. replacement cell for use whilst yours is being recharged and enjoy continuous reception. There is a C.A.V. type suitable for every Popular Portable.

Examples of batteries for Popular Portables.

Pye Q and Marconiphone 55 - Type 2VN9/3 12/6

Pye Twintriple B4D . . . Type 2VN11/1 14/-

McMichael . . . Type 2VN11/2 14/-

C.A.V. BATTERIES Ltd.,
WELL STREET, BIRMINGHAM.

C.A.V.

JELLY ACID



NON - SPILLABLE

Loudspeaker supremacy

NEW LISSEN



CABINET CONE

22'6

No loudspeaker you have ever seen can challenge this new Lissen range for sheer value. See the new Lissen Cabinet Cone Loudspeaker above. That is a solid Oak Cabinet, naturally hand polished to bring up the fine grain of the wood, distinctively simple in design, beautifully finished. In tone this speaker compares with anything you have ever heard — bass deep but not predominant, upper register brilliant, voice soft and natural, volume anything from a whisper to a great degree of loudness according to your set. Lissen look forward to demonstration of this speaker alongside the season's greatest efforts, no matter what their price because this new Lissen Cabinet Cone simply challenges comparison

SPLENDID NEW LISSEN PLAQUE

13'6

For those who like the plaque design, here is a very handsome loudspeaker to stand on a table or hang on the picture rail. It incorporates the same unit and the same construction as the Cabinet described above and at the price is outstanding value.



With Metal Frame, price **13/6**

In Black Moulded Bakelite, finished silver, price **15/-**

Do not buy until you are satisfied you have heard a fair test of these new Lissen speakers. They will do justice to the finest set you can buy or build and you will never want to pay more for any cone speaker.

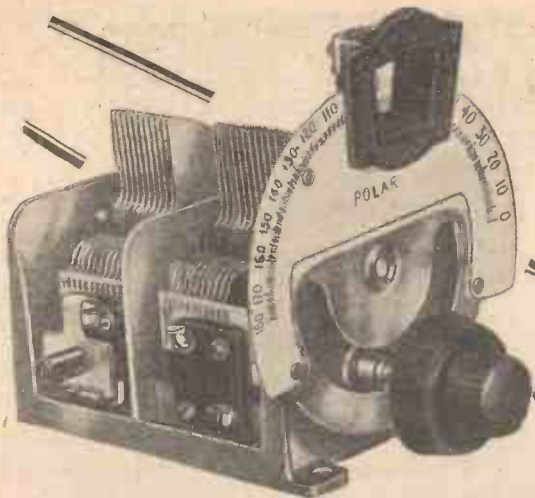
*Ask your
dealer to
demonstrate*

LISSEN LIMITED, WORPLE ROAD, ISLEWORTH, MIDDLESEX

Advertisers Appreciate Mention of "A.W." with Your Order

NEW POLAR CONDENSERS

Many new and improved models have been introduced into the Polar range. At their popular prices and with the high Polar quality still maintained, they are the most attractive condenser value obtainable. See them at Olympia or write for fully illustrated catalogue.



The "Uniknob" .0005 x .0005 21/-

POLAR

CONDENSERS

STAND 60 OLYMPIA

THE "UNIKNOB"

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Postcard Radio Literature

The Six-Sixty Chassikit

I SEE that Six-Sixty have among their new lines for the Show a fine home-assembly idea known as the Chassikit. This enables a battery or mains-driven set to be built up and a number of standard circuits can be used. Get a free copy of the new folder just issued in connection with the Chassikit. **564**

Varley Resistances

I am not surprised that the new Varley wire-wound and spaghetti resistances are so popular. They are really well made. Every set builder should have on the work-bench a free list of the ranges of these components. **565**

Why Not Eta?

Have you tried Eta valves yet? There is to be had free a fine folder giving fullest possible details of every valve in the range, and this is well worth having. **566**

Burglar Alarms for All

If you are unable to see the light-sensitive cell kits displayed on Stand 226 by Audio-visor, Ltd., at Olympia, then take my tip and write through my free Catalogue Service for details of these Ray Craft outfits. The kit contains a light-sensitive cell and all necessary gear for its use in connection with burglar alarms, automatic light switches, counters and wireless controls. **567**

For Mains Users

If you are dissatisfied with your high-tension supply, then see if a suitable mains eliminator is not listed in the Regentone range. I have just received a folder giving details of all the A.C. and D.C. jobs. **568**

Ediswan Speakers

I like the new Ediswan Minor and Senior A.C. and D.C. speakers, and as there is literature describing these just issued I confidently recommend this to your attention. **569**

Free Grid Bias

Tannoy eliminators, several models of which incorporate a special section giving grid bias entirely separate from the high-tension supply side, are described in a catalogue, a copy of which has just been sent me. Mains users would do well to write for this. **OBSERVER. 570**

GET THESE CATALOGUES FREE.

Here "Observer" reviews the latest booklets and folders issued by well-known manufacturers. If you want copies of any or all of them FREE OF CHARGE, just send a postcard giving the index numbers of the catalogues required (shown at the end of each paragraph) to "Postcard Radio Literature," "AMATEUR WIRELESS," 58-61, Fetter Lane, E.C.4. "Observer" will see that you get all the literature you desire.

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NAME

ADDRESS

A.W. 26/9/31.

"RADIOGRAMS"

(Continued from page 558)

band of the 1st Battalion of the Argyll and Sutherland Highlanders.

On October 7 West Regional listeners will hear *Cindelectra*, a parody of Sophocles' *Electra*, as seen through the eyes of a musical comedy producer.

Henry Holst, the newly appointed Professor of the Violin at the Manchester Royal College of Music, is the artiste chosen to give a recital on September 28.

The Bradford City Brass Band are new to the North Regional programmes. They will appear on September 30. A one-act play entitled, *Rosemary*, will be heard by North Regional listeners on the same evening.

The Belle Vue Tattoo, which is to be relayed in the North Regional programme on October 1, should prove interesting. Regular and Territorial Army units will take part, as well as representatives of the British Legion.

On October 3 speeches from the banquet of the British Hotels and Restaurants' Association will be relayed from the Palace Hotel, Buxton. The speakers to be heard will be the Marquess of Hartington and the Earl of Derby.

The National Orchestra of Wales will give its final performance on October 7. The orchestra has been maintained for three and a half years in the hope that there might be found some way in which the people of Wales could assume control and financial responsibility, but the efforts to

place the orchestra on a permanent basis have failed. For studio work its place is being taken by a smaller combination, to be known as the Western Studio Orchestra.

On September 27 the augmented Northern Studio Orchestra will give a light symphony concert.

A NEW "A.W." STATION IDENTIFICATION SERVICE

AMATEUR WIRELESS has organised a new service of the greatest importance to all listeners. This Station Identification Service is available for identifying stations from information supplied by readers, and will be conducted by J. Godchaux Abrahams in conjunction with "A.W." The fee is 6d. for identifying any one station, but if three identifications are required at a time the fee is only 1s. A stamped addressed envelope must be enclosed. Only stations giving a regular broadcast service can be dealt with.

Address your inquiry to Station Identification Service, "Amateur Wireless," 58-61 Fetter Lane, E.C.4, and give fullest possible details. State type of set used, date and time when station was heard, wavelength, call or interval signal, and details of any programme heard.

Before the Show closes—see the "A.W." Stand 71

Bernard Johnson and Helen Guest are again partners in an organ recital from Nottingham on October 4.

In the first six months of 1931, it is stated, the wireless licences in Scotland increased by 18,000. This increase is three times as great as the corresponding increase in the same months of 1930 and is naturally taken by the Scottish Regional B.B.C. as justification for the programme policy.

In Scotland an experiment is being made with a series of six lessons in Scots country dancing.

A site has been selected for the 75-kilowatt transmitter to serve the Berlin district. It is stated that the new station is to be erected in the immediate neighbourhood of the German capital. The wavelength of 419 metres now in use will be retained. Protests in respect to the close proximity of this transmitter are already being lodged with the authorities by licence holders as listeners fear that the advent of a 75-kilowatt transmitter at so short a distance from the city would create a swamp area as in London and thus prevent the general public from hearing a number of foreign broadcasts.

The 200-watt Bolzano (Italy) broadcasting station suspended its transmissions at the end of August. Tests are now being carried out with the 1.5 kilowatt plant which will be brought into daily operation within the next few weeks. There is a possibility that a change of wavelength may be made, as in view of its increased power the common channel now used is deemed unfavourable.



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The fact that this speaker is fitted with the famous "Wufa" 60 Pole Unit guarantees the most perfect quality of tone.

Its classic appearance is in keeping with its perfect reproduction, and it is therefore an asset to every home. Hearing and seeing is believing.

Visit the "Wufa" Exhibition. No. 3 Hammersmith Road, opposite Olympia.

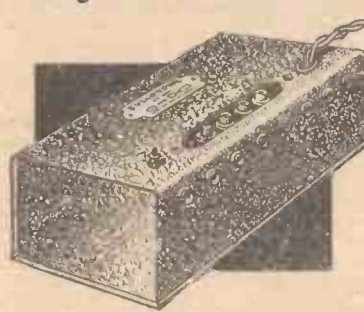
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Model D.C. 15 30 Voltage Tappings: Screen-grid, 50 80, Detector, 50/80 and Power, 100/150. Output, 15 or 30 M.A.

30/6 or 8/1 monthly for four months

Model A.C. 15 Voltage Tappings: Screened-grid 50/80, Detector 50/80, Power, 100/150. Output, 15 M.A.

42/- or 6/- monthly for eight months

The new FULLOTONE MAINS UNITS

Fit a Fullotone Eliminator to your set and you will marvel at the improvement in reception and low running costs. Just plug it into wall plug or lamp socket and connect to your set as you would an H.T. Battery; no tiresome connections, no more expensive batteries! Owing to our policy of dealing direct with the public, which saves all middlemen's big profits, we are able to offer a complete range of A.C. and D.C. models at prices much below the usual. Obtainable only from Fullotone.

Other A.C. models and Trickle Chargers at low prices. BROCHURE FREE ON REQUEST.

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**The perfect dry
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If you could visit the famous old Fuller factory and see for yourself the new machinery that is revolutionising battery manufacture you would immediately understand how and why the Fuller 'Super' is the world's most perfect dry battery. Every process is controlled automatically. Variations in size, shape and power of the individual cells are no longer possible. This photograph shows the zinc cans ready for filling. These cans are made from purest zinc of standard gauge, tested for weight, diameter and height. They cannot leak and therefore remain alive for the maximum length of time. Fit a FULLER 'Super' and your wireless will gain a new lease of life.

See us at National Radio Exhibition,
Olympia, Stand 36

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EMISSION UP TO 20 MILLIAMPS
TYPE F1, 60 VOLTS, PRICE 7/5. TYPE F4, 108 VOLTS, PRICE 13/9

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Please mention "AW" when Corresponding with Advertisers.

SOME NEW USES FOR THE SELENIUM CELL

THE photo cell undoubtedly has done much towards replacing selenium—a metal which had gradually got into disrepute owing to its sluggish action and its uncertainty.

Nevertheless the selenium cell is not "dead." Indeed, it is very much alive, as Mr. George P. Barnard shows in a book on the subject which has recently been published by Messrs. Constable & Co., Ltd. The literature on selenium, both here and abroad, is quietly growing, and there is some indication that selenium cells will come into prominence again and be found useful tools of the wireless investigator

Advantages of Selenium

The use of selenium cells for automatically lighting up buoys at sea when dusk falls is well known. The cell is connected in series with relay and battery. In daylight the resistance of the cell is small, and sufficient current flows through the meter to cause the relay contact to remain off. At night, the resistance of the cell greatly increases and the relay turns over to the on contact, which switches on the lamp. Elaborations of this idea are in use to-day in several towns for controlling the public lighting systems—doing away with the lamp-lighter! and a number of factories are using such devices.

Wireless relays, counting machines, fire

alarms, photographic exposing devices, automatic train lighting controls, and so on, are amongst the many devices for which selenium is being used. But it is its possibilities in television which are coming again to the fore and give rise to interesting speculations. Some years ago Langer showed that selenium cells are capable of responding normally to intermittent light of a frequency of 10,000 per second; that above this frequency the sensitivity of the cell is greatly reduced, but that it is possible to compensate for the loss in sensitiveness

See Our Stand 71 at Olympia

by the use of valve amplification. W. A. Balmain and the writer showed in 1927 that the effect of very feeble light on selenium cells when amplified by valves was identical in character with the effect of strong illumination *without* amplification, and these results, coupled with the experiments of Langer, go to show that selenium is quite capable of dealing with the scanning problem on a par with the photo-electric cell—that is, so long as simple subjects are dealt with.

The high amplification that is necessary with photo cells would be in large measure avoided by selenium cells, which can be used with comparatively large currents. Cells are obtainable, and can indeed be

made, which have a resistance of a thousand ohms or thereabouts, through which 15 or 20 milliamperes can be passed. The difficulties involved by very high amplification would thus be avoided.

A good deal of harm has been done to the selenium cell by stupid claims of sensitiveness. If the resistance of a cell falls to one-tenth or one-hundredth when light is cast upon it, this does not necessarily mean it is *sensitive*. Sensitiveness is the measure of the smallest amount of light which will give a useful change in resistance of the cell, and most cells which drop enormously in resistance on being illuminated are very unsatisfactory where very feeble light changes are concerned.

The type of cell that is being sought now, for television purposes, is one which responds to very brief flashes of light of moderate brilliance, and one which responds faithfully to variations in the intensity of the light. It will almost certainly have a very high resistance, for the effect on selenium is a *surface effect*, and the silver-grey type of highly-crystalline selenium will probably be found best. The process of annealing the cells, the materials of which the electrodes are made, the degree of purity of the selenium, the wavelength of the light used, the pressure at which the cell is used, and the optimum strength of illumination, and so on, are matters engaging the attention of physicists to-day and receiving systematic research. As a result we may find the selenium cell once again coming into favour as the "fool-proof" light-sensitive element.

T. THORNE BAKER.

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THREE OLYMPIA INTRODUCTIONS

MAINS UNIT KIT, C.150.
Output:—25 m.a. at 150 v.
Three tappings:—one variable. Westinghouse rectification. Ready assembled. Requires wiring up only.

Price 76/-

COMPLETE MAINS UNIT. D. Minor.
Output:—12 m.a. at 120 v. Ready to switch on. The ideal Unit for two-valve Receivers

Price 57/6

MAINS UNIT KIT, C.250.
Output:—60 m.a. at 250 v.
Four tappings:—three variable. Suitable for any set from one to seven valves. Requires wiring up only.

Price 137/6



POST THIS TO-DAY

I enclose 3d. stamps for lists giving full details of (a) Complete Mains Units and (b) How to Make the Unit best suited for my particular Receiver. Send also information on Mains Transformers with circuit diagrams.

M

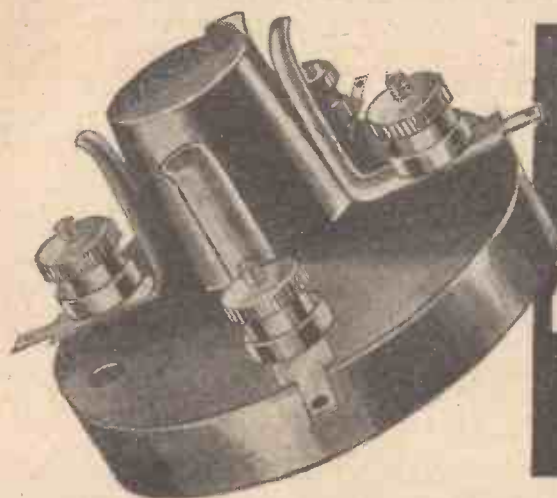
Address

Another New Factory has opened this month at Greenwich to cope with the tremendous demand for Heyberd Mains products.



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Sets cost less to build with these new LISSEN parts



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NEW LISSEN ECONOMY VALVE-HOLDER

A new rigid valve-holder of simple and robust design. Firm and individual contact between springs and valve pins is assured by the curved surface of the springs. Suitable for high-frequency circuits and short wave work. A really good valve-holder at an economy price, 4¹/₂d.

YOU CANNOT BUY BETTER PARTS THAN LISSEN NO MATTER WHAT YOU PAY

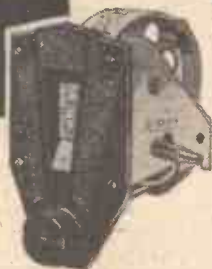
Lissen components are the best value for money you can possibly buy. They form a huge family of parts built to identical standards of precision—built to pull together in any radio circuit. Replace anything that is specified with the equivalent Lissen component and you will find that you not only SAVE MONEY EVERY TIME but IMPROVE RESULTS AS WELL.



NEW LISSEN DIE-CAST VARIABLE CONDENSER

You have only to handle this new Lissen Variable Condenser to make you desire it. The die-cast frame, the one-piece spindles into which the vanes are solidly riveted, the unshakable rigidity of the whole construction, the clean-cut finish of the job—all these speak of new pleasure in building, new ease of tuning. And the new manufacturing methods used now for the first time by Lissen have enabled the Lissen Variable Condenser to be turned out to very fine standards of precision. You will not find anything like this new Lissen Condenser in anything but a luxury set. It enables you to GET A NEW STANDARD OF TUNING ACCURACY INTO EVERY SET YOU BUILD.

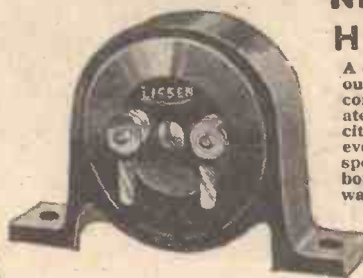
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NEW LISSEN ILLUMINATED DRUM DIAL

Fit this Lissen Illuminated Drum Dial to any set and at once you give it a new distinction—the real "professional" appearance which every keen constructor aims at. The mechanism is robustly built and the drive is by tension gut, sure and pleasantly easy. Can be fitted easily to the new Lissen Variable Condenser, and also to all other condensers, singly or in gangs.

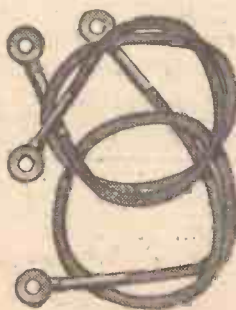
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NEW LISSEN H.F. CHOKE

A disc type H.F. Choke of outstanding merit in very compact form. Will operate perfectly in any capacity reaction circuit wherever an H.F. Choke is specified. Suitable for both long and medium wavelengths. Will give perfect results in receivers employing Dual Wave Coils.

2'6



NEW LISSEN FLEXIBLE RESISTANCES

The Lissen Flexible Resistances are well made components, built to stand up to heavy duty in a way no other type of flexible resistance can do. Special resistance wire is used, heavily covered in artificial silk. Values from 600 ohms to 200,000 ohms. Prices from 7d. to 2/6.

7^D

LISSEN LIMITED, WORPLE ROAD, ISLEWORTH, MIDDLESEX

Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention

DETECTORS IN SHORT-WAVE RECEIVERS

It is highly essential that the detector portion of a short-wave receiver be kept in as sensitive a condition as possible

OWING to the fact that there is generally little or no amplification provided at high frequency in short-wave receivers, the receiver has to rely on the detector valve to bring in the signals and when it has brought them in, to turn them into usable low-frequency currents. Even in short-wave receivers using one or more stages of H.F. amplification, these stages do not amplify very much in comparison with the amplification given by the same number of stages when used in an ordinary broadcast receiver.

In short-wave receivers, because the H.F. gain cannot in any case amount to much, we have to keep the detector stage in as sensitive a condition as possible, in order to make up for our poor H.F. gain and in short-wave sets which do not have any H.F. amplification, the whole success of the receiver will depend upon whether or not the detector stage is being used to the best advantage.

Short-wave Requirements

Well, what should a sensitive detector stage have as its outstanding features? First and foremost, the reaction control must be smooth. It must not go in and out with a "plonk," and must be within

easy control of the operator. It must not, for instance, stop oscillating at 50 degrees and start again at about 40. Many sets do that. And their owners think there is something dud about the set and complain "that it won't get foreign stations!" Well, who could wonder? This reaction control really must go out and come in with a gently swishing sound which gradually builds up to the well-known sounds which tell us that the set is oscillating.

It is quite simple to ensure that practically any type of receiver shall have its reaction control as easy and as simple to work as this. The simplest remedy is to reduce the high tension on the detector. If you have been using a fairly high figure such as 70, or even 80 volts, start by reducing it to about 20. Note if the set will now oscillate or not and, if it does not, increase the voltage in small steps at a time until it does. If now, it oscillates at, say, 35 volts, keep on increasing the voltage and stop immediately the reaction control shows any signs of going "plonky." The set is now in its most sensitive condition as regards this point, anyway. A rule for this is to note that the detector voltage should be as high as possible, consistent with a smooth reaction effect. Like most

rules, this one has its exceptions, but it is none the worse for that and none the less correct.

Grid Leak Values

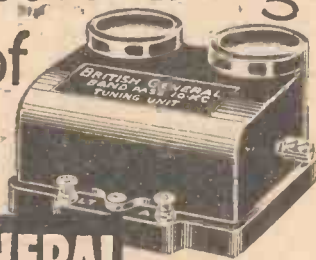
The next cause for trouble will be found in the grid leak. A high value of leak, say, about 10 megohms, will usually result in a very smooth reaction control, but the detector will not be so sensitive as regards actual signal strength as it would be when a lower value is used. Also, when a high value of leak is used, it will be found that the pitch is slightly lower than when a smaller leak is in use and that the high notes will not be coming through so well.

The ideal remedy, as regards this feature, is to use a fairly low value of leak such as 2 or 3 megohms and connect it to a potentiometer, instead of wiring it direct to L.T. plus. Indeed, all short-wave receivers which use an ordinary type of detector valve should be fitted with a potentiometer as it is a real help when trying to tune in weak signals. Connect the two fixed terminals of the potentiometer to L.T. negative and positive respectively and connect the potentiometer arm to the end of the grid leak which was formerly connected to L.T. positive. The arm of the potentiometer should be adjusted as far to the positive side of the resistance as possible, consistent with easy tuning and reaction control.

Another component which may cause troubles in the detector stage is the H.F. choke. Poor chokes will reveal themselves by such features as: certain spots on the

(Continued on page 568)

The Outstanding feature of the show



BRITISH GENERAL

BAND PASS IOK.C. TUNING UNIT

At last—a Tuning Unit which gives the separation of 10 Kilocycles as laid down by the International Radio Convention, and yet gives full strength throughout the entire wave-band between 230 and 550 and from 800 to 2,000 metres.

PRICE
14/6
INCLUDING
COUPLING
CONDENSER

From all dealers of repute or direct from the manufacturers:—

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LTD.
Brockley Works, London, S.E.4

STAND
30
RADIO
EXHIBITION

SENSATIONAL SUCCESS OF THE "A.W." LINEN SPEAKER

THE introduction of the new A.W. Linen Speaker has aroused the interest of every radio constructor and evoked unanimous appreciation of its unique construction and excellence of tonal qualities. The complete kit as described in this issue on page 500 is supplied by official sanction of "Amateur Wireless" complete with all parts exact to specification as follows:

Weedon's Patent Self-Centering Rod, 24 in. by 24 in., 3 birch-ply board frames, fretted circular, wood supports free from knots, machined, drilled and countersunk for screws. Linen cut to size as specified. Tin of special Weedon's Golden Tautening Dope. Thumb tension and tone regulating screws. All necessary wood screws and tacks.

Speaker assembled and tested at Works. Ready for use (except Unit). Carr. paid, 25/-

Complete as above, for making Speaker, as illustrated. Strongly packed. Carriage paid. Price **19/6**

For best results use "Motor" Units. We can supply "Motor" Units with the Kit at following prices: Type S.8., 23/6; Type S.4., 27/6; Type S.3., 35/-

Buy your Kit from the only officially specified suppliers and be certain of the fine results claimed for this Speaker.

YOU NEED THESE PATENTED WEEDON ACCESSORIES FOR HOME CONSTRUCTION.

Weedon's Self-Centering Rod, price 1/6 (Postage 2d.).
Weedon's Adaptacon (as specified for the Olympian 3).
Price 3/- (Postage 4d.).
Weedon's Golden Tautening Dope. Price, per tin, 1/- (Postage 3d.).
Weedon's Adaptadix. Price 1/6 (Postage 2d.).

Prompt delivery from:—

WEEDON & CO., LTD.,
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MR. BROWN HAS DONE IT AGAIN! . . . NO NEED FOR H. T. BATTERIES—EVEN THOUGH YOU HAVE NO MAINS SUPPLY.

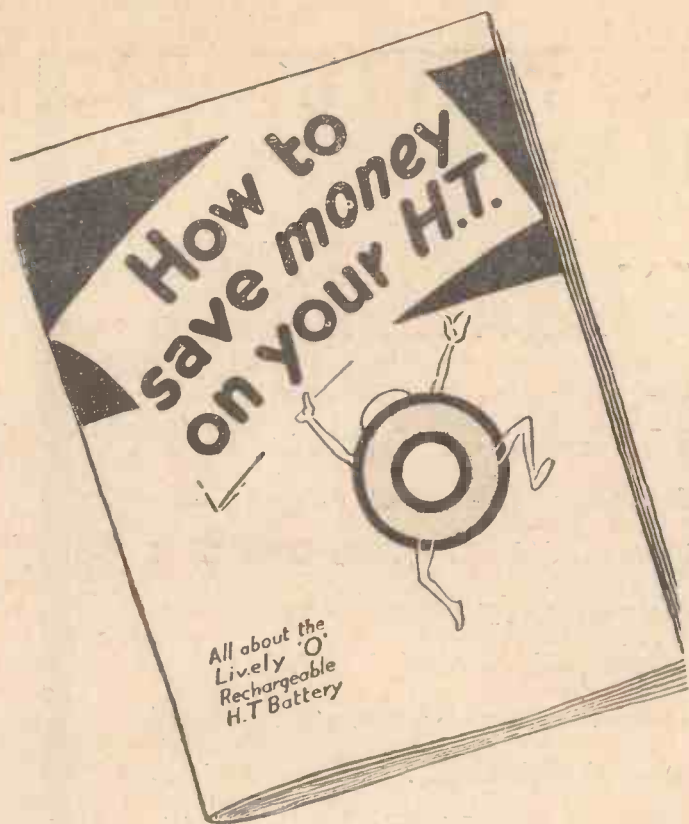
Mr. S. G. Brown, F.R.S., the man who made the first loud speaker, invented the 'Microbox' and designed a score of other wonderful devices, has added yet a further triumph to his long list of successes. At the Radio Show this week is being shown and demonstrated for the first time the wonderful **S. G. BROWN BATTERY — SUPERSEDER — an entirely new invention** which does away once and for all with the trouble and expense of H.T. Batteries. **NOT A MAINS UNIT.** The SUPERSEDER is not a mains unit. It will appeal chiefly to those whose houses are not wired for electricity. All you do is to connect the SUPERSEDER (a small and compact device) to your L.T. Accumulator and it builds up a steady flow of H.T. current which necessitates only a small extra consumption from the L.T. Accumulator. **COSTS LESS THAN H.T. BATTERIES.** The SUPERSEDER is the most amazing radio invention of recent years. It costs less than using H.T. batteries. It gives a constant level flow of current and once fitted it needs no attention or replenishment of any kind. **Be sure not to miss this amazing device on STAND NO. 2 at the Show.** If you cannot get to the Exhibition, write for illustrated descriptive leaflet to S. G. Brown, 19, Mortimer Street, London, W.1.

The SUPERSEDER is only one of the attractions on the S. G. Brown Stand. See the wonderful "Microbox," the new S. G. Brown Permanent Magnet Loudspeaker and the whole range of Brown products which, because of their completely faithful reproduction, enable us to sign ourselves literally

Yours faithfully

S. G. Brown

FAITHFUL RADIO



Send for this Book—it's free!

IT tells how you can end, once and for all, the expense of renewing Dry H.T. Batteries. It tells you how you can get the very last ounce out of your present Battery while gradually replacing it with a Lively "O" Rechargeable H.T. It tells you all about the Lively "O" Rechargeable H.T.—how it works—why it will improve your reception—how it will save you money—how it lasts for years—how it can be recharged at small cost. It is one of the most informative books on H.T. Batteries ever published. Send for your copy now . . . use the coupon.

TWO TYPES:

Standard 10 volt Unit
(2,750 milliamps)

5/6

Extra large capacity
(5,500 milliamps) per
10 volt Unit

6/9



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Please send me, free of charge, a copy of your book, "How to Save Money on Your H.T."

NAME

ADDRESS

A.W.426/9/31.....

"DETECTORS IN SHORT-WAVE RECEIVERS"

(Continued from page 566)

dials where the set refuses to oscillate, a loud threshold howl and bad distortion. If a home-made choke is used, experiment with different sizes, etc. Very often, a small fixed condenser, of about .0005 microfarad, connected across the output end of the choke and earth will cure this and the trouble will disappear.

Insulation

Finally—insulation. The insulation of the components in the detector stage is as important as it is anywhere else and the only rule here is, keep it as perfect as possible. Sometimes you will come across a listener who is delighted because his detector works perfectly without a grid-leak. No detector can work properly without a grid-leak, unless it be of the anode-bend variety, and an experience of this sort is an indication that some poor insulation is, being used somewhere in the grid circuit of the detector stage and that a leakage somewhat equal to that provided by the average grid-leak is taking place across the grid and earth components. Nevertheless, this is an expensive way of economising because where poor insulation is causing trouble in one part like this, it is sure to be appearing somewhere else as well, probably in the anode circuit and that means a run-down H.T.B.!

M. B.

MAGNETIC SOUND-RECORDERS

A WELL-KNOWN form of magnetic sound-recorder is the Telegraphone, in which sound "images" are impressed upon a steel ribbon by passing it beneath a pole-piece energised by voice currents. The images so formed are sufficient permanent to induce currents, when passed beneath a second pole-piece, thus reproducing the original sounds. An interesting development of this idea has recently been made in connection with talking-picture films. A magnetic alloy of nickel, cobalt, and iron, prepared as a colloidal mixture, is incorporated in a celluloid cinema film, so that a sound-record can be impressed magnetically on the film at the same time as the associated scene is being photographed.

B.

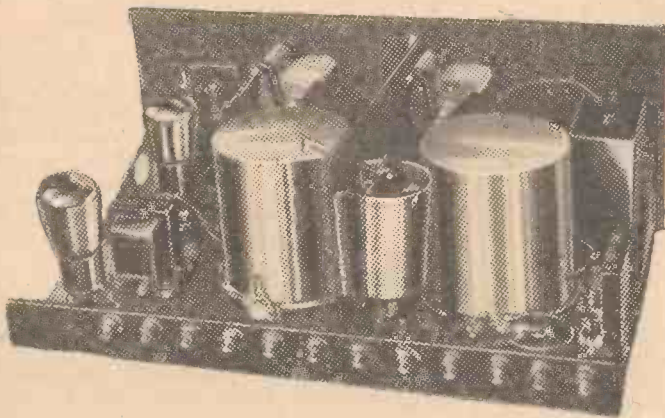
SEVEN-METRE BROADCASTING

IN the course of experiments on ultra short broadcasting it was found that satisfactory loud-speaker reception could be received on small indoor aerials throughout the Berlin area with a 1-kilowatt output from the transmitter. Screening was occasionally experienced, particularly in reinforced-concrete buildings, but as a rule this could be obviated by shifting the receiving aerial into a new position a few feet away. A favourable point is that the short-wave adapters used for receiving this type of radiation seem to be very little affected by artificial interference from electrical apparatus. If the scheme will protect the listener from "man-made" static it should be worth trying out on this ground alone.

M. A. L.

NEW INVENTION for PERFECT RADIO

A new screen-grid 3-valve set has just been specially designed to suit modern conditions and the development of regional stations. The Northampton Plating Co. have recently made extensive researches within three miles of Moorside Edge and Brookmans Park, and can undoubtedly claim to have obtained the most efficient means of overcoming the tremendous difficulty of obtaining selectivity. The New Screen-Grid 3 was specially tested at Huddersfield within sight of the aerial, and the two local stations were easily separated by over thirty degrees, thus allowing for the reception of many stations—English and Foreign—between these wavelengths. This performance is far superior to that of any other set that has been tested in this locality. The results obtained are due to special devices incorporated in the design.



These include a specially patented Regional Unit which may be incorporated in any set to improve selectivity. There are also super screening methods and coils designed exclusively for the new set. This set can be used as a battery or all-electric set, or for radio-gramophone. It has been easily constructed by a novice at expense less than half that of other inferior sets. In order to give everyone the opportunity of testing out this new circuit, a full-size 6d. Blueprint will be supplied for 3d. from Northampton Plating Co.

SPECIAL OFFER of BLUEPRINTS of FAMOUS SETS

Two 6d. Blueprints for Super Selective 2 and 3 for 3d. each. 1s. Blueprint of 4-valve Portable (which separates Brookmans Park stations under the aerials) for 6d.

Read These Testimonials

"I write to say I have made up your 3-valve set. I am delighted with the results. I am about 8 miles from the Slaithwaite Station, and can separate the two programmes easily. I have only used your cheap parts. Please send me your 1931 catalogue."—G. C., Halifax. 7/7/31.

"Your Super Selective 3-valve set I made up is giving every satisfaction, and is an improvement on any receiver I have yet tried, both for quality and volume. The number of stations I can get is amazing:—High wave: Warsaw, Motala, Eiffel Tower, Berlin, Radio Paris, and Daventry, 5XX. Short wave: Budapest, Vienna, Brussels No. 1, 5GB, Langens, Rome, Stockholm, Katowice, Frankfurt, Toulouse, Hamburg, Algiers, Muhlack, Graz, Turin, Strasbourg, Brussels No. 2, Heilsberg, and many others which I cannot name. All these I obtained on an indoor aerial of about 40ft."—H. G., Nottingham. 9/3/31.

"It is now two years since I built your 'Super Three.' I might tell you I have tried many, including '—' which is classed very good on all waves by the late engineer to B.B.C., but I can say it is not a quarter as good as the 'Super Three.' The '—' Co. advertise their '—' to get about 30 stations, but you can go one better any time on them with your set. I logged 63 stations in two nights, from two thousand metres to two hundred metres, and that is quite a lot to say, but quite true. Your 'Super Three' is as good on short waves. I mean 80 metres downwards to 30 metres; this is how far I have tested with a six-turn coil and four-turn coil, home-made coils, out of connecting wire—Glazite. I haven't made the other coils yet to get a bit lower; anyway, here's one or two stations which I have logged: Doberitz, Germany, 67.65 metres; Prague, France, 58 metres; New York, W2XAL, 49.67 metres; Bound Brook, New Jersey, W3XAL, 49.18 metres; Pittsburgh on 48 metres; Madrid, 43; Paris, 32; Zeesen, 31; Eindhoven, Holland, 31. I can get Bound Brook, New York, about any night."—W. P. Hucknall. 10/4/31.

I have examined the above testimonials, and am satisfied that they are genuine communications.—(Advert. Manager, Daily Paper.)

THE NEW REGIONAL UNIT



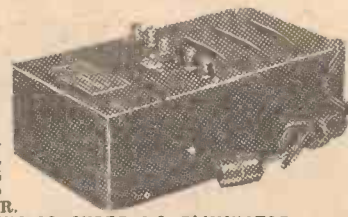
This epoch-making invention (P. Patent 21319), as designed for use with the Northampton Plating Co. Screen-Grid Three, has been found equally efficient in improving all types of sets. This unit is not a wave trap or rejector, and, unlike same, does not require adjustment for each wavelength. It has been designed to overcome the enormous interference caused by the New Regional Stations, and many foreign stations have been obtained with ease, using an old set that was useless without the new Regional unit.

SPECIAL OFFER.—7 days' approval to test. This Unit will be sent to any address on payment of 7s. 9d. Cash or C.O.D., with the guarantee that if it does not improve your set the money will be instantly refunded if returned undamaged.

SPECIAL OFFERS

7 Days' Approval to Test

Make your Set all electric by fitting the Northampton Plating Co. Super A.C. H.T. Eliminator with Trickle Charger. This Unit value £6, will be sent to any address on payment of 70/- Cash or C.O.D. It is most silent in operation. STATE MAINS VOLTAGE AND CYCLES AND VOLTAGE OF ACCUMULATOR.



NORTHAMPTON PLATING CO. SUPER A.C. ELIMINATOR
This A.C. Eliminator, value £3, will be sent to any address on payment of 42/- Cash or C.O.D. It is guaranteed to be most silent in operation, giving over 15 milliamperes and suitable for all 2 and 3-valve sets. State mains voltage and cycles.

These Units are sold with the guarantee that if they are not superior to other units on the market, and not giving complete satisfaction, your money will be instantly refunded if returned in good condition and undamaged. **EASY PAYMENTS ARRANGED. TRADE INQUIRIES INVITED.**

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Usual Price	Sale Price	Usual Price	Sale Price	Usual Price	Sale Price	Usual Price	Sale Price
10/- Latest Type Cabinet, 12 x 8	4/11	7/6 H.F. Choke	3/11	17/6 Dual Coil for M.M.3	12/6	4/- Reaction Condenser	1/11
5/- Ebonite for same, 12 x 8	3/-	2/- H.F. Choke	1/6	Triotron Dull Emitter	...	5/- D.I.F. Reaction	1/11
8/6 Transformer	3/11	2/6 Daventry 5GB Coil	1/3	Valve	4/11	2/- Loud Speaker Cord	11d.
4/6 .0005 Variable Condenser	2/11	10/6 6-Volt Ampiton Valve	3/11	5/- Cycle Tyre	2/6	2/- Phone Cord	11d.
2/6 4 Blueprints of Famous Sets, 2, 3 and 4 valve	1/-	12/6 Cone Unit	4/11	2/6 Cycle Tube	1/3	6/- S.L.F. Condenser	2/11
1/- Anti-Mic. Valve Holder	6d.	12/6 Speaker Cabinets	7/11	6/6 Double-Reading Voltmeter	3/11	21/- D.C. Eliminator, 15 Milli-amp.	17/6
2/3 Rheostat	9d.	2/- 12-in. Speaker Frets	11d.	15/- Titan Coil	9/11	£4 A.C. Eliminator, 20 Milli-amp.	59/-
2/- Indoor Aerial	9d.	3/- 15-in. Speaker Frets	1/11	17/6 Screen Grid Valve	9/11	£3 A.C. Eliminator, 15 Milli-amp.	42/-
5/- Earth Tube	1/6	2/- 12-in. Silk for Fret	6d.	Triotron Super Power Valve	6/6	17/6 Electric Iron (weight 5 lb.)	7/11
10/- Guaranteed Phones	3/11	3/- 18-in. Silk for Fret	1/6	9/- 60-Volt H.F. Battery	3/11	25/- Electric Heater	9/11
3/6 S.M. Dial	1/6	7 6 Old Type Cossor Coils	3/11	12/6 100-Volt H.T. Battery	6/11	30/- Cone Speaker	9/11
17/6 New Type Cossor Long Wave Coils (pair)	9/6	15/- Old Type Cabinets, 21 x 7 Ebonite for same	3/11	15/- 120-Volt H.T. Battery	8/11	Phones Repaired	2/6
7/6 Volume Control	3/11	12/6 Cabinet, 18 x 7	6/11	5/6 2-Volt Accumulator	3/6		
		7/6 Aluminium Panel, 18 x 7	2/11	4/6 Neutralising Condenser	1/11		

New Cycles, Guaranteed, 59/11; with 3-speed, 79/11; with Dunlop Tyres, 10/- extra.

Parts supplied for all sets at Reduced Prices. Send now to avoid disappointment. Cash with order or C.O.D. Special terms to those making sets. All goods guaranteed and exchanged if not satisfactory. Inquire for anything you want. Trade supplied. Send for our wonderful Bargain Price List A.W. Owing to the enormous number of inquiries and orders received, write clearly Name and Address in Block Letters to the firm that made Radio Popular. Letters must be fully stamped.

NORTHAMPTON PLATING CO. (Radio and Cycle Manufacturers), NORTHAMPTON

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FINDING HIDDEN TREASURE BY RADIO!

FINDING hidden treasure by radio is not mere fiction, for there is a special branch of United States Naval Bureau, of the Canadian National Railways, and of the Telefunken Co. in Germany in each of which radio is put to this novel purpose.

The type of "treasure" which radio methods are successful in locating is not sunken Spanish galleons or trunks of doubloons, but metal ore in prospective mining areas and modern steel-hull wrecks on the ocean bed. Oil streaks, new coal sources, and water springs beneath the ground can also be located.

Any readers who served in the Signal Corps during the war may recall a type of communication which the French Army Communications employed extensively, and which was the best that could be until radio telephony came along and the old Round valve was developed. Well, it is this type of signalling, known as earth-current communication, which has formed the basis of radio treasure-hunting. For many purposes almost exactly the same type of apparatus is employed.

What used to happen in war-time was this. Some unlucky signaller would be deputed to go out into No-man's Land with a couple of copper earth rods which

he endeavoured to place about 200 yards apart and to connect each to the listening post. A similar arrangement was installed at H.Q., and in this case the two rods were connected to the secondary terminals of an L.F. transformer carrying the speech currents. The low-frequency currents travelled out in circles from the "aerial" in the ground, and could be detected on a pair of phones connected across the two earth rods at the receiver.

Using H.F. Currents

The whole point was that the scheme wouldn't work properly in shell-holed ground, for the amount of scrap metal buried in the earth appeared to affect the earth-current flow. It has been rumoured, even, that a buried ammunition store, deserted in retreat by "Jerry," was located in this way, and it is not improbable.

This earth-current method is one used for locating metallic ore or water springs when the depth is not great, nor the area to be explored very large. It is not very efficient, owing to the low-frequency currents used.

In examining possible mining districts in the Western U.S., where the country is hilly, some good work has been done with

an ordinary 50-metre transmitter. On the very short waves it is easy to make both receiving and transmitting aeriels very directional, and if a low-power transmitter is operated on one side of a ground elevation, with the aerial directed towards an equally directional receiver on the other side of the elevation, then the presence of any metallic ore intervening will cause a decrease in signal strength.

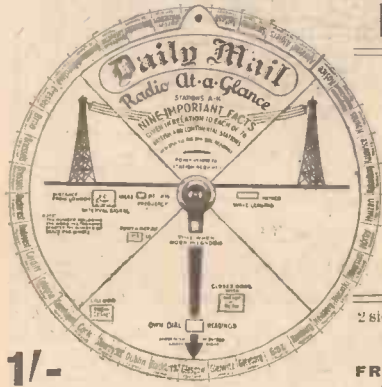
The presence of ore has the same effect on radio waves as does a mirror on light waves, and when a mechanical dot transmitter is used, accurate measurements can be made of received strength.

The same method is used in locating metal, either a ship's hull or metallic ore, at the bottom of the sea. Two tugs with D.F. aeriels circle round likely spots, and measurements are made of the signal strength received by one from the other. When the directional lines and the fields of force are drawn on a map the position of the metal can be roughly located.

There is another scheme which is a development of the foregoing. Doubtless you know that with modern very short-wave transmitters the "beam" effect of the waves can be made very marked. The Huizen 16.88-metre station has a beam of only 5 degrees each side of the maximum point, and within a mile or two from the transmitter *nothing at all* can be heard outside the fan of this beam.

(Continued on page 573)

HAVE YOU GOT YOUR "DAILY MAIL" RADIO CHART?



... the cleverest thing of its kind ever devised ...

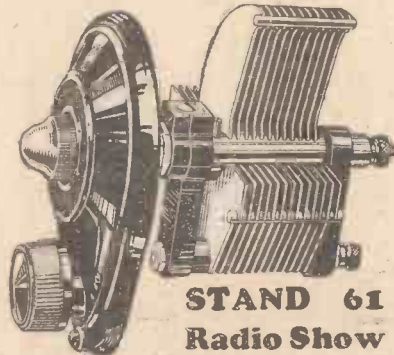
HOW TO IDENTIFY RADIO STATIONS AND GET THEM AS YOU WANT THEM

EVERYBODY'S USING IT. GET YOURS TO-DAY.

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1/-

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LOG CONDENSER AND VERNIER DIAL

Exceptionally accurate tuning can be obtained by fitting the Formo Vernier Dial to the Formo Log Condenser. The aperture and scale of the dial are set at an angle of 30 degrees, thus ensuring easy reading.

Condenser . . . 4/-
Vernier . . . 2/6
See also page 488

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The "AW" Condensers

Famous throughout the world for their elastic bearing system.



"AW" Type 770.



"AW" Type 110.



"AW" Type 220 (straight).



"AW" Type 660 (Logarithmic mic)



"AW" Type 880.



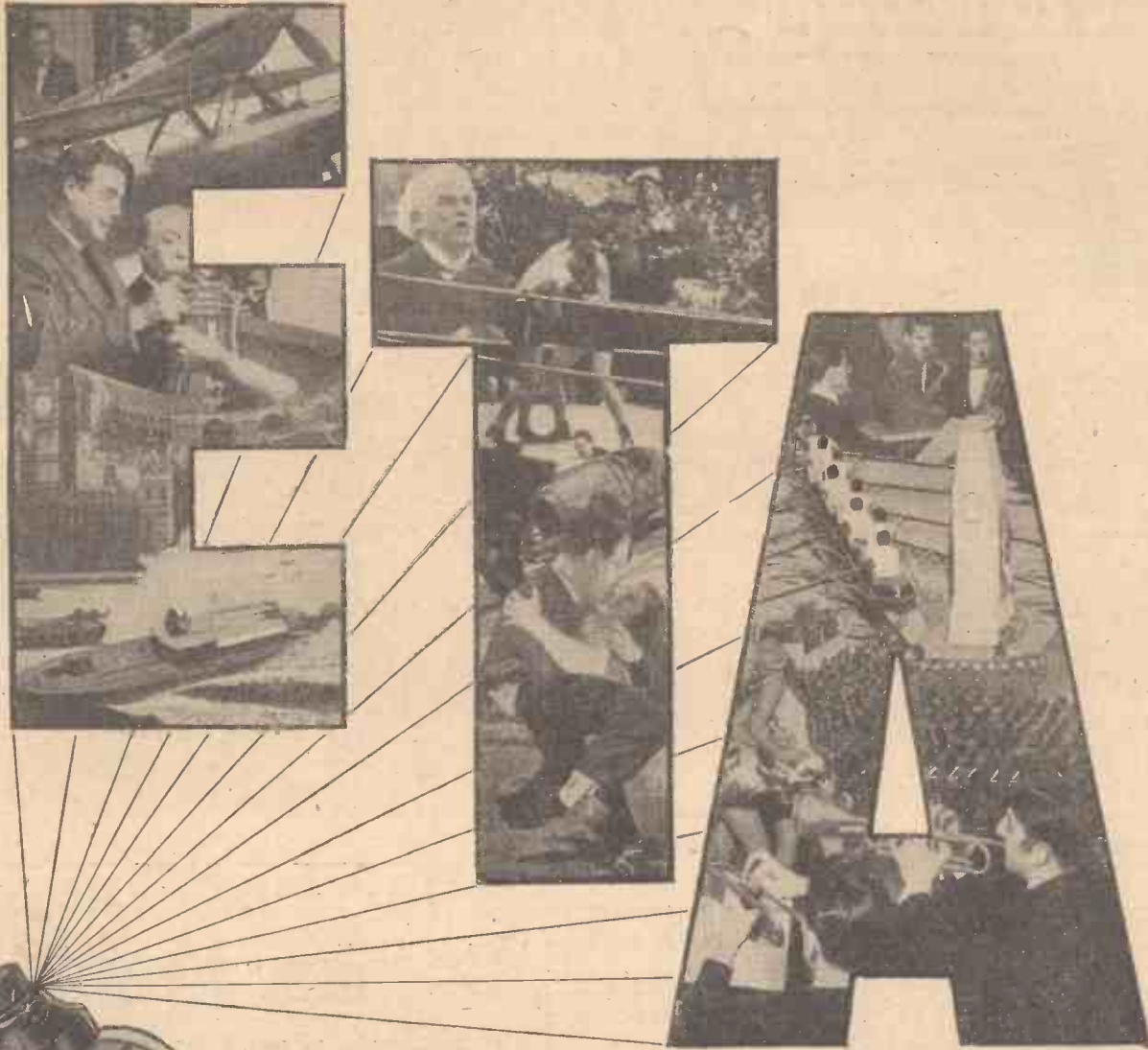
"AW" Type J, Side View showing special isolation.

"Beware of Imitations."

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GEORGE ROBINSON & SON, LTD. (Established 1850)
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through ETA Valves
means better Selectivity
clearer reception**

THE ELECTRICAL TRADING ASSOCIATION LIMITED,
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Don't Forget to Say That You Saw it in "A.W."

MAKE YOUR OWN RADIO-GRAM

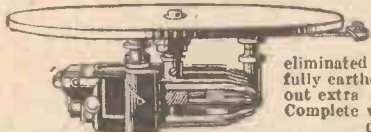


The British Ideal "DAPTACON" Pick-up is supplied with three separate leads, giving low, medium and high output for use with different power sets. Even though your radio be only a ONE-VALVE Set the "Daptacon" is so sensitive that it will give splendid loud-speaker reproduction from Gramophone Records. It is beautifully finished in Florentine Bronze, absolutely complete in box with full instructions, ready for use with any power or make of radio set. This Pick-up is also supplied at the same price with a patent CARRIER-ARM which ensures that the Pick-up travels across the record in a dead straight line, minimising wear on the record grooves.

32/6

ASK FOR "DAPTACON"

The "DAPTACON" ELECTRIC GRAMOPHONE MOTOR is universal for both A.C. or D.C., and covers voltages, 100 to 120, and 200 to 250. Therefore can be used *anywhere* by simply plugging into any electric light socket. All frictional surfaces automatically lubricated, spindles run in best bronze bearings and have ball-bearings to take up end play. Guaranteed not to heat up.



Fits easily into *any* Gramophone and running cost negligible. When used in a Radio-gramophone electrical interference is eliminated by the use of a small condenser, fully earthed, supplied without extra cost. Complete with 12-in. plush-covered Turntable

55/-

The well-known "DAPTACON" products are on sale at leading dealers everywhere. Trade inquiries to: BRITISH IDEAL PATENTS, LTD., Green St., Brimsdown, Middlesex. 'Phone: Enfield 1741-1808, Or to the usual Factors.

A REAL ADVANCE IN HOME-RECORDING



YOUR RADIO AND YOUR GRAMOPHONE NOW BRING TO YOU A MARVELLOUS NEW ENTERTAINMENT

You can now make records in your own home on your own gramophone through your own wireless set, with the marvellous Kingston-Wearite Home Recorder, now made by the manufacturers of the famous Wearite Components. It is simplicity itself, costs little to buy and next-to-nothing to run.

You can record anyone's voice, any musical instrument, and any radio broadcast. Clear and concise directions are sent with every instrument.

No less than 37 technical press experts from the leading national newspapers and publications commend to you this marvellous Home Recorder. We have prepared for you a free illustrated folder giving full details. Write for your copy now. Or ask your dealer for a demonstration.

Kingston-Wearite Electrical Home Recorder (Broadcast Model)	67/6	Kingston-Wearite Record Blanks	4/6 per doz.
Kingston-Wearite Acoustic Model	45/-	Kingston-Wearite Microphone	42/-

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THE M.12 CHASSIS 35/-

The Most Amazing Speaker Ever Made

Outstanding in its wonderfully realistic tone, and its ability to handle great volume. That *essential* to absolutely true reproduction—The **RE-INFORCED DIAPHRAGM**—is found **ONLY IN CELESTION SPEAKERS**. That is why the Celestion M.12 gives such outstanding results, and why it covers a tonal range never before attained in a cone speaker.

Three terminals allow any output valves to be accurately matched. At **35/-** the M.12 represents *the finest value ever offered*. Truly a speaker of outstanding merit.

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A demonstration will instantly convince you. Insist on your dealer demonstrating CELESTION or write for literature to—

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FOREMOST NAME IN SOUND REPRODUCTION

Advertisers Appreciate Mention of "A.W." with Your Order

"FINDING HIDDEN TREASURE BY RADIO!"

(Continued from page 570)

It has been found, though, that the presence of any large conducting mass, such as a strata of ore, near the beam deflects it and distorts the local curve.

All that has to be done, therefore, is to set the transmitter sending out a constant-amplitude carrier wave and to walk round the locality with a small frame aerial, the two ends of which are connected to a valve voltmeter. When the beam is plotted the distorted area shows the presence of the conducting mass.

Canadian prospectors some years ago made use of a very simple radio gadget for locating water. A frame about 10 ft. square was made up, horizontally, on a trolley cart, and was connected to a one-valve oscillator having a milliammeter in the plate circuit. The oscillator was started and the plate current noted. This current value was found to vary as the frame was wheeled over water springs!

When the B.B.C. engineers were selecting a site for what has turned out to be Slaithwaite they had to make similar

The "Olympian Three" described in this issue can be seen on our Stand 71 at Olympia

investigations to determine the nature of the soil and the presence of conducting masses in the locality.

This was automatically shown when the transmitter van was set in operation, for the comparison of the aerial current, when a counterpoise earth and a portable aerial were used, at different points literally showed "how the land lay."

Comparison of earth connections at almost any amateur receiver, and the difference of signal strength which results, shows how the transmission of radio waves depends on the nature of the lower capacity. In London, for example, some areas are supposed to be good and others bad for reception; but generally this is due to the nature of the subsoil, and not to what are called "blind spots"—whatever they may be.

Reverting once more to the B.B.C. experiments in connection with the regional scheme, it is interesting to note that very accurate field-strength curves were made over London. The curves should be true circles, but the distortion is caused by the presence of the large amount of metal in building construction.

Exactly the same effect is noticed in exploring open tracts of country, where there are no buildings, and where the distortion of the curves is due to metallic ore or water springs, and the direction of distortion shows the actual location of these "hidden treasures."

YOU complain of the dole problem.

What do you do to solve it?

ACT NOW

No British person should to-day buy a foreign article made with foreign labour and capital, if he can buy a British article of the same quality instead.

Within the next week hundreds of you will buy an H.T. Battery. What will you buy?

Grosvenor Batteries are made in Watford, Hertfordshire. Hundreds of English people are employed there.

Within a few weeks we should employ hundreds more if you buy a Grosvenor Battery.

So many wild claims are made for H.T. Batteries that we won't compete. We'll make one true statement, however.

●●● To the best of our belief no battery gives as consistently good results or has as consistently long a life as a Grosvenor.

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108 V. ..	10 0	105 V. ..	21 0	108 V. ..	14 0
120 V. ..	11 0	120 V. ..	24 0	120 V. ..	15 6

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 J.C.2

A NOVEL WELCOME

THE photo-electric cell is becoming as universal in its applications as the thermionic valve, and in some respects lends itself to even more ingenious uses. The latest innovation hails from America and is designed to offer an automatic welcome to business guests. As he passes through the doorway the visitor intercepts an invisible ray of light, and in so doing operates a photo-sensitive relay. This in turn starts up a gramophone which bids the caller a pleasant good-day, directs him to the adjacent cloak-room, and bids him hang up his coat and hat. Simultaneously a distant call-bell is rung to notify the reception clerk that his services are required to carry on after the robot cell has completed its routine duty.

B. A. R.

MODERN STANDARDS

THE time has gone by when a broadcast receiver was considered satisfactory if it would bring in a programme occasionally, and by dint of much fiddling with tuning-controls and similar methods of persuasion. Nowadays a wireless set is expected to comply with the same standards of utility and reliability as are applied to any other mechanical or electrical appliance. It must not only bring in the programme expected of it, but it must do so invariably, day in and day out, producing an output of constant strength and quality in the hands of an unskilled operator. This standard is, in fact, achieved by the modern all-mains set with switch-controlled tuning.

M. A. L.

KEEPING THE WOLF AWAY

IN certain districts of the Siberian Steppes, a microphone is utilised to give warning to the villagers of the approach of dangerous packs of wolves which infest these areas in the depth of winter. At certain strategic points in the forest, microphones are suspended and connected up in series to a guard post at the nearest village. Here a constant watch is kept, and when the presence of a wolf-pack is announced by howls in the microphone, the local guards are mobilised and sally forth with rifles and shot-guns to drive off the savage intruders.

M. B.

FIBRE GRAMOPHONE NEEDLES

IT is a moot point whether fibre or steel needles give the best reproduction. Each type has its own school of adherents, though most people agree that fibre causes much less wear and tear on the record. On the other hand the fibre needle is liable to break down in the groove, especially at a heavily recorded passage, unless the sound-box is correctly aligned with the track. Where preference is definitely in favour of the fibre needle, it is advisable to fit a sound-box specially designed for its use.

Two new sets feature in the programme of Messrs. Hustler, Simpson & Webb, Ltd., for 1932. These are the "1932 Super Two," which sells at £4 4s., and the three-valve Radio-gram, price £16 16s. The two-valver can be obtained complete with a four-pole balanced-armature speaker and H.T., L.T., and G.B. batteries. The Radio-gram is battery operated, but can be supplied with a mains eliminator if desired.

Owing to a typographical error, the "1932 Radio" slogan in the New Times Sales Co. announcement in last week's issue was given as "1923." Readers will not need to have this obvious error pointed out, and it remains only to emphasise the point of the slogan, that the easy terms provided under the New Times plan make it possible for every listener to have a really good set.

DO YOU KNOW—

THAT when following out a blueprint, dotted lines indicate leads which are taken beneath the baseboard or terminal strip, while solid lines denote those connected above?

THAT the speaker in your portable or transportable set should occasionally be adjusted? In enclosed sets one is apt to forget the adjustment of the speaker armature or reed.

THAT with an A.C. set it is sometimes possible to use a 6-volt car sidelamp bulb across the 4-volt heater circuit as a pilot lamp? Take care, though, that this does not upset the filament current value.

THAT crackling in mains units can sometimes be traced to a faulty contact of the negative socket, which, of course, affects all tappings?

AUTHOR SPECIFIES SOVEREIGN OLYMPIAN 3



SPECIFIED by "A.W." SOVEREIGN VOLUME CONTROL (type V.C.) in original design of "Olympian 3." No need for greater proof of Sovereign superiority—a quality component at a popular price. All values (with protecting cover), each ...

4/6



SPECIFIED by "A.W." SOVEREIGN (MAX.) TYPE CONDENSER, also in original designs. This famous component now sets the standard for use in selectivity circuits. Highest quality—amazing new low-price level. All values (except H Type, 1/6) ...

1/3



SOVEREIGN L.F. TRANSFORMER

The latest addition to the Sovereign range is housed in moulded bakelite case. Precision manufacture ensures greater volume and purer tone. Ratios 5:1 and 3:1

7/6

COMPONENTS OF STERLING

ANOTHER SCORE FOR SOVEREIGN

● Sovereign Twenty Shilling Speaker. Complete in solid oak cabinet of simple attractive design. Under test handled heaviest load without stress. Pure toned full volume, complete

20/-

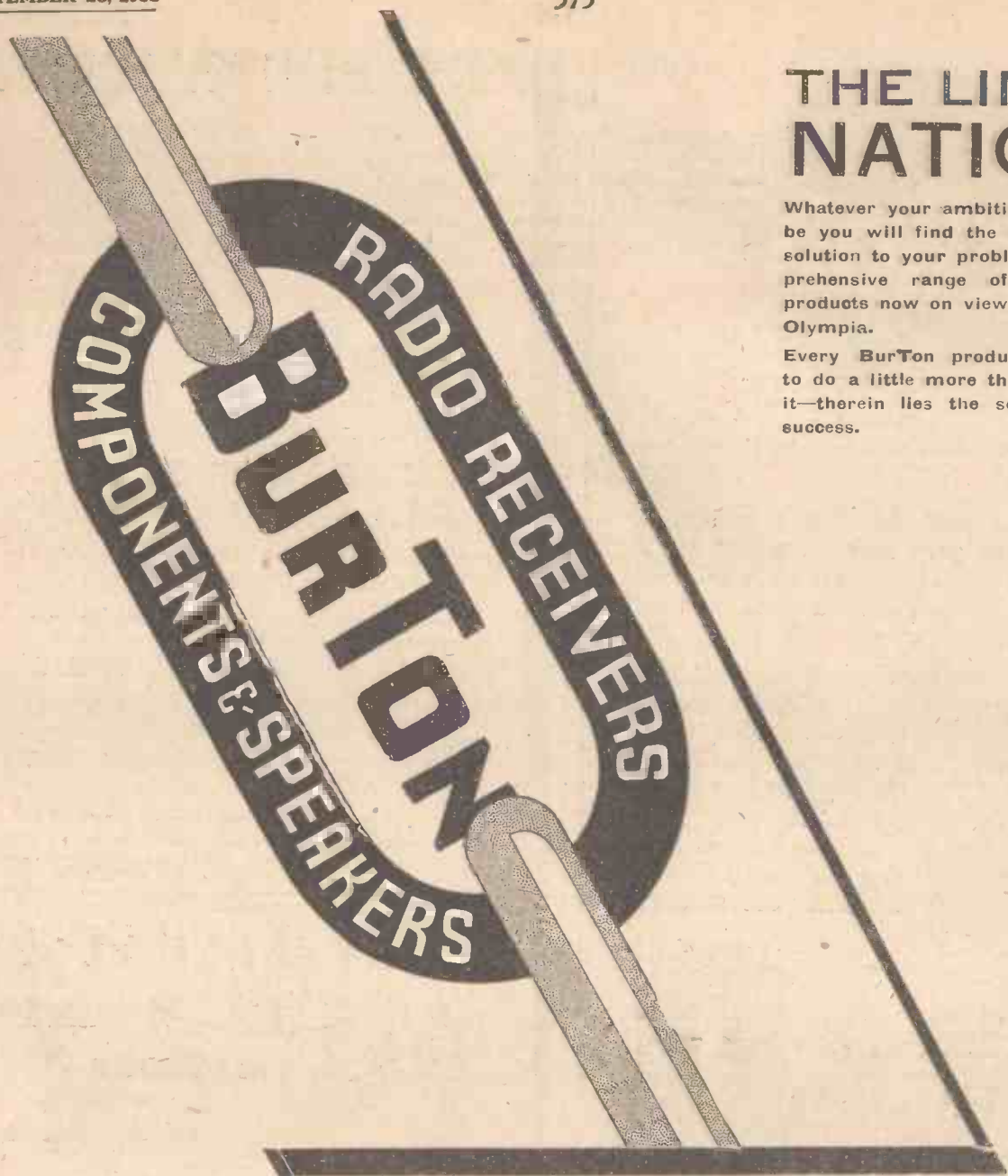
SENSATIONAL LOW PRICE LEVEL FOR SPAGHETTIS

Sovereign Superior Spaghetti Resistances reduced to amazing low price level. Improved too, in design. All values from 600 ohms 4d. to 100,000 ohms 1/3.

SEND FOR CATALOGUE OF NEW SEASON'S RANGE OF COMPONENTS

SOVEREIGN PRODUCTS LTD

52/54 Rosebery Avenue, London, E.C.1



THE LINK OF NATIONS

Whatever your ambitions in Radio may be you will find the most satisfactory solution to your problems in the comprehensive range of BurTon Radio products now on view at Stand No. 31, Olympia.

Every BurTon product will be found to do a little more than is claimed for it—therein lies the secret of BurTon success.

New Lines in the BurTon range for the coming season include:—

Loud-speakers of exceptional merit.

A combined Three-valve Battery Receiver and Speaker set.

ALL-MAINS POWER SUPPLY UNITS for A.C. and D.C. Mains.

New Condensers—New Switches—Coils—Three-valve Kits, etc.

All the old favourites are retained at even more attractive prices still.



OLYMPIA

C. F. & H. BURTON, Progress Works, Walsall

You Will Help Yourself and Help Us by Mentioning "A.W." to Advertisers



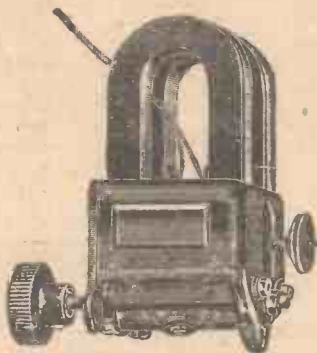
AIDS TO BETTER RADIO!

These are the World famous Units more scientifically constructed than ever before. The laminated pole pieces working on V slides are a huge advance on all Units hitherto made, and give a volume with clarity that is unequalled.

Compare the results which Eliion gives with those of higher priced Units and judge for yourself. The finest set in the World depends upon its speaker for results. Let your set give of its utmost by incorporating an Eliion Unit in your speaker.



LOUD-SPEAKER UNIT S.60
Adjustable 4-pole Armature Unit with precision adjustment as in Type 60. Price 24/-



LOUD-SPEAKER UNIT S.50
Very powerful 4-pole balanced Armature Unit. Laminated pole pieces. Price 30/-



CHASSIS K.5
Diameter 1 1/4 in., depth 4 in. Price 9/6

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Telephone No. :
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5886-7-8

Northern Office :
7 MARTON ROAD,
MIDDLESBROUGH

TUNEWELL

You are invited to visit Stand **82** at Olympia (Empire Hall) September 18-26, and inspect our extensive range of Battery Eliminators, Rectifiers and Chargers, as used by the leading Electric Light Corporations. See also our full range of Mains Transformers and Chokes—

A TUNEWELL CHOKE FOR EVERY PURPOSE

MAKE YOUR SET AN ALL - MAINS SET

Models of eliminators for home construction will be exhibited and circuit diagrams explaining their assembly may be obtained.

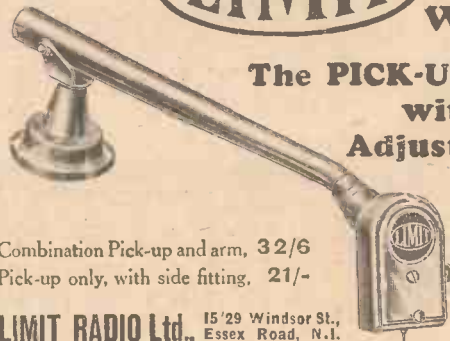
The usual range of TUNEWELL COILS and other components will be on view.

Ask for the leaflet describing the Tunewell S.G.3 for home construction.

TURNER & CO.

54 STATION ROAD, LONDON, N.11

IT'S THE **LIMIT** YOU ARE WANTING



The **PICK-UP** with the **Adjustable Reed.**

Combination Pick-up and arm, 32/6
Pick-up only, with side fitting, 21/-

Obtainable from Dealers or write direct.

LIMIT RADIO Ltd., 15/29 Windsor St., Essex Road, N.1.



The Camco "Melodee" Speaker Cabinet

IMPROVED—In Appearance and Performance . . .

Users of the Camco "Melodee" Speaker Cabinet all over the country are saying this. It is definite proof that they are not words but facts! The "Melodee" does improve the performance of any unit housed in it! And it is a handsome, well-finished cabinet. Prices from 22/-. Write now for FREE copy of the new 24 page Radio Cabinet Catalogue.

CARRINGTON MFG. CO., LTD.,
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Phone: HOL 8202 Works: S. Croydon

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ADDRESS _____

A.W.14

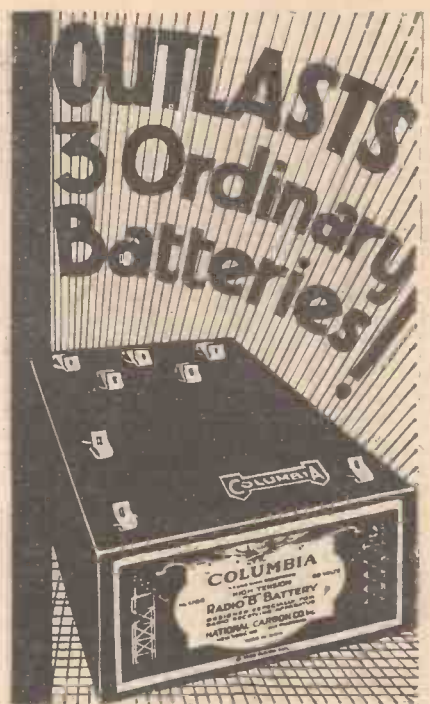
Every **CAMCO** Cabinet bears the **CAMCO Seal.**

Please mention "A.W." when Corresponding with Advertisers

BROADCAST TELEPHONY

Broadcasting Stations classified by country and in order of wavelengths. For the purpose of better comparison, the power indicated is *aerial energy*.

Kilo- Metres cycles	Station and Call Sign	Power (Kw.)	Kilo- Metres cycles	Station and Call Sign	Power (Kw.)	Kilo- Metres cycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN								
25.53	11.75r		328.2	91r		303.4		
			328.9	91z		416	72t	
242	1.275		345.2	869		NORTH AFRICA		
261.3	1.148		370.4	810		825.3		
288.5	1.040		385	779		72t		
288.5	1.040		447.1	67r		NORWAY		
288.5	1.040		466	644		235.8	1.271.9	
288.5	1.040		1,445.7	207.5		240.6	1.247	
288.5	1.040		1,724.1	174		365.2	821.2	
288.5	1.040		1,724.1	174		367.6	816	
288.5	1.040					453.2	662	
288.5	1.040					493.4	608	
288.5	1.040					500	536	
301.5	995					1,083	277	
309.9	968					GERMANY		
356.3	84z		31.38	0.560		214.2	1.400	
376.4	797		217.1	1.38z		234	1.283	
398.0	75z		218.5	1.373		244.1	1.229	
479.2	626		227.4	1.319		312.8	059	
1,554.4	193		227.4	1.319		335	896	
			232.2	1.29z		381	733	
			239	1.256		408	734	
			245.0	1.220		1,411.8	212.5	
			253.4	1.184		POLAND		
			259.3	1.157		214.2	1.400	
			260.8	1.11z		234	1.283	
			276.5	1.085		244.1	1.229	
			283.6	1.058		312.8	059	
			283.6	1.058		335	896	
			318.8	94t		381	733	
			325	92z		408	734	
			360.1	83z		1,411.8	212.5	
			372.3	805		PORTUGAL		
			390	770		290.5	1.033	
			419	716		ROMANIA		
			453.2	66z		394	76r	
			472.4	635		RUSSIA		
			532.0	56z		427	702.5	
			559.7	535		497	603.5	
			559.7	536		511	585	
			566	530		720	476.6	
			569.3	527		800	375	
			1,020	185		840	357	
			1,634.9	183.5		937.5	329	
			2,525	119.3		1,000	303	
						1,060	283	
						1,073	279.0	
						1,103	272	
						1,304	230	
						1,481	202.5	
						SPAIN		
						252	1.193	
						268	1.121	
						349	860	
						366.9	817.7	
						424	707	
						450.1	666.5	
						SWEDEN		
						230.3	1.304	
						257.3	1.166	
						307.5	975.5	
						322	93z	
						431	689	
						512	554	
						770	389	
						1,229.5	244	
						1,318	222.5	
						SWITZERLAND		
						244.1	1.229	
						246	1.220	
						405.5	743	
						459	653	
						763	395	
						TURKEY		
						1,204.8	249	
						1,538	195	
						YUGOSLAVIA		
						308.3	973	
						430.4	697	
						574.7	522	



The Columbia Triple-capacity Battery (4780) is still the world's most economical battery. Its larger cells give you longer service than three ordinary batteries. They give you reception clear and undistorted, built on smoothly flowing power, free from all crackling noises.

Ask your dealer for Columbia 4780 (Triple Capacity), 60 volts. Now reduced to 17/6.

If your dealer has not Columbia in stock, send to us, giving his name.

Other famous Columbia Batteries.

4486.—"Layerbilt," for large sets using power valves. Truly a battery and a half. 45 volts. 24/-.

4755.—For portables. 99 volts. 18/-.

No. 6.—Dry Cell, Red Label. Highly recuperative. 2/6.

MILLIONS IN USE ALL OVER THE WORLD

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J. R. MORRIS, Imperial House, 15 Kingsway, London, W.C.2

Scotland: J. T. Cartwright, 3 Cadogan Street, Glasgow.

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Please write concisely, giving essential particulars. A Fee of One Shilling (postal order), a stamped addressed envelope, and the coupon on the last page must accompany all letters. The following points should be noted.

Not more than two questions should be sent with any one letter.

The designing of apparatus or receivers cannot be undertaken.

Modifications of a straightforward nature can be made to blueprints, but we reserve to ourselves the right to determine the extent of an alteration to come within the scope of a query. Modifications

to proprietary receivers and designs published by contemporary journals cannot be undertaken.

Readers' sets and components cannot be tested at this office. Readers desiring specific information upon any problem should not ask for it to be published in a forthcoming issue, as only queries of general interest are published and these only at our discretion. Queries cannot be answered by telephone or personally.

Readers ordering blueprints and requiring technical information in addition, should address a separate letter to the Query Department and conform with the rules.

The first of a new Midland Regional series entitled "Midland Towns and Cities" will be given on September 28. The first programme will come from Leamington and will be preceded by a talk on the interesting features of the Spa.

Considerable use is being made of the microphone by Cabinet Ministers of the Spanish Republican Government. Political speeches are regularly broadcast and it is proposed to relay parliamentary debates in the near future.

CLIX

CONSTRUCTOR'S KIT

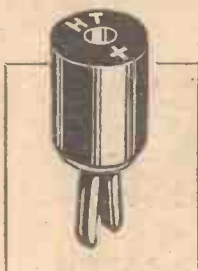
Saves you Time and Money

This Kit contains an assortment of nineteen Clix fitments specially selected for the set builder.

Buy a Clix Kit for your next set and save Fivepence.
Value 3/5. Price 3/-



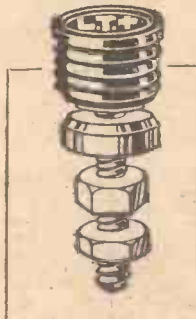
Contents:—2 Spade Terminals engraved L.T.; 2 Plugs and Sockets (A and E); 7 Terminals, H.T., L.T., L.S., 6 Wander Plugs, H.T., and G.B. Value 3/5. Price 3/-



"VICEGRIP" WANDER PLUG 1½d.



CLIX VALVEHOLDER. Type B for keyboard mounting
5-pin Model with screw terminals 1/-
5-pin Model without screw terminals 9d.
4-pin Model with screw terminals 10d.
4-pin Model without screw terminals 8d.
Fully Illustrated Folder A. Free.



PANEL TERMINAL 3d.

See the full Clix range on Stand 202 Olympia.

Cheapest PERFECT Contact

Lectro Linc Ltd., 254 Vauxhall Bridge Road, S.W.1

"THE HOW AND WHY OF RADIO"

READERS who have followed "Hot-spot's" series of articles for beginners during the past year will be interested to hear that these articles have now been produced in book form. Called *The How and Why of Radio*, this book is published jointly by Cassell & Co., Ltd., and Bernard Jones Publications, Ltd. It can be obtained, price 2s. 6d., from all bookstalls, or 2s. 9d. post free, from the publishers.

Lavishly illustrated with nearly one hundred diagrams, photographs and circuits, this book is just what the beginner needs to endow him with a working knowledge of the different parts of the broadcast receiver. Included are many practical details about aerials, tuning cir-

cuits, loud-speakers, and batteries to mention only a few of the chapters. The theory and practice of the valve is also very fully illustrated and explained. Altogether there are twenty-four chapters crammed full of easy-to-understand information for wireless amateurs.

THE MULTI-RANGE DIX-ONEMETER

6 TERMINALS.
60 RANGES.

50/- Worth £10.

(Multipliers extra)
Latest Model. To 1st. Grade Brit. Eng. Standard. Mirror Double Scale. Moulded Base. The finest Precision Multi-measuring instrument obtainable.
Test Booklet Free.



MICRO-AMPS TO 20 AMPS
MILLIVOLTS TO 2,000 VOLTS
50 OHMS TO 50 MEGOHMS
WITH ONE METER

Write for September Sale List
ELECTRADIX RADIOS,
218 UPPER THAMES STREET, E.C.4
Phone: City 0191

TAYLEX WET H.T. BATTERIES

New Prices: Jars 1/3. Sacs 1/2. Zincs 10d. Sample doz. 18 Volts complete with bands and electrolyte 4/1 post 9d. Sample unit 6d. illus. booklet free. Bargain list free. AMPLIFIERS, 30/- 3 VALVE ALL-STATION SET £1. A. TAYLOR, 57, Studley Road, Stockwell, LONDON.

H & B Super Quality Kit FOR THE OLYMPIAN THREE

	2 s. d.
1 Oak-faced wood panel, 11½ by 7 in.	9
1 Baseboard 18 by 10 in.	1 3
1.0305 mfd. triple gang variable condenser with slow motion dial, Lotus	1 5 0
1.0005 mfd. reaction condenser, Lotus	2 6
1 50,000 ohm potentiometer, Colvera	5 6
3 valve holders, Lotus	2 6
1 dual range square peak aerial coil, Varley	15 0
1 dual range inter-valve coil, Varley (H.F.)	8 6
1 special .04 fixed condenser, Dubilier	2 0
1 S.P. valve screen, H. & B.	2 9
1 Binocular H.F. Choke, McMichael	4 0
3.0002 mfd. fixed condensers, T.C.C.	4 6
1 grill leak holder, Lissen	6
1 2-meg. grill leak, Teisen	8
1 filament switch, Junit	1 0
1 H.F. choke, Lewcos	2 6
1 L.F. Transformer, ratio 7-1 Teisen radiogram	12 6
Condenser bank comprising two 2-mfd. and two 1-mfd. fixed condensers, Formo	9 6
3 10,990 Spaghetti resistances, Lewcos	2 0
2 20,000 " " "	3 0
1 30,000 " " "	1 6
1 fuse and holder, Belgin	1 3
1 gramophone jack, Lotus JK5	3 0
7 wander plugs marked H.T. minus, H.T. plus 1, 2, 3, G.B. plus, G.B. minus 1 and 2	2
2 spade terminals marked L.T. plus and minus	4
4 terminals A.E., L.S., plus and minus, Belling Lee	1 6
1 screen grid connector, Belling Lee	6
2 H. & B. terminal blocks	8
1 9 S.G. bias cell, Siemens	1 0
4 yards of thin flex and connecting wire	1 0
CASH PRICE	£5 17 11

3 Cossor or Mullard Valves £1:19:0 extra
H & B Cabinet in Walnut, Guaranteed Hand-made and Hand French Polished £2
Ormond Unit and Cone combined £1:5:0
TERMS: Carriage Paid on all Retail Cash Orders. C.O.D. charges paid over £1.

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IF IT'S YOUR SWITCH

FIT THE "BUSCO" SWITCH and ensure perfect switch contact! There is no contact point to turn round, and when you "switch on" you have contact like a power switch. They are as cheap as the inferior type but far superior in operation. From your local dealer, Halford's Cycle Stores, or

BUSBY & CO., LTD. (Patentees)
Dept. A.W., PRICE ST., BIRMINGHAM

"Amateur Wireless and Radiovision." Price Threepence. Published on Thursdays and bearing the date of Saturday immediately following. Post free to any part of the world: 3 months, 4s. 6d.; 6 months, 8s. 9d.; 12 months, 17s. 6d. Postal Orders, Post Office Orders, or Cheques should be made payable to "Bernard Jones Publications, Ltd."

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets. Contributions are always welcome, will be promptly considered, and if used will be paid for. Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4

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YOUR MOVING COIL SPEAKER!

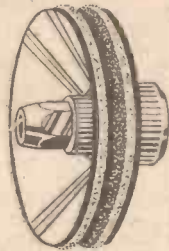
42 Pages of valuable information on how to secure REALISTIC REPRODUCTION.

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CROYDON — SURREY.
PHONE: CROYDON 1618.

THE IMPROVED TONAX CONE ADAPTOR

FOR EVERY CONE USER
Every builder of a SINGLE or DOUBLE CONE SPEAKER can, by using the Patented "Tonax" Chuck, avoid all distortion, chatter and rattle caused by badly fitting cones.



Precision construction. Practical efficient design. Easily fitted to any unit. Two extra chucks, two linen washers, two felt washers, both deep and standard metal washers, and full instructions contained in every box.



Single Cone Type 1/-
Double Cone Type 1/6

From all dealers or send P.O. direct to Dept. A.

GARRATT STORES, 193 Garratt Lane, Warrackworth, London, S.W.18

STAND 249 OLYMPIA

"RED DIAMOND" SWITCHES

Robust Construction. Definite "on" and "off" positions. No shaking. Perfect contacts. Large terminals for easy fitting.

RD39 2 point	1/3	1/6
RD49, dead spindle	1/3	1/6
RD37 3 point	1/6	1/9
RD47, dead spindle	1/6	1/9
RD44 Radio-gram 3 point	2/-	2/3



"RED DIAMOND" DETECTOR

As specified for Crystal Set for 1932

RD49 2/-
By insured Post 2/3 or 2/9 with shield.

Can be mounted on brackets or through panel. Once set always ready. Not affected by vibration. Each one is tested on broadcast before dispatch.

Of all high-class Radio Dealers or Sole Makers:

JEWEL PEN CO., LTD., (Radio Dept. 45), 21-22, Great Sutton Street, LONDON, E.C.1

"CRAFTEASE" CABINETS

For Wireless or Gramophones—Distinctive Designs—Moderate Prices—Supplied "Machined Ready to Assemble" or "Assembled."

Write to-day for latest Catalogue, No. RD-2

CRAFTEASE WORKS, (Dept. RD) Winscombe - Somerset

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EXPRESS POSTAL DELIVERY TO ALL PARTS OF THE WORLD

YOU WANT ADVERTISED GOODS—we have all of them IN STOCK and can give you IMMEDIATE DELIVERY. The Advertisement columns of this publication are our catalogue—free delivery at LIST PRICES (no extra postage).

INTERNATIONAL RADIO BUREAU

FARADAY HOUSE HENRY STREET BLACKPOOL (Lancs) CASH WITH ORDER or C.O.D.

They're all buying

WUFA
(OPPOSITE OLYMPIA)
SEPT. 18-26

Next Week—A fine two-valver for local and distant stations

Watmel's latest!

THE WATMEL SQUARE-LAW TAPERED WIRE-WOUND RESISTANCE

OUR latest product—the Watmel 50,000 ohms wire-wound potentiometer specially wound on a tapered former giving a perfect square-law reading.

This is the first resistance of its kind and was very favourably commented on at the Exhibition.



NOTE THE POINTS—

- 1—Polished pointer-knob.
- 2—Engraved Bakelite front plate.
- 3—Wire Wound Former.
- 4—Insulating bush to insulate spindle from panel.
- 5—Contactfinger. Phosphor-Bronze.
- 6—One-hole fixing—Brass bearing bush resulting in perfect bearing.
- 7—Bakelite case protects winding.
- 8—Back self-cleaning contacts.
- 9—Large contact plate.
- 10—Stops at end of wiring.

ANY RESISTANCE UP TO 50,000 OHMS ... 6/6

This is our latest product. Every part is made from the finest materials. Try Watmel components in your new sets this season. Ask your dealer for full particulars, or write to us direct.

TRADE ENQUIRIES INVITED



GETS THE BEST OUT OF ANY SET
WATMEL WIRELESS CO. LTD.,
Imperial Works, High Street, Edgware,
Telephone: Edgware 0323 (M.C.40)

TANNOY RADIO

for the connoisseur

MIDGET SUPER-HET RECEIVER

Comprising of a high-grade chassis which embodies amplification multi band-pass tuning, with corrected L.F. amplifier. Housed in an attractive walnut figured veneer domed cabinet, with single dial tuning. Incorporating Radio and Gramo switching with independent volume control and moving-coil speaker.

PRICE (complete)
MAINS operated - - 28 gns.
BATTERY " - - 25 gns.



SUPER-HET RADIO GRAMOPHONE (JUNIOR MODEL)

This Radio receiver and Gramophone combined has a high-grade chassis which embodies a multi band-pass tuning super-het receiver and corrected L.F. amplifier. Independent volume control, with necessary Radio and Gramo switching are provided. Automatic brake on Gramo Motor which works on any make or size of record without independent setting. Housed in a beautifully figured polished walnut cabinet of Tudor design.

This instrument is not mass produced but is individually built for a discerning buyer. All models incorporate specially matched moving-coil Speakers.

PRICE, MAINS operated 45 gns.
BATTERY " 43 gns.

SUPER-HET RADIO GRAMOPHONE (SENIOR MODEL)

Similar in appearance to the Junior Model but incorporating a considerably larger Radio and Gramophone output.

PRICE, MAINS operated 55 gns.



TANNOY PRODUCTS
1-7 DALTON ST. WEST NORWOOD, S.E.21

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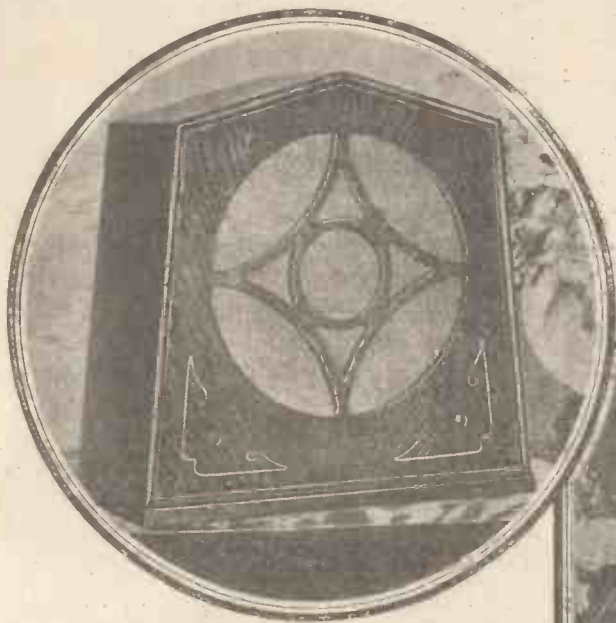
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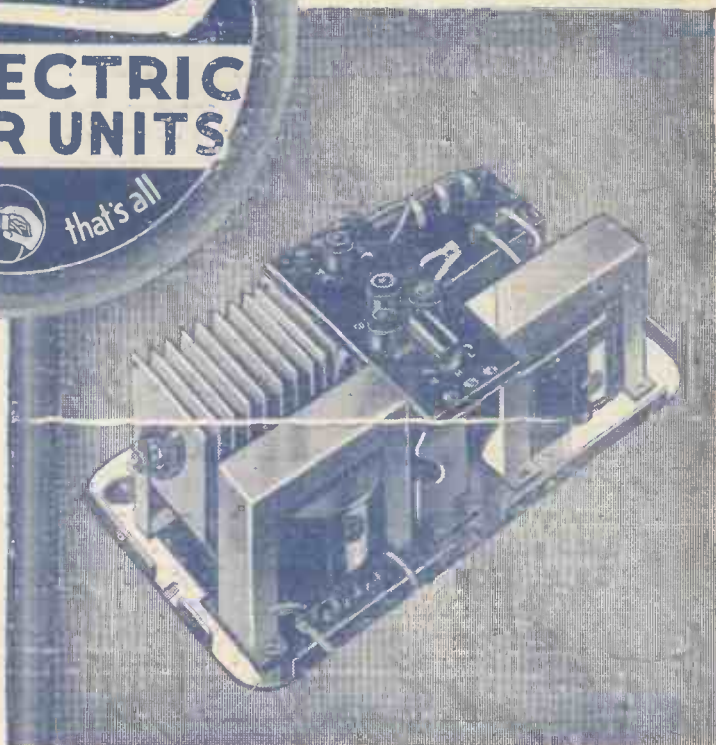
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