

**"TWO-EAR" TRANSMITTERS FOR REALITY!**

**IS THE SIMPLE SET GOOD ENOUGH?**

**THIRD SHOW  
NUMBER  
Enlarged**

# Amateur Wireless

and  
Radiovision

Every  
Wednesday

3<sup>d</sup>

Vol. XXIII. No. 585

Saturday, Aug. 26, 1933

## The PRACTICAL MAN LOOKS AT OLYMPIA



**MAKING  
USE OF  
THE LATEST  
GADGETS**



# "MATCHED PERFECTION" *Scoops the Pool!*

**B**RITISH RADIOPHONE matched perfection components are specified by practically every designer in practically every set of note.

Why is this? Why are the British Radiophone products chosen in preference to others?

The answer is to be found in their quality and reliability. They are all matched to perfection. Many undergo no fewer than sixteen separate and exacting tests before release for sale.

The result is perfect performance—razor-keen selectivity, no slipping, no uneven wear; Radiophone takes hold of the station you want and keeps it for as long as you desire.

Whether you're building afresh this year or merely reconstructing use British Radiophone "matched perfection" and be sure of satisfaction.

BRITISH RADIOPHONE, LTD.,  
ALDWYCH HOUSE, ALDWYCH, W.C. 2.

*Insist on*

# "MATCHED PERFECTION"



## SPECIFIED for the A.C. TRIODYNE

- 1—.0001-mfd. Tubular Fixed Condenser.
- 2—.01-mfd. Tubular Fixed Condensers.
- 1—Midget Three-gang .0005-mfd. Variable Condenser, type 604.
- 1—Full-vision Scale, type 711.
- Accessories : Receptru.
- Also Recommended : 2—5-pin Chassis-mounting Valve Holders, one 7-pin.

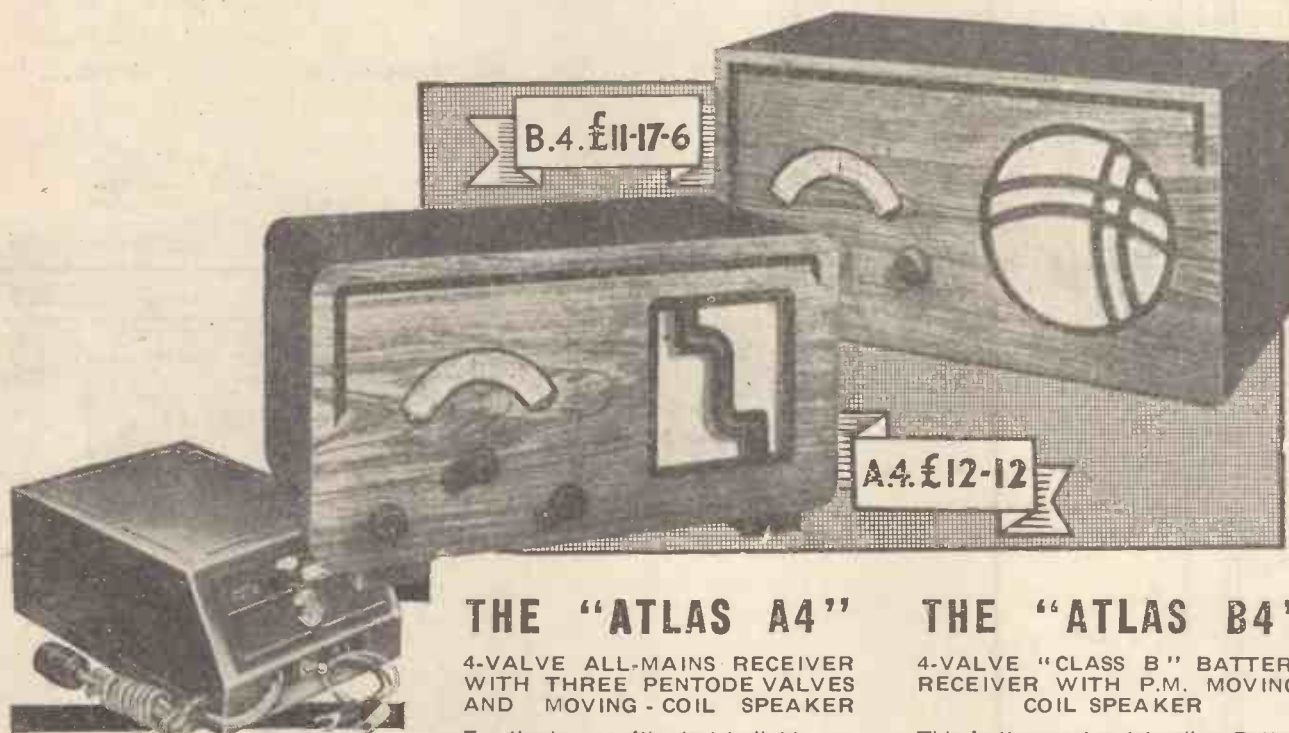
## for the SIGNPOST FOUR

- 1—.0003-mfd. Tubular Fixed Condenser.
- 2—.01-mfd. Tubular Fixed Condensers.
- Accessories : Receptru.

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

# The secret revealed

## SEE THE NEW "ATLAS" SETS AND UNITS AT RADIOLYMPIA, STAND 91



### "ATLAS" MAINS UNITS

It seems incredible that these world's finest Mains Units, the only Units to win the "Olympia Ballots" for two years in succession, could possibly be improved. But they have been—and without any increase in price! Handsome new cases and panels—increased outputs—higher voltages—better smoothing—now suitable even for "Q.P.P." or "Class B."

**IF YOU CANNOT VISIT  
RADIOLYMPIA POST THIS  
COUPON TO-DAY.**

Messrs. H. Clarke & Co. (M/CR) Ltd.,  
Atlas Works,  
Patricroft, Manchester.

Please send me full details of the  
new "ATLAS" Sets and Units.

Name .....

Address .....

..... 27/25/8

### THE "ATLAS A4"

4-VALVE ALL-MAINS RECEIVER WITH THREE PENTODE VALVES AND MOVING-COIL SPEAKER

For the home with electric light, you could not choose a better set at any price. It gives every single thing you want in radio—world-wide reception—flawless truth of tone—3 watts output—and wonderful selectivity.

The secret lies in the three Pentode Valves: Variable - Mu S.G., Detector and Power, the new "ATLAS" M.C. Speaker, and a host of refinements.

For A.C. Mains £12. 12. 0. Cash, or 30/- down and 13 monthly payments of 20/-.

CONSOLE MODEL £13 17 6. Cash, or 40/- down and 14 monthly payments of 20/-.

### THE "ATLAS B4"

4-VALVE "CLASS B" BATTERY RECEIVER WITH P.M. MOVING-COIL SPEAKER

This is the most outstanding Battery Receiver ever produced. It gives the performance of a Mains Set with an H.T. Consumption so low as to be the radio sensation of the year.

So efficient is the circuit, Variable-Mu S.G., Detector, Driver and "Class B" Power, that an input of only 8 m/A. gives an output of fully 1½ watts.

Tone, range, selectivity and volume are beyond comparison. Complete with Valves, batteries and accumulator £11. 17. 6. Cash, or 30/- down and 12 monthly payments of 20/-.

CONSOLE MODEL £13. 5. 0. Cash, or 40/- down and 13 monthly payments of 20/-.

# "CLARKE'S ATLAS"

**H. CLARKE & CO. (M/CR) LTD., PATRICROFT, MANCHESTER**

London Office: Bush House, Aldwych, W.C.2.

Sole Scottish Distributors: G.E.S. Co. Ltd. 38, Oswald St., Glasgow

# DEATH RAYS from the EARTH?

**R**EMARKABLE changes in radio have taken place during the past few weeks. The new sets that will be built during the next six months will put nearly every existing piece of apparatus right out of date.

In the September issue of WIRELESS MAGAZINE full constructional details of three outstanding new sets are given, each of which takes advantage of the latest developments.

Firstly, there is the ALL-PROGRESS FOUR, a battery-operated four-valve super-het.

Secondly, a high-class A.C. super-het receiver giving an output of 2 watts and using A.V.C.—the CONNOISSEURS' SUPER.

The simplest set in this issue is the I.C.B.3, using iron-core coils and class B—a real station-getter.

If, however, you are thinking of buying a complete receiver, test reports on the following commercial sets will help you make up your mind as to the right one for your needs:—

H.M.V. Model 438.

H.M.V. Radiogram 512

Ferranti Gloria Seven

Pye Model P/B.

Don't delay. Get your copy of this splendid 116-page September issue to-day.



**EARTH-RAY PROTECTION**  
Using a china cup to insulate a bed from the influence of earth rays. Such precautions are taken in certain parts of Germany, where there is a regular "craze" for protection

**T**HE September WIRELESS MAGAZINE contains an exclusive feature by Dr. Alfred Gradenwitz on the earth-ray craze prevailing in many parts of Germany. He explains why special "necklace aeriols" are worn to shield off these ubiquitous rays and their harmful effects.

Get your copy to-day and learn more about this new mysterious influence.



**THE EARTH-RAY CRAZE IN GERMANY**  
A whole family wearing protective "necklace aeriols" which are supposed to counteract the influence of earth rays

## SOME OF THE OTHER CONTENTS of the SEPTEMBER ISSUE

IS THE OUTSIDE AERIAL WORTH WHILE? By Dr. E. H. Chapman, M.A., D.Sc.  
THE ELUSIVE ELECTRON—PARTICLE OR WAVE? By L. S. Kaysie  
SKY-REFLECTED WAVES  
SAVING THE MILLIAMPS  
WE TEST BEFORE YOU BUY. By the "W.M." Set Selection Bureau  
TO-DAY'S TUNING. By Percy W. Harris  
RADIO AT OLYMPIA  
A HIGH-FREQUENCY PENTODE FOR BATTERY USERS  
IS CONDENSERLESS TUNING PRACTICABLE? GUIDE TO THE WORLD'S BROADCASTERS  
WORLD'S BROADCAST WAVELENGTHS  
EXHIBITORS AT OLYMPIA  
RADIO MEDLEY. By BM/PRESS  
LOUD-SPEAKERS FOR THE DEAF

MUSICAL TERMS EXPLAINED. By Whitaker-Wilson  
THE WORLD'S CALL SIGNS  
FROM GENEVA TO LUCERNE. By J. Godchaux Abrahams  
THE PLAN DE LUCERNE  
BROADCASTING TO THE STARS. By Kenneth Ulyett  
PROGRAMME NOTES AND NEWS. By T. F. Henn  
ON THE CREST OF THE WAVES. By Jay Coote  
NEWS OF THE SHORT WAVES. By Kenneth Jowers  
THE PORTABLE COMES TO CAMP  
WHAT YOUR PICK-UP HAS TO DO. By P. Wilson, M.A.  
CHOOSING YOUR RECORDS. By Whitaker-Wilson and Chopstick.

# WIRELESS



September Issue  
On Sale TO-DAY

# MAGAZINE

# Now!

## TELSEN

### covers

# Every Radio Requirement

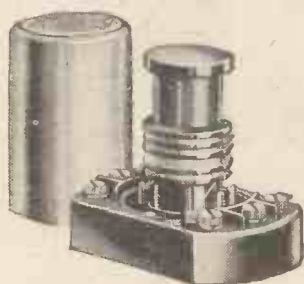
The sensational Telsen range now comprises over 500 component parts and constructor's outfits. For full details, catalogue numbers and prices, see the wonderful new Telsen Radiomag, issue No. 5, which also contains 3 full size 1/- Blueprints and a wealth of invaluable radio information. Get your copy now—price 3d., from your nearest dealer.

*at  
Reduced  
Prices!*

**TEAR OUT AND KEEP THE NEXT FOUR**

**PAGES**

# Sensational New TELSEN COMPONENTS



### TELSEN IRON-CORED SCREENED COILS

The smallest and most efficient tuning coils ever designed. Can be used either as aerial tuning coils or H.F. transformers.

	Price
Single Coil .. .. .	8/6
Twin Matched Coils	17/-
Triple Matched Coils	25/6



### TELSEN HIGH VOLTAGE ELECTROLYTIC CONDENSERS

Excellent for use wherever high voltage high capacity condensers are required. Supplied with special bracket and terminal for mounting on any type of baseboard or chassis.

	275 working peak voltage	500 working peak voltage
Cap.	Price	Price
4 mfd.	3/6	4/6
6 ..	3/9	5/-
8 ..	4/-	5/6



### H.T. UNIT AND L.T. CHARGER FOR A.C. MAINS

For input voltages between 200 and 250 at 40 to 100 cycles. Charges 2-, 4- or 6-volt accumulators at 0.5 ampere.

Price £4 17 6

### H.T. AND L.T. UNIT FOR A.C. MAINS

Similar to H.T. Unit and L.T. Charger, but with the L.T. charger replaced by a centre tapped transformer winding capable of supplying 2.5 amps at 4 volts.

Price £3 7 6



### H.T. UNIT FOR D.C. MAINS

For D.C. inputs of from 200 to 250 volts. Price 35/-

THE most all-embracing range in radio history—that is the only way to describe the wonderful range of radio products which Telsens offers you now! Not only have designs been improved—not only has efficiency been increased—but, in addition, a large number of sensational NEW components has been introduced! The name TELSEN now covers every radio requirement—from the smallest yet most efficient Iron-Cored Coils to the most brilliant All-mains, Battery and Kit-Sets ever designed. See them on Stand No. 88 at Olympia—to-day!



### TELSEN LOW VOLTAGE ELECTROLYTIC CONDENSERS

Ideal where a very high capacity with a fairly low voltage is required. Very compact, with wired ends for easy suspension in the wiring.

25 mfd. at 25 volts ..	Price 2/6
50 .. 25 .. .. .	3/-
25 .. 50 .. .. .	3/-

### TELSEN SMALL TUBULAR CONDENSERS

Very small, yet quite as efficient as the larger types. Tested up to 1,500 volts. Wired ends make them very suitable for suspension in the wiring.

Capacity.	Price
.0001 mfd. to .006 mfd. . . . .	1/-
.01 mfd. . . . .	1/3
.1 mfd. . . . .	1/6



### TELSEN "CLASS B" OUTPUT CHOKE

For matching to any M.C. speaker having either a high resistance speech coil or a low resistance coil and input transformer. D.C. resistance 220 ohms per half winding. Total inductance 18 henries. Price 8/6

### TELSEN "CLASS B" OUTPUT TRANSFORMER

For matching to M.C. speakers having low resistance speech coils. Primary resistance 200 ohms per half winding. Price £2/6



### TELSEN RESISTORS WITH WIRED ENDS

Negligible self-capacity and inductance. Noiseless in use. Value remains unchanged under all circumstances.

Power rating of 1/2 and 1 watt: 250, 500, 1,000, 1,250, 5,000, 10,000, 20,000, 25,000, 50,000, 100,000, 250,000, 500,000 ohms resistance .. Price 1/-

Power rating of 2 watts: 250 to 100,000 ohms resistance .. Price 2/-

Three and 6-watt types can be supplied on demand.

**GET YOUR COPY OF THE TELSEN RADIOMAG No. 5 NOW!**

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

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

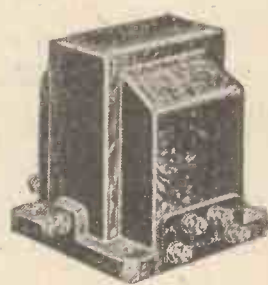
# AMAZING PRICE REDUCTIONS!

## for 1934

VALUE has always been an outstanding feature of the wonderful Telsen range—but never before has Telsen value been so amazing as it is now. For now Telsen announce almost unbelievable PRICE REDUCTIONS! Just look at this list—and see how much you will save by insisting on Telsen Components for that new set you intend to build!

**TELSEN "CLASS B" DRIVER TRANSFORMER**  
 Made in two ratios covering the requirements of all the "Class B" valves available at present. Supplied with comprehensive instructions.

Overall	Primary to half-secondary	Price
1-1	2-1	8/6
1.5-1	3-1	8/6



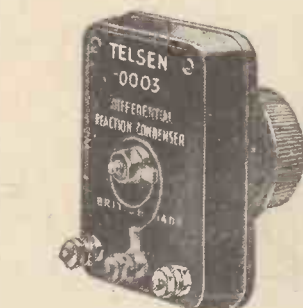
**TELSEN SCREENED H.F. CHOKES**  
 The metal screen, which is connected to an earthing terminal, eliminates interaction.

- "All-Wave" Binocular (10-2,000 metres) Price 4/6
- "Standard" (100-2,000 m.) Price 2/6
- "Short Wave" (10-100 m.) Price 3/-



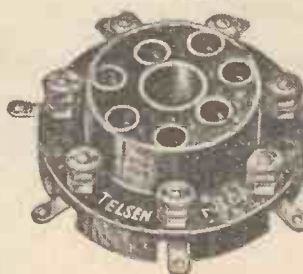
**TELSEN BAKELITE DIELECTRIC REACTION CONDENSERS**  
 Entirely re-designed. Now incorporate several valuable improvements with no increase in price, the whole unit being also now enclosed in a strong dust-proof bakelite case.

Price
·0003 mfd. to ·0001 mfd. 1/9
·00075 mfd. to ·0005 mfd. 2/-



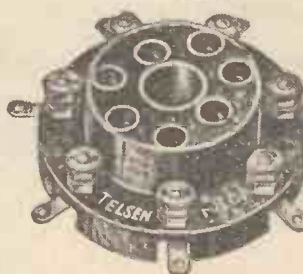
**TELSEN DIFFERENTIAL CONDENSERS**  
 Similar in design and construction to the reaction condensers.

Price
·0003 to ·0001 mfd. 2/-



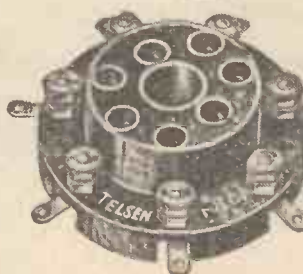
**TELSEN AERIAL SERIES CONDENSER WITH SWITCH**  
 Built on similar lines to the new reaction condensers, providing an ideal selectivity and volume control.

Price
Max. capacity ·0003 mfd. 2/-



**TELSEN 7-PIN VALVE HOLDERS**  
 Accommodate the latest types of valve, such as "Class B" valve. Contact sockets extended in one piece to form soldering tags, ensuring perfect connection.

Price
7-pin Solid Type 1/6
7-pin Anti-Microphonic Type 1/9



No.	H.F. CHOKES	Reduced to
W.74	Binocular H.F. Choke ..	3/6
W.75	Standard H.F. Choke ..	1/6
W.221	Short Wave H.F. Choke ..	2/6

No.	L.F. CHOKES	Reduced to
W.68	40 hy. L.F. Choke ..	4/9
W.69	100 hy. L.F. Choke ..	4/9

No.	OUTPUT CHOKES	Reduced to
W.71	Output Choke ..	6/3
W.72	Tapped Pentode Output Choke ..	6/9
W.172	Power Pentode Output Choke ..	9/6

No.	COILS	Reduced to
W.76	Dual Range Aerial Coil ..	5/6
W.154	H.F. Transformer Coil ..	4/6
W.216	Screened Coil ..	7/-
W.287	Twin Matched Screened Coils ..	14/6
W.288	Triple Matched Screened Coils ..	21/6
W.290	Band Pass Coil Unit ..	14/6
W.292	Band Pass and Oscillator Coil Unit ..	21/6
W.293	Oscillator Coil ..	7/6
W.294	Intermediate Frequency Transformer Coil ..	7/6
S.330	Superhet Coils ..	21/6

No.	PAPER CONDENSERS	Reduced to
W.232	·01 mfd., 500-volt test ..	1/3
W.230	·04 mfd., 500-volt test ..	1/3
W.231	·1 mfd., 500-volt test ..	1/6
W.229	·25 mfd., 500-volt test ..	1/6
W.228	·5 mfd., 500-volt test ..	1/6
W.227	1 mfd., 500-volt test ..	1/9
W.226	2 mfd., 500-volt test ..	2/6
W.239	·01 mfd., 1,000-volt test ..	1/9
W.237	·04 mfd., 1,000-volt test ..	1/9
W.238	1 mfd., 1,000-volt test ..	2/-
W.236	·25 mfd., 1,000-volt test ..	2/-
W.235	·5 mfd., 1,000-volt test ..	2/-
W.234	1 mfd., 1,000-volt test ..	2/6
W.233	2 mfd., 1,000-volt test ..	3/6

No.	DIALS	Reduced to
W.141	Slow motion, Black ..	1/6
W.141A	Slow Motion, Brown ..	1/6
W.184	Illuminated Disc Drive ..	2/6
W.257	Small Disc Drive ..	2/-
W.313	"313" Disc Drive ..	3/6

No.	SWITCHES	Reduced to
W.107	2-pt. Push-Pull ..	9d.
W.108	3-pt. Push-Pull ..	1/-
W.153	4-pt. Push-Pull ..	1/3
W.297	Mains Type ..	1/6

No.	TUNING CONDENSERS—Air Dielectric	Reduced to
W.130	·00025 mfd. ..	2/6
W.131	·00035 mfd. ..	3/6
W.132	·0005 mfd. ..	3/6
W.339	Single Condenser Unit ..	7/6
W.306	Twin Ganged ..	12/6
W.307	Triple Ganged ..	17/6
W.152	·0001 mfd. ..	1/3
W.151	·0003 mfd. ..	1/3
W.150	·001 mfd. ..	1/3
W.149	·002 mfd. ..	1/3

No.	FIXED CONDENSERS—Mica	Reduced to
W.310	·01 mfd. ..	2/-
W.311	·02 mfd. ..	2/6
W.316	·05 mfd. ..	4/6

No.	VARIABLE RESISTANCES	Reduced to
W.299	Hum Adjuster ..	2/6

No.	PAPER BLOCK CONDENSERS	Reduced to
W.175	4 mfd., 500-volt test ..	4/9
W.176	6 mfd., 500-volt test ..	7/-
W.177	8 mfd., 500-volt test ..	9/6
W.178	4 mfd., 1,000-volt test ..	6/6
W.179	6 mfd., 1,000-volt test ..	9/6

No.	TRANSFORMERS—Intervalve	Reduced to
W.61	1-75-1 "Radiogrand" ..	9/6
W.59	3-1 "Radiogrand" ..	6/9
W.58	5-1 " " ..	6/9
W.60	7-1 " " ..	9/6
W.66	3-1 "Acc" ..	4/9
W.65	5-1 " " ..	4/9

No.	OUTPUT TRANSFORMERS	Reduced to
W.62	1-1 "Radiogrand" ..	9/6
W.63	Multi-Ratio "Radiogrand" ..	9/6

No.	VOLUME CONTROLS	Reduced to
W.296	50,000 ohms, with Mains Switch Combined ..	4/6

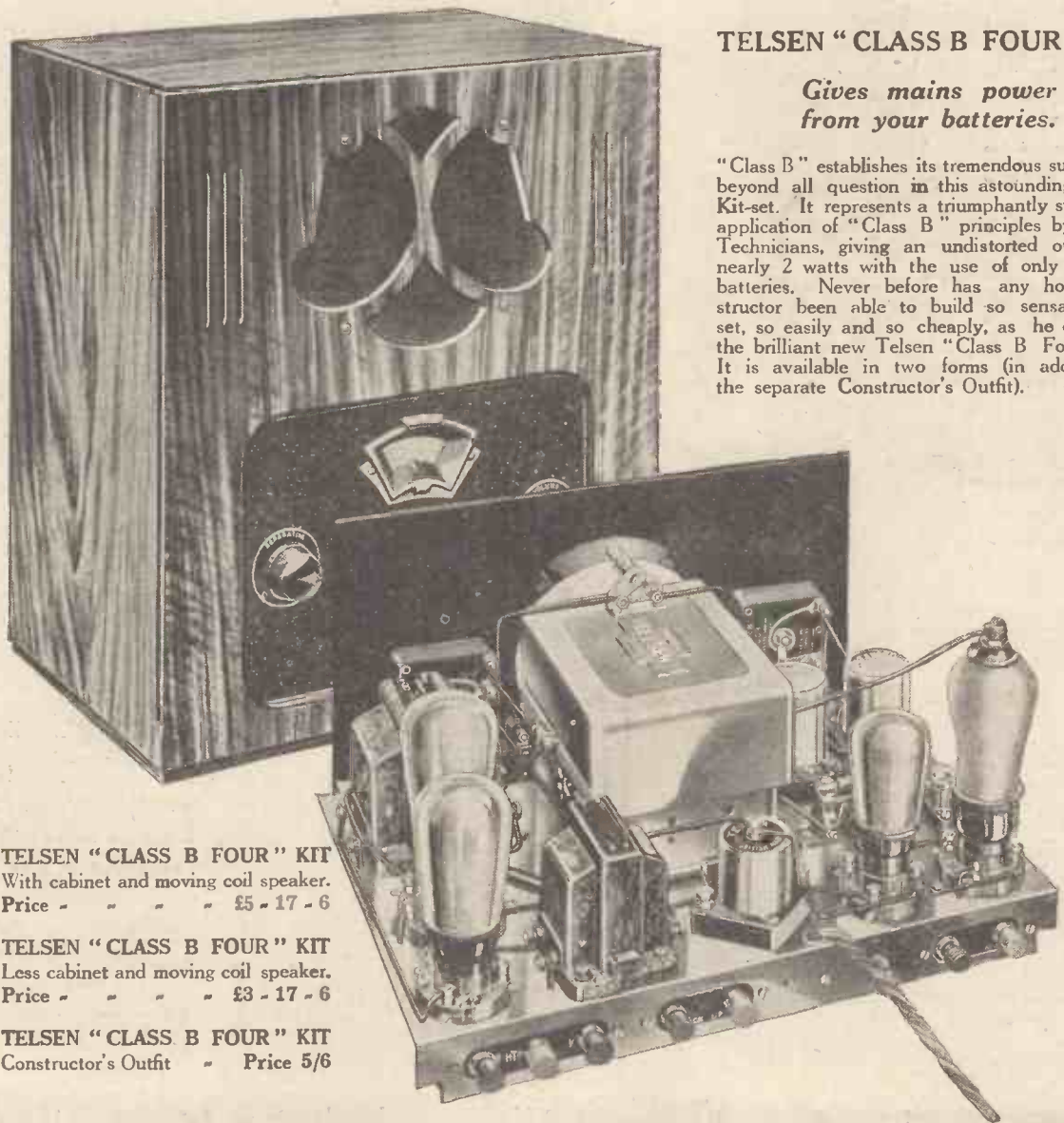
No.	LOUDSPEAKERS, UNITS AND CHASSIS	Reduced to
W.54	Loudspeaker Unit ..	3/6
W.170	"Major" Chassis ..	7/6
W.181	Loudspeaker ..	8/6
W.182	Loudspeaker ..	11/6
W.183	Loudspeaker ..	12/6

For full details, prices and catalogue numbers of the complete Telsen range (over 500 component parts, many of which have been improved in design at no increase in price), see the new Telsen "Radiomag," Issue No. 5, price 3d.

**PRICE ONLY 3/-—3 FULL SIZE 1/- BLUEPRINTS FREE WITH EVERY COPY**  
 ANNOUNCEMENT OF THE TELSEN ELECTRIC CO., LTD., ASTON, BIRMINGHAM

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

# AMAZING Telsen & 'CLASS B'



## TELSEN "CLASS B FOUR" KIT

*Gives mains power  
from your batteries.*

"Class B" establishes its tremendous superiority beyond all question in this astounding Telsen Kit-set. It represents a triumphantly successful application of "Class B" principles by Telsen Technicians, giving an undistorted output of nearly 2 watts with the use of only ordinary batteries. Never before has any home constructor been able to build so sensational a set, so easily and so cheaply, as he can with the brilliant new Telsen "Class B Four" Kit. It is available in two forms (in addition to the separate Constructor's Outfit).

TELSEN "CLASS B FOUR" KIT  
With cabinet and moving coil speaker.  
Price - - - - £5-17-6

TELSEN "CLASS B FOUR" KIT  
Less cabinet and moving coil speaker.  
Price - - - - £3-17-6

TELSEN "CLASS B FOUR" KIT  
Constructor's Outfit - Price 5/6

**FULL DETAILS IN ISSUE No. 5 OF THE TELSEN RADIOMAG—**  
ANNOUNCEMENT OF THE TELSEN ELECTRIC CO. LTD., ASTON, BIRMINGHAM

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



# NEW RECEIVERS KIT SETS



## TELSEN "464" A.C. MAINS RECEIVER

Telsen's previous experience in the all-mains field has been an invaluable aid in the production of this superb new all-electric receiver. It has that lasting perfection which means the practical elimination of the "servicing" bugbear. Its brilliant circuit incorporates every conceivable ultra-modern refinement, including the new Telsen Iron-Cored Coils, Variable Tone Control, New Type Moving Coil Speaker, Single Knob Tuning, Wavelength Calibration, etc., in a beautiful Walnut-finished cabinet, providing really astounding selectivity with amazing sensitivity, exceptional volume and wonderful tone **Price £9-9-0**  
Or can be had for 15/6 down and 12 equal payments of 16/9.

## TELSEN "AIR MARSHAL"

The ultra-selective, ultra-modern circuit of this wonderful Telsen three-valver makes it the most efficient set of its type ever produced—yet it is simpler to operate, cheaper to run, and costs less to buy. It is absolutely self-contained in a beautiful cabinet of modern design, finished in Walnut and is supplied complete with valves, batteries and either Moving Iron or Moving Coil loudspeaker.

With Moving Iron loudspeaker  
**Price £4-17-6**

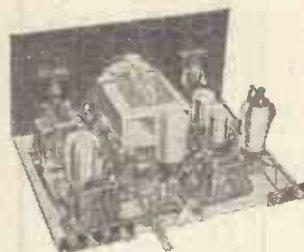
Or can be had for 9/6 down and 12 equal payments of 9/6.

With Moving Coil loudspeaker  
**Price £5-5-0**

Or can be had for 10/- down and 12 equal payments of 10/-.



If the receivers shown on the left are not exactly what you require, then one of the following two Constructors' Sets will certainly be your choice. They are not 'Kit' sets but circuit designs using Telsen Components (some of which you may already have). Complete details, together with full size 1/- Blueprint of each, are contained in the New Telsen Radiomag, Issue No. 5, price only 3d.



## TELSEN BATTERY S.G.3

An economical yet outstandingly efficient battery operated S.G. Det. Pentode three valver, employing the sensational new Telsen Iron-Cored Coils, with single knob tuning.



## TELSEN A.C. SUPER FIVE

A magnificent five-valve superheterodyne receiver for A.C. Mains, embodying every de luxe feature, including Band Pass Tuning with single knob control.

**BIGGER AND BETTER THAN EVER—YET NOW ONLY 3<sup>d</sup> PER COPY!**

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

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

# THE NEW J.B. LINACORE

## BAND-PASS TUNER



The J.B. LINACORE . . . an exceptionally selective band-pass tuning unit employing the latest type of iron-cored coils. LINACORE takes all the worry out of set-building. Far more efficient than if home-assembled and far more compact. Obviates all ganging difficulties. Makes the most of its super-selective coils by very accurate matching of the condenser sections. Tunes from 200-550 and 800-2000 metres. LINACORE gives a 3-valve set a performance comparable to a superhet. Complete with volume and reaction controls and all switching. Fitted with the latest pattern J.B. Straight Line Dial.

Advertisement of Jackson Bros. (London), Ltd., 72, St. Thomas' Street, London, S.E.1.

Telephone: Hop 1837.

**STAND 116**  
**MAIN HALL**



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



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

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## News and Gossip of the Week

### Practical Value of the Show

OUR indefatigable contributors "The Experimenters" have been touring the Radiolympia Show on a unique mission—to find out how the new development could be utilised by the amateur. Their record makes invaluable reading on pages 300 to 302.

### Our Star Sets

BUILT the Triodyne yet? Perhaps you favour the Signpost Four? Both sets represent the latest in the amateur constructor's technique. On pages 284 and 285 we continue the story of the Signpost Four, telling you, among other things, how to convert it into a fine radio-gramophone. On page 295 a member of our staff recounts his tests of the Triodyne—one of the best mains sets we have ever put out.

### Permanent Lady Vocalist for the B.B.C. Dance Band

LAST week we mentioned that, in addition to Diana Claire, another lady vocalist was in the running for pairing up with Les Allen for singing (or crooning) the choruses with the

B.B.C. Dance Orchestra. Now we learn that Phyllis Robbins is the other lady in question. Quite recently, in addition to Diana Claire, several other vocalists have been heard, including the Southern Sisters. They will continue to be heard in occasional broadcasts. For the whole-time job we have good reason to expect that Phyllis Robbins will be appointed and will begin her duties towards the end of next month.

### Tea-time Vaudeville Programmes

STARTING in the autumn a series of special vaudeville matinees will be broadcast at teatime on Saturday afternoons, under the title of "First Time Here." The feature of this new series is that all the artists taking part will be first-timers making their broadcast debut. Those who make a success of their first show will be given dates for performances in the evening shows later. We think that the younger generation will complain that teatime dance music on Saturdays is preferable to listening to broadcast vaudeville auditions!

### Ambitious Autumn Productions

A VERY popular broadcaster, "Uncle" Andre Charlot, is returning to the "mike" with his company for a show. The date is not fixed, but we understand that it will take place in the middle of September. C. B. Cochran is producing a special show for broadcasting which will be broadcast in October. The theme of the Cochran show will be based on his old revue successes. Three big musical-comedy hits will be given their first broadcast shortly. Romberg's *Desert Song* will be broadcast in September, the first performance in English of Kalmann's *Circus Princess* will be heard in October, and a new production by Roger Quilter, the *Blue Boar*, will be heard before the end of the year.

### British Valves Versus American

OUR article entitled "What Can Our Valve Designers Learn from America?", which

### This Week's "Specials"

"Two-ear" Transmitters for Reality! ... ..	Page 283
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At Home with the "A.C. Triodyne" ... ..	295
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appeared in the August 12 issue, has excited considerable comment. We seem to have been rather misunderstood. What we wanted to point out was that Americans do seem to lead in the introduction of new types. We certainly did not wish to imply that British valves, when they are introduced, are in any way behind American. In fact our valves are manifestly streets ahead of anything in America when you compare mutual-conductance figures, as we do in this issue in the article entitled "British Valves Top the List!" on page 298.

### Wireless Sets in Russia

A SPECIAL correspondent who recently returned from Russia tells us that the quality of receivers used by Russian listeners is far below the standard of those used in this country. The general quality of the sets in use is about our 1925 and 1926 standard. He also tells us that most listeners get their programmes indirectly from wireless relay services.

### Big Variety Drive in the Autumn

ERIC MASCHWITZ, who takes over the control of the variety and vaudeville shows this month, has already made plans for vast changes. One big innovation will be the employment of eight pretty girls as a vaudeville chorus whose main job will be to sing and dance and generally to give vitality to the programmes.

Mr. Maschwitz has decided also that the attraction of a vaudeville show does not lie in



Visitors to the Radio Exhibition at Olympia can listen in to details of H.M.V. receivers by telephone. The speech is heard from gramophone records played about 400 times a day

the amount of "jazz" in the programme. He has decided to "stem the ever-advancing tide of jazz in vaudeville programmes"—as he calls it—and to introduce the old type of comic song that has a story in the middle and to introduce more lilting melodies. We wonder what the younger generation will think of this move?

**B.B.C. Attempts Television Census**

LOOKERS-IN and listeners must have been surprised when the television programmes were interrupted last week by the announcer who requested them to send their names and addresses to the B.B.C. No explanation of any kind was given.

**Plenty of "Lookers-in" Now**

RECEPTION of the vision signals from the B.B.C. is limited to those who can pick up the London National station, so that a big response to this census appeal can hardly be expected.

Still, we think there are enough "lookers-in" now possessing some form of Baird-type television apparatus to justify a continuance of the present 30-line experimental transmission.

**Sir John Reith to Visit U.S.A.**

UNLESS he is prevented by unforeseen last-minute circumstances, Sir John Reith, Director General of the B.B.C., is shortly leaving for the United States to attend the opening of Radio City. The last time the "D.G." was in the States he made arrangements with Merlyn Aylesworth, chief of the N.B.C. network, for the exchange of personnel between British and American interests.

This interchange of staff will begin this autumn, when one or more of the bright young men of Broadcasting House will visit U.S.A. in an official capacity. We understand that one of the younger producers is likely to leave our merry shores shortly.

**Future of Fécamp**

FOLLOWING the action of the British Government in requesting the stoppage of sponsored programmes from France comes the information that the French authority controlling broadcasting has requested Fécamp to reduce its power from 10 kilowatts to 700 watts. This reduction in power will greatly diminish the service area of Fécamp and it is certain that the reception of its programmes will be seriously affected in this country.

**Preparing for Colonel Dawnay**

THERE is a deal of activity on the third floor of Broadcasting House in preparation for the arrival of Colonel Dawnay, the recently appointed co-controller of the B.B.C. A room has been got ready on the third floor which has involved the moving of massive copper doors, so that Colonel Dawnay can have ready access to Mr. Whitley, the chairman, Sir John Reith, the director-general, and Sir Charles Carpendale, the other co-controller. The group of offices for the major officials are in the front of the building over the main entrance.

**Effect of Droitwich Power**

ALREADY the B.B.C. engineers are thinking of the difficulties that will be experienced by listeners living close to the Droitwich transmitter when the station opens next year. It is believed that the only real difficulty will be that listeners will not be able to cut out the strong signals and get other foreigners on the long waves. The difficulty of separating the Droitwich National and Regional transmissions should not occur.

**Fate of German Broadcasting Officials**

IT is not a pleasant occupation being a German broadcasting official at the moment unless one has strong Nazi principles. News

has reached us that five prominent officials—including Dr. Flesch, the programme director—have been discharged from their posts and interned. Previous to this, two other officials and the chief engineer had taken their lives.

**Thrilling Motor-race Broadcast**

A RUNNING commentary will be relayed from Ireland on September 2 when the Ulster T.T. motor race will be run over the famous Ards circuit. An experiment that will be nerve-racking enough for one of the commentators will be the installation for the first time of a microphone in a shop at Comber, at one of the most dangerous corners of the course. Many a driver has jibbed at this corner and has been counted out of the race.

Many well-know British drivers are among this year's entrants. The total course is some 478 miles and this year thirty-one sports cars have been entered. Get ready for the most thrilling running commentary yet!

**Autumn Sport Talks**

SPECIAL descriptions of Empire and foreign sports will be included in the interesting series of sport talks that will be broadcast this autumn. The B.B.C. has certainly a wide field of foreign sports from which to choose. Talks on American baseball and Rugby, surfing, pelota, rodeo, ski-ing, ice hockey and skating, shooting rapids, polo and ju-jitsu will be included in the series. A general talk on Sport in Other Lands, will be given by W. C. Lyle, an Australian sportsman, on October 7.

**New 5-metre Record!**

AS we go to press we are pleased to hear that G5BY, the amateur station run by Mr. L. O'Hefferman, has raised the British record for 5-metre transmission to 200 miles. The distance spanned was from the top of Snowden to Hoddesden, Herts.

**AT THE RADIO SHOW**

**The Man Who Asked for a Crystal Set!**



# "Two-ear" Transmitters for Reality!

At the Chicago Twentieth Century Exposition the Bell Laboratories are demonstrating the remarkable realism that can be obtained by the binaural or "two-ear" system of transmission

**I**N our search for perfect quality of reproduction we are apt to overlook the fact that ultimate reality does not depend entirely on the range of musical frequencies faithfully handled by the transmitting and receiving apparatus; quite apart from the need for covering all the audible frequency gamut

orchestra, a listener at the receiving end with two separate receivers, one in one ear and the other in the second ear, would be in true aural perspective. The distant microphones would, in fact, be doubling for the ears themselves.

The Bell Laboratories of America have been working on this idea, and with their usual thoroughness have fully exploited the possibilities of "two-ear" transmission, with a remarkable increase in the fidelity of the reproduction.

Oscar was the hero of the experiments, a tailor's dummy with microphones fitted into each cheekbone just below the ears. Oscar duplicated as far as possible the conditions of normal hearing, not only by providing two sound pick-up points approximately the same distance apart as human ears, but by modifying the sound field near the ears as a human head does.



Into Oscar's head two microphones are set, one on each side

headphones connected to Oscar's microphones were then asked to express their preference, either for the monaural system with a single microphone transmission or for the binaural system with Oscar.

Even when the binaural system was purposely limited in frequency range to an upper cut-off of 2,800 cycles, more than a third had a preference for Oscar.

### An Amusing Sidelight

An amusing sidelight on the realistic effect created by the binaural system occurred at the Philadelphia demonstrations. When the guests had put on their receivers to listen to Oscar in another room, someone would whisper confidentially in Oscar's ear, "Move over, please."

A surprisingly large number of guests would start to obey the request before realizing that the sound came from the receivers and not from a nearby human being. A. H.



Amplifiers used for the binaural system demonstrated at the Century of Progress Exposition, Chicago



Talking to Oscar in a glass booth at the Chicago Exposition, headpieces being provided for visitors to put themselves aurally in Oscar's place

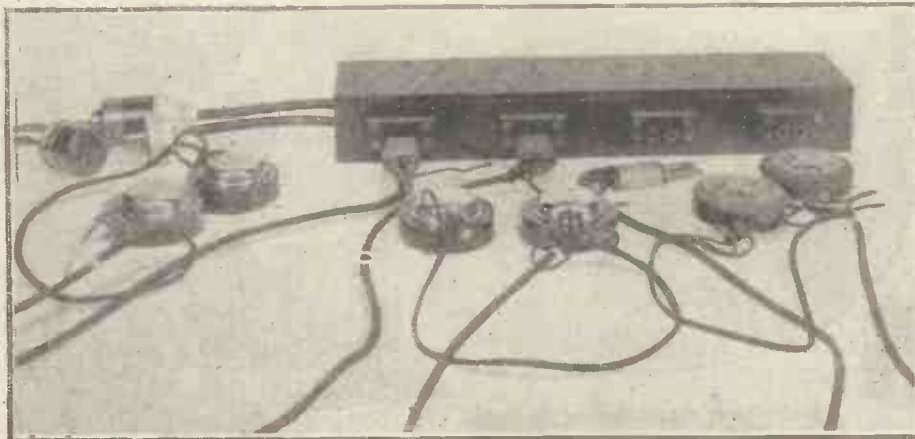
Oscar was placed in the auditorium of the American Academy of Music in Philadelphia, to test the idea in conjunction with Dr. Leopold Stokowski and the famous Philadelphia Symphony Orchestra.

Listeners in another room fitted with

there is the problem of bringing the sounds into "aural perspective."

When we hear a sound we can usually locate its source—its distance and direction. The exact means whereby we do this is not fully understood, but the interaction of the two ears seems to have a lot to do with it. Stopping up one ear, for example, will almost completely destroy the ability to "place" sounds.

The idea has occurred to many engineers that if two separate microphones, connected to two separate transmitters, were to send out the same sounds as played, say, by an



Several pairs of headphones arranged in a multiple connection system for binaural reception of Oscar by several people at the same time

### Radiolympia, 1933

#### Your Last Chance to See the Show

**T**O-MORROW, August 24, is your last chance to see this year's wonderful display of the new radio developments as revealed on the manufacturers' stands at Olympia, London.

The doors of the Exhibition open at 11 a.m.; and finally close at 10 p.m. The price of admission is only 1s. 6d.

Radiolympia provides the radio enthusiast with a unique opportunity of comparing sets, components and accessories, of collecting technical data, and of meeting representatives of all the radio people that matter in this country.

#### A Cordial Welcome for You

In addition, there is the AMATEUR WIRELESS stand (No. 10,) where you may be very sure of a cordial welcome by members of our technical staff, who will answer your queries free of charge.

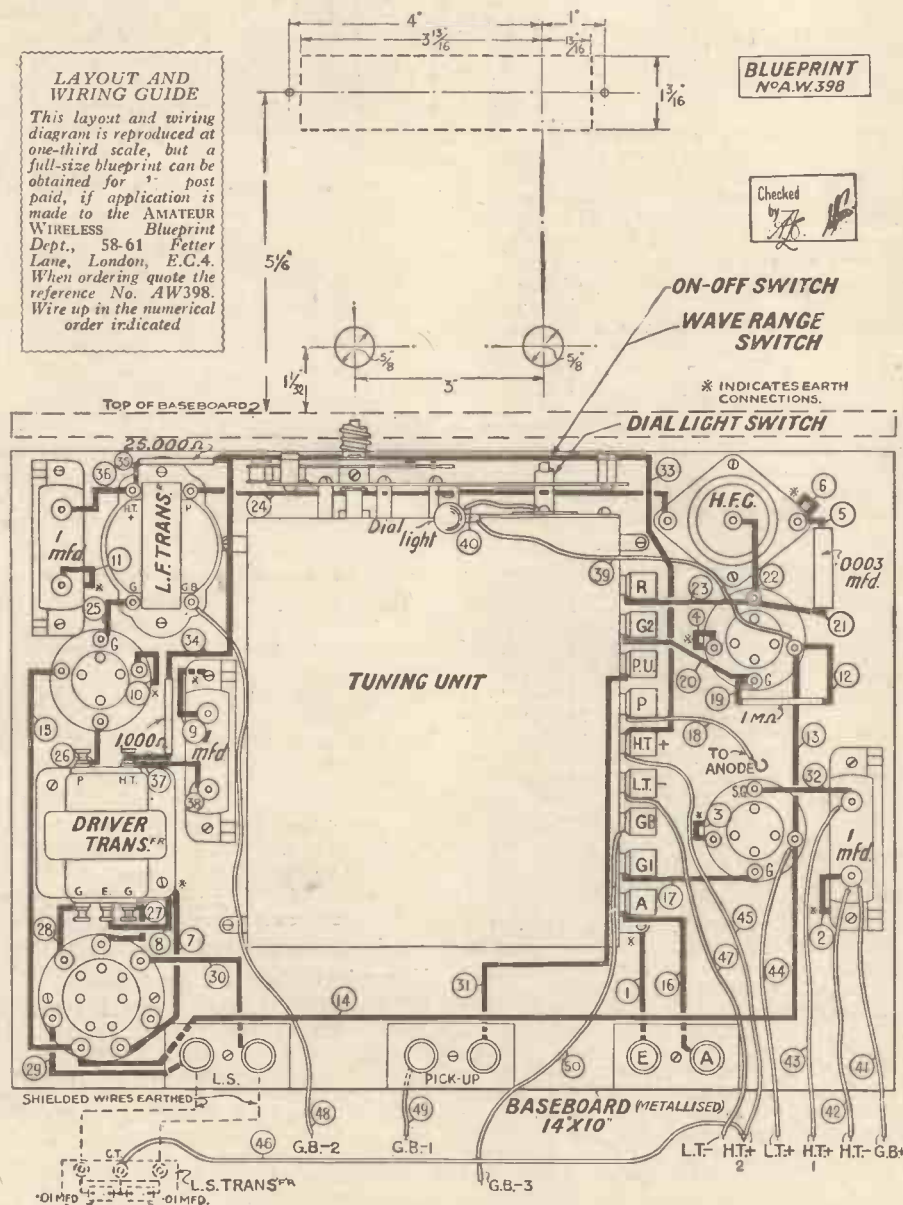
On our stand we show all the latest constructor designs as published in the show numbers of AMATEUR WIRELESS and "Wireless Magazine," with such special attractions as the latest box-baffle moving-coil loud-speaker and the "A W" mirror-drum television apparatus to be described next week.

Our stand is probably the liveliest in the Show because we show a real-life film of our staff producing AMATEUR WIRELESS, with intimate glimpses of all the leading lights hard at work in office and laboratory.

# Your Signpost Four as a

### LAYOUT AND WIRING GUIDE

This layout and wiring diagram is reproduced at one-third scale, but a full-size blueprint can be obtained for 1/- post paid, if application is made to the AMATEUR WIRELESS Blueprint Dept., 58-61 Fetter Lane, London, E.C.4. When ordering quote the reference No. AW398. Wire up in the numerical order indicated



A view of the completed Signpost Four Radiogram. The simplicity of the controls gives it an attractive appearance

**M**ANY constructors attracted to the simple design of the Signpost Four, fully described in our August 19 issue, will be anxious to convert it into a radio gramophone, so that the undoubted advantage of being able to play records electrically may be fully exploited.

We have been carrying out the conversion since the original article was written, and the alterations are very simple indeed. The set was, of course, designed with this radio-gramophone function in view.

You will find the special coil switching arrangement in the Linacore pack makes the

Ganging the Signpost Four is an easy task if the simple instructions given on the opposite page are carefully followed

There are only two controls on the Signpost Four. On the left is a combination wave-change, gramo-radio and on-off switch; the other is the tuning knob



A back view of the set showing the simple layout of the components. The pick-up is connected to the centre terminal block



# Radiogram

By the "Amateur Wireless" Technical Staff

switch-over from radio to gramophone perfectly simple.

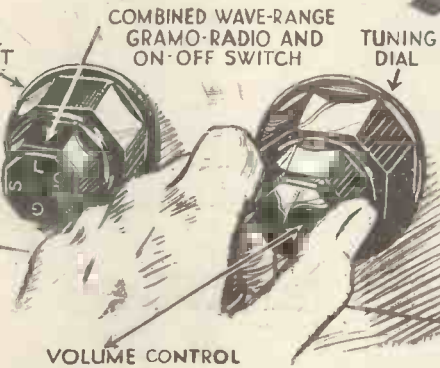
This switching does all that is necessary to go from radio reception to record reproduction. It switches the grid of the detector valve from the grid condenser (which is incorporated in the pack, remember) to one side of the pick-up.

### Adjusting for Amplification

The other pick-up lead goes to a grid-bias tapping, and as the grid leak, which applies a small positive bias to the detector grid, is left in circuit, it may be necessary to take this tapping to as much as 3 volts negative, in order to make sure that the bias on the grid through the pick-up effectively overcomes the positive bias applied by the grid leak, so that the valve is in an effective position for amplifying without distortion.

You will find terminals already provided on the back of the set for the connection of the pick-up, but except with pick-ups of very small output you will need a volume control between the pick-up and these terminals. Many pick-ups are provided with their own volume controls.

One other circuit point to note: the high-frequency valve filament is switched off when the combination switch knob on the pack is switched to gramophone. The



This sketch shows clearly the two dual controls used on the Signpost Four. On the left-hand knob "L" indicates long waves; "S," medium waves; and "G," pick-up

incoming signals are thus prevented from passing on to the set, which then acts as an amplifier for the pick-up inserted in the detector grid circuit.

The constructional details are quite easy to undertake. First, there is the radio-gramophone cabinet, which for this job is an Osborn, as specified in the list of components. To this must be fitted the gramophone motor with its turntable and motor winder.

Then, in an appropriate position nearby, must be fitted up the pick-up and its leads, which, in the type specified, are already screened, taken to the volume control mounted on the front of the cabinet.

Remember that the screening of the pick-up has to be earthed to prevent whistling noises. Any convenient earthing point can be utilised.

Several small points have cropped up since we gave our first details of the Sign-



The connections to the batteries can be easily seen from the blueprint. H.T.+1 should be plugged into the 60-volt and H.T.+2 into the maximum tapping of the high-tension battery

post Four, and these might as well be dealt with here.

For a start, there is the question of adjusting the trimmers on the tuning pack. Tune in a station at about 300 metres and adjust the centre trimmer for loudest results on any given station. Then, having made any slight re-adjustment of the main knob, tackle the high-frequency trimmer. Again re-adjust the main knob if needed, and then finally adjust the aerial trimmer, making a further main knob adjustment if required.

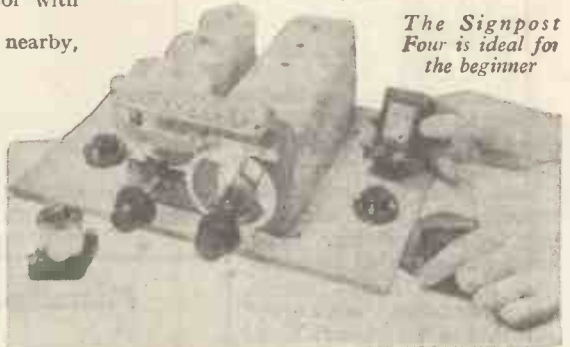
### Over the Whole Tuning Range

These adjustments should hold good over the whole tuning range. Of course, the coil screens must be on the unit while all this is done.

About the power supply: if you want to use a mains unit you can—the circuit is well decoupled, but remember that a special class-B type of unit is needed.



You will find the full-vision scale of the Signpost Four very easy to read. A flashlamp bulb is used for illuminating the scale



The Signpost Four is ideal for the beginner

## COMPONENTS YOU WILL NEED FOR THE SIGNPOST FOUR

### BASEBOARD

1—14 in. by 10 in. (Peto-Scott Metaplex).

### CHOKE, HIGH-FREQUENCY

1—Telsen screened (or Wearite, Goltone, Bulgin, Kivar).

### CONDENSERS, FIXED

1—0.003-microfarad (British Radiophone tubular or Telsen, Lissen, Graham Farish, Dubilier, T.C.C.).

2—0.1-microfarad (British Radiophone tubular or Telsen, Lissen, Graham Farish, Dubilier, T.C.C.).

3—1-microfarad (Lissen or Telsen, Graham Farish, Dubilier, Igranic, T.C.C.).

### HOLDERS, VALVE

3—Four-pin (W.B. or Lissen, Telsen, Ferranti, Graham Farish, Benjamin, Wearite).

1—Seven-pin (W.B. or Ferranti, Benjamin, Wearite).

### RESISTANCES, FIXED

1—2,000-ohm (Telsen or Erie, Dubilier, B.A.T., Graham Farish, Goltone).

1—25,000-ohm (Telsen or Erie, Dubilier, B.A.T., Graham Farish, Goltone).

1—1-megohm (Telsen or Erie, Dubilier, B.A.T., Graham Farish, Goltone).

### SUNDRIES

Connecting wire and sleeving (Lewco).

6 yd. thin flex (Lewcoflex).

3—Terminal blocks (Belling Lee or Sovereign).

1 yd. shielded flex (Goltone).

### TERMINALS, PLUGS, ETC.

6—Terminals, marked: Aerial, Earth, Pick-up (2).

L.S. (2) (Belling Lee type M or Belex, Clix).

7—Wander plugs, marked: H.T.+1, H.T.+2.

H.T.—, G.B.—1, G.B.—2; G.B.—3, and G.B.—4 (Belling Lee or Belex, Clix).

2—Spade terminals, marked: L.T.—, L.T.— (Belling Lee or Belex, Clix).

### SUITABLE VALVES

Make.	H.F. Amplifier.	Det.	Driver.	Power.
Mullard	PM12M (met.)	PM1HL	PM2DX	PM2B
Marconi	VS2 (met.)	HL2	HL210	—
Osram	VS2 (met.)	HL2	HL210	—
Cossor	22V5G (met.)	210Det	210LF	240B
Mazda	S215VM (met.)	HL2	HL210	PD220
Six Sixty	SS215VSG (met.)	210HL	210LF	—
issen	SG2V (met.)	HL2	L2	—

### TRANSFORMERS, LOW-FREQUENCY

1—Igranic intervalve, type Midget (or Lissen, Telsen, Varley, R.I., Ferranti, Graham Farish).

1—Lissen class B (or Multitone, R.I., Ferranti, Varley, Benjamin, Wearite, British Radiophone).

1—Lissen class B (or Multitone, R.I., Ferranti, Varley, Benjamin, Wearite, British Radiophone).

### TUNING UNIT

1—Linacore unit (Jackson Bros.).

### ACCESSORIES FOR TABLE MODEL

Cabinet (Peto-Scott, type Luxor).

120-volt H.T. battery (Lissen or Drydex, Pertrix, Ever Ready, Marconi, Ediswan).

44-volt G.B. battery (Lissen or Drydex, Ever Ready, Ediswan, Fuller).

2-volt accumulator (Exide or Lissen, Ever Ready, Ediswan, Fuller).

Loud-speaker (W.B. type PM4A or Marconiphone, Epoch, Blue Spot, Amplion, Igranic, R. & A., B.T.H.).

Earth (Graham Farish Fit).

Aerial (Electron).

Download (British Radiophone Receptra).

Lightning switch (Bulgin).

Suitable mains unit (Atlas, Regentone or Ekco).

### ADDITIONS FOR RADIOGRAM

Cabinet (Osborn, type 250).

Gramophone motor (Garrard, type Junior B).

Pick-up (B.T.H. Minor or Blue Spot, British Radiophone, Varley, Belling Lee).

## Studio Chats with Broadcast Stars



Introducing Tom Jones, violinist and leader of his own frequently broadcast orchestra at the Grand Hotel, Eastbourne

NATURALLY, I feel at home when broadcasting," said Tom Jones to me after a recent broadcast. "I was one of the first people to broadcast from the little B.B.C. studio at the top of Marconi House, at the very start of broadcasting—it may have been even just before the B.B.C. was formed, and certainly long before the company changed to a corporation.

"I had an orchestra of six, and as the engineers were using the old Post Office telephone microphones in those days, we had to have a separate microphone for each member of the orchestra. Each microphone was hung from the ceiling on cords.

#### Only One Microphone

"The announcer spoke into one of them and then put it down again so that the orchestra could play."

It is a big jump from that sort of broadcasting to the Concert Hall of the Grand Hotel at Eastbourne, well known to holidaygoers.

Tom Jones told me that experts have pronounced it to be almost ideal acoustically for broadcasting. The reverberation period, as measured by the B.B.C. engineers, compares favourably with that of the Queen's Hall, London.

In ordinary language, there is a fair amount of echo, owing to the domed roof of the Grand Hotel *salon*, and this gives "body" to the playing.

Tom Jones took over the place of Albert Sandler and he has made quite a name for himself with the evening broadcasts, generally on Sundays. He is as much an artist as an artiste and once thought of taking up sketching as a profession. He is still very good in rapid pencil sketches.

However, he was so immersed in music at an early age that there was never much time to think about sidelines. His family are musical and he told me several amusing stories about his

# TOM JONES—Violinist

By Kenneth Ulyett

grandfather, who had such a large family that practically every member was able to play an instrument, and they formed an orchestra of their own.

Tom Jones was always keen on the violin, but in the early days, at any rate, was not very keen on practising. Mr. Jones, senior, whelped him regularly when Tom Jones practised irregularly, and he is now thankful for it.

"Because of my name," he said to me, "people think I am Welsh; my parents were Irish, though. I was leader for Sir Walford Davies of the Welsh Symphony Orchestra at Wembley, but that does not alter my Irish parentage."

"When I was fifteen, I was one of the first violins in an orchestra which Sir Thomas Beecham started in Birmingham, and many years later, before leaving for Eastbourne, I ran a series of broadcasts for Midland listeners. These were very popular, but bear no comparison with the Eastbourne broadcasts, which have been such a regular feature in the programmes."

He showed me a batch of correspondence received in only one month, following each of his Eastbourne broadcasts. There were letters from all over Europe.

The fine echo in the Concert Hall from which Tom Jones broadcasts is not an accident, for the room was specially designed architecturally for musical performances, but the architect could not have visualised how popular the resulting acoustics would become via broadcasting.

Unlike many other halls where there is a fairly long reverberation period, the microphone arrangements do not present any

great difficulty, and one microphone usually suffices.

"A B.B.C. man is at the control end of the line," said Tom Jones, "while our broadcasts are on, but all the members of my orchestra know exactly where to place themselves, so that the B.B.C. control man doesn't need to follow a score. I myself often make a point of listening through the B.B.C. amplifier to get an idea of how any new item will sound to listeners."

## Condenser Breakdown

By D. M. ROBINSON, B.Sc., Ph.D.

WE have all seen the inside of an ordinary variable condenser, and we know it is composed of two sets of plates, one lot interleaving the other, with all the plates of one set connected together. The large-capacity condensers used for many purposes in the modern receiver are made in the same way, except that the plates are fixed, there are more of them, and they are separated only by a thin sheet of mica or of waxed paper.

The capacity is large because (1) there are many plates, (2) they are close together, (3) and the capacity of two plates when separated by wax or mica is several times greater than if air of the same thickness forms the insulation.

### Charging Up of the Aerial

So it seems we have it all our own way—but stop a bit! Suppose that, due to a thunderstorm, the aerial gets charged up and tiny sparks pass between the plates of our air condenser. (I have actually seen this happen.) As soon as the sparks have passed, the air, as it were, heals behind them and the condenser is as good as ever.

On the other hand, in the mica or waxed-paper condenser, the spark which passes leaves a minute perforation and a trace of carbon or other conducting material in its path. Usually the resulting resistance at this point is so low that the condenser will no longer withstand its normal working voltage, and must be replaced.

But why did that first ruinous spark pass at all? Most probably the voltage rose to a value greater than the insulation could stand.

The voltage required to produce such a spark is proportional to the thickness of the intervening layer. Now, if the maker of the condenser intended it for use with 220 volts across its terminals, he probably made the insulation thick enough to stand 400 volts. One day this critical value is exceeded and the insulation punctures.

But this is not the whole story, for it is possible for condensers to break down on normal voltage. However good a condenser is, there is always a very small leak of current through it.

## Miscellaneous Records for Your Radiogram

Heaven Will Protect an Honest Girl and Happy Ending, 2s. 6d.

H.M.V. B4470

Gracie Fields tells a virtuous story of Little Nell with all her inimitable art. A delightful leg-pull. The second is an excellent tune, sung admirably.

I Lay Me Down to Sleep and When It's Lamp-lightin' Time in the Valley, 1s. 6d.

BRDCST 3317

Whoever Singin' Sam really is, I have no idea, but he has a remarkably fine bass voice. He gets the utmost effect from these mediocre numbers, and if you are after these titles—hear this.

When You've Fellows Like Me in the Force and London, 2s. 6d.

PARLO R1547

The new gentlemen-police-to-be come in for some pungent verse from Ronald Frankau. Quite funny with a quiet and subtle second side.

A Woman Should Stick to Her Man and At the Little Pig and Whistle, 1s. 6d.

REGAL-ZONO MR971

I like Harry Fay, who sings these. He has a good voice and the style of the better music-hall comedians of a generation ago. This is a very entertaining record indeed.

Down in the Valley and Where Be 'E Goin', Jarge? 1s. 3d.

STERNO 1208

Vine and More will go a long way, if they keep their material good. They are quite entertaining in these, especially the second.

"RECORDER"



# MULLARDS MAKE IT EASIER



**"IT'S A VERY COMPLICATED CIRCUIT"**  
**"YES, BUT EVEN THEN THE SCREENED PENTODE WILL PLUG INTO IT"**

Whatever the A.C. circuit. Three valve—four valve—five valve. New, old, advanced or amateur-designed, this wonderful new Mullard Screened Pentode will plug into it. It will bring old sets up-to-da'e again. It will make new sets the sets of the future. Because all set-designers are now Pentodising every new receiver. Pentode—Detector—Pentode, that's the new idea. And Mullard Research, which first brought Pentode Power into the speaker stage of all receivers, has now given us Pentode Power in the H.F. stage. Ask your dealer about it. It will mean a lot to you. ASK T.S.D. Whenever you want advice about your set or about your valves—ask T.S.D.—Mullard Technical Service Department—always at your service. You're under no obligation whatsoever. We help ourselves by helping you. When writing, whether your problem is big or small, give every detail, and address your envelope to T.S.D., Ref. B.B.N.

## THE NEW SCREENED PENTODE

WE ARE EXHIBITING AT



STAND NO. 71

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However expert or amateur you may be, this new 'Igranipak' cannot fail to save you time, trouble and expense. 'Igranipak' is a complete and compact tuning unit. Upon its rigid metal chassis are mounted:—screened coils with built-in wave-change switch, Igranic 3-gang condenser with cover, escutcheon and disc drive assembly with pilot lamp attachment, mains switch, three 5-pin valve-holders, grid leak and condenser, engraved terminal board. Wavelengths covered: 210-520m. and 900-2,000m. Complete with instructions and simple circuit diagram

**57'6**

If your local dealer cannot supply you, please write to us direct.



*Write for fully illustrated Catalogue No. D.191*

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

# On Your Wavelength!

## Still Time to See the Show!

THE Exhibition is drawing to its close, but there is still time to pay a visit if you haven't already done so. Should you be hesitating, my advice is: "Go! It really is a remarkable show and you will enjoy every minute that you spend there."

Even supposing you are not a wireless man, you can go and see what £2,000 worth of gold and silver looks like. Bullion to this value is shown on the H.M.V. stand and represents the amount of precious metals that they use in a year for making switch contacts.

## An Ingenious Valve

A FEW minutes before I started to write this paragraph the postman brought me one of the most remarkable valves that has appeared this year.

This is the Lissen AVC2, which is the first of the portmanteau automatic volume control valves for battery use.

The AVC2 is a combination within one bulb of pentode and diode. The pentode portion performs both detecting and amplifying functions, while the diode part delivers the voltages required for controlling the variable-mu intermediate-frequency or high-frequency valves of the preceding stages.

I haven't yet tried the valve, but I have no doubt that it will prove to be a good performer. If it does, it will solve one of the battery user's chief problems by making automatic volume control easy to obtain.

## Battery Sets Need A.V.C.

A SIMPLE and effective means of automatic volume control was the one thing needed to complete the battery user's triumph this season.

Class B has enabled him to have mains quality and volume from a small high-tension battery, and the new high-frequency components open the way for far greater efficiency in high-frequency and intermediate-frequency stages.

There is absolutely no reason now why a battery "straight" or super-heterodyne set should not give every bit as good account of itself as its mains counterpart.

## Where Battery Valves Score

WHEN I write "as good account of itself" I was possibly rather understating things. The battery set can actually be in some ways better than mains apparatus, the chief reason being the complete absence of noisy background.

Some time ago I decided to make up the very best battery set that could be turned out, irrespective of cost or of the drain on the batteries. That was before the days of class B, and I had to use ordinary push-pull output. This set was, and still is, a wonder as regards quality.

It was not designed as a distance-spanner, but its reproduction of the more powerful stations and of gramophone

records is, though I say it myself, as near perfection as makes no matter.

Sets just as good can be turned out nowadays at very reasonable cost, and in working they don't impose a big load on the high-tension battery.

## A New Component Fault

THE silly season for component manufacturers has begun. Every year I come across a number of examples of the purest folly in designing components, and it always puzzles me that such obvious "bloomers" can possibly slip through.

Here is the latest example. I was fitting a four-gang condenser of beautiful design into my new super-het when I found that it could not be used as it stood.

There are little "feet" supporting the condenser, but these are just too low by an eighth of an inch or so. The result is that if you mount it, as you must, on chassis or baseboard, the dial carrying the scale binds in certain positions.

You have therefore all the bother of picking out washers of the right thickness and putting one under each foot. Can you beat it?

## Standardising Component "Nuts and Bolts"

THERE is now a component manufacturers' association which intends to standardise many things which ought to have been standardised long ago. I wish them every success in their efforts, for nothing has been more annoying to the constructor than to find, for example, that the 4 B.A. nuts used in certain components were too large or too small for his 4 B.A. box spanner, or if he lost a terminal nut he might have nothing to replace it, since it was of 5 B.A. or some other outlandish and unnecessary size.

Then, again, some makers in the past have made their terminal shanks over-size, so that the standard nuts would not go on to them. There is still one reform that is badly needed, and that is that every

component should be provided with terminals.

One comes across a certain number which have soldering tags only, though the home constructor has shown in no uncertain manner that he refuses to have anything to do with the soldering bit.

## World's Worst Quality Set

THE other day, after driving through Daventry, I stopped for lunch at an hotel—not in the town, but at no great distance away from it.

Finding himself with nothing to do for the moment, the waiter disappeared round a corner of the room and next instant we were listening to a flood of the most appalling wireless that I have heard for many, many years. It really must have been just about the world's worst set.

Somehow, I thought that people in the neighbourhood of Daventry would be rather connoisseurs of wireless. I had to beg the waiter to turn it off, for I had begun to feel quite ill.

In many hotels one hears first-rate sets, but there are places where they are just about as bad as they can be. Hotel proprietors would do well to see that their apparatus is of the best, for I know people who will not go to certain hotels on account of "that ghastly wireless set."

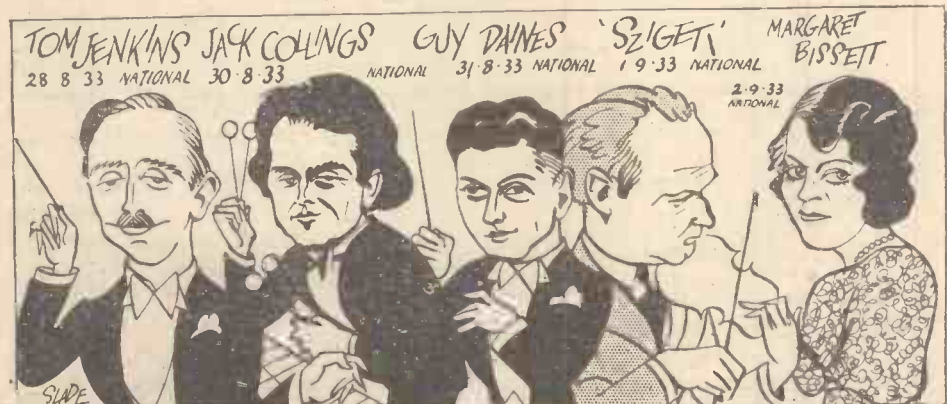
## Doubts About Lucerne Plan

LIKE a good many other folk, I am beginning to wonder seriously whether the Lucerne Plan will come into operation on January 15. My candid opinion is that it will not do so unless a miracle happens. There will, I think, be a postponement, possibly for several months, and in the meantime various modifications will be introduced.

The reason why I hold these views is that the seven countries which have not yet signed the agreement do not appear to be going to do so; and if they don't, the whole apple cart may be upset.

The most important of the countries are

## RADIO ARTISTS OF THE WEEK



Holland, Luxembourg, and Hungary, each of which possesses high-powered stations and are determined to use them on wavelengths that they consider suitable.

### Job for the League?

SOME time ago I suggested that wireless had now become such an enormously important factor in national and international life that the allocation of broadcast wavelengths—not only in Europe, but also all over the world—was a matter that could very well be settled by the League of Nations.

Conferences are all very well in their way, but they cannot produce settlements unless everybody agrees. Further, the coming of high power has immensely increased the ranges of wireless stations, and though the present plan takes in Europe, Asia Minor, and North Africa, the time is bound to come when a world plan will be needed.

Even this year I should not be at all surprised if some of the big American stations caused serious heterodynes with European transmitters.

### Big Strides in Television

I HAVE not yet been able to obtain a demonstration of the newest Baird apparatus, but I hear that remarkable strides have been made. The definition is good and the synchronisation has been brought to such a pitch of perfection that once you have centred up the picture it stays there.

I still don't feel—and, remember, I am expressing only my personal views—that television yet has genuine entertainment value, and I find the flicker very trying whenever I use a television receiver.

Real television is bound to come, but I stick to my guns and say that it will not be accomplished by means of the scanning disc. An entirely new method is required before it can achieve the same popularity as audible wireless.

### Renovating Old Sets

A FAIR number of letters still reach me from owners of very old sets who propose to bring them up to date by fitting band-pass tuning or class-B output, or by exchanging some ancient loud-speaker for a moving-coil reproducer.

It is hard, I know, to part with old friends, but the answer I invariably give to such queries is that money spent upon the antique apparatus is money wasted.

It is no use bringing one part of the set up to date if it still contains weird old components that cannot possibly give pure reproduction or reasonably good performances in other ways.

Almost the only things of any use in a set six or seven years old are the terminals. It is the old story of the cobbler who, when asked whether an ancient pair of boots was worth repairing, replied: "Well, the laces are still quite good."

### Self-contained Aerials Wanted

I AM rather surprised to find this year how few sets there are which will work properly without a largish external aerial.

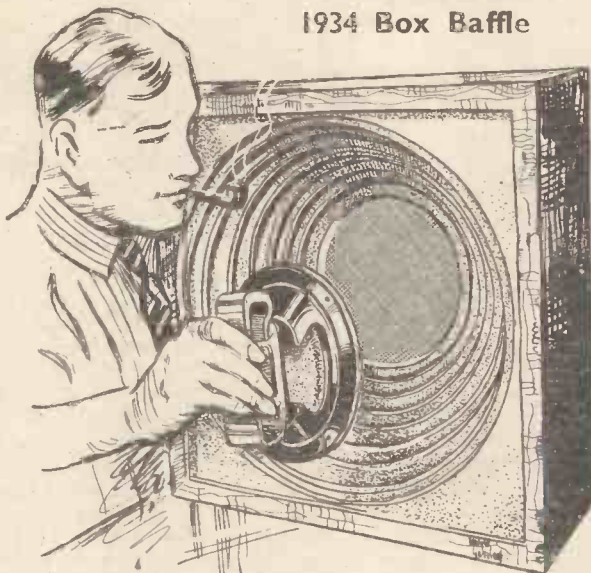
The frame has proved itself unsatisfactory for a good many reasons, but I do think that we want a collector which can be built into the cabinet and enable the set to give a good account of itself.

I know so many people who object to the appearance of either outdoor or indoor aerials that they simply will not have a wireless set of any type but the suitcase portable. They know that they are not getting the best out of wireless and that running costs are much higher than they need be, but the self-contained aerial is the biggest attraction for them in selecting a wireless set.

### The Accumulator's Centenary

NEXT year France is to celebrate the centenary of Gaston Planté, the inventor of the lead-plate accumulator. Planté may be reckoned amongst the world's greatest benefactors, for the storage battery has a wonderful history of useful-

### The "A.W." 1934 Box Baffle



Fully described in last week's "Amateur Wireless," this new box baffle has attracted considerable interest on our stand at Olympia

ness, not only in wireless, but for a thousand other purposes.

If we owe our low-tension batteries to Planté, we owe those that supply our high-tension current to another Frenchman, Léclanche, who invented the cell that bears his name.

This is, of course, a wet cell; but the dry cell of which high-tension batteries and flashlamp refills are made is a development from it, the only real difference being that the electrolyte, instead of being liquid, is made up into paste form.

### Where Are the Crystals?

IS there such a thing as a crystal receiving set made to-day? I know that there are still a good few old ones in use, but could you buy a ready-made new one, however hard you tried? I rather doubt it.

So far as I can make out, there was not a single one to be seen at the Exhibition, and I haven't noticed such a thing in any

catalogue that I have yet come across. The three-valve set nowadays costs a good deal less than a crystal receiver did only a few years ago: so it is not really surprising that the earliest type of receiving set is disappearing as fast as it came.

### The Loud-speaker Question

THERE is a good deal of misunderstanding about loud-speakers. Many people imagine that if the existing receiving set is not too good with a balanced-armature loud-speaker it can be made to give perfect reproduction by the substitution of a moving-coil instrument.

This is true only if the old loud-speaker is entirely to blame for such defects as there are—and in nine cases out of ten it isn't. The result of coupling a moving-coil loud-speaker to a poor set is usually that the reproduction is worse than it was before, for this type of instrument is exceedingly unkind to the faulty set, showing up all its defects.

If you want to use a moving-coil loud-speaker make sure, first of all, that your set is a good one and that your output stage can supply the power required.

### Television Up-to-date

I HAVE recently been "looking-in" through a cathode-ray television receiver and was quite favourably impressed with what I saw. It is particularly fascinating to watch how the fluorescent screen lights up under the action of the ray, and when one comes to think of it there is a certain amount of "magic" about this fact alone.

Not so long ago, I am afraid, I used to regard fluorescence and phosphorescence as being more or less in the same class, but I have been put wise since making contact with the cathode-ray tube.

Phosphorescence is a much more permanent quality than fluorescence, which is only visible so long as it is being directly stimulated by light—or by cathode rays. The effect must come and go quickly as the ray passes over each point on the screen in succession, otherwise the picture would be blurred instead of clear-cut.

### Fluorescence

A NOTHER peculiar thing is that the light given off by a fluorescent substance is always of longer wavelength than that which excites it. Actually, in the case of the cathode-ray tube the stream of electrons is first transformed into X-rays, as they strike against the screen, and these—being a form of short-wave energy—cause the screen to emit those longer waves which are visible to the eye.

I am told that all sorts of quite ordinary substances, such as paper, leather, cork and cotton, will fluoresce when exposed to strong light, though the effect can only be seen properly with the help of colour filters. It's all really amazing and goes to prove that to take an intelligent interest in wireless—or television—is an education in itself.

THERMION.

For the Beginner

# Is the Simple Set Good Enough?

By PERCY W. HARRIS, M.Inst.Rad.E.

IN my article, "Don't Judge a Set by the Number of Valves!"\* we discussed the relationship of tuned circuits to selectivity and showed how in a modern set using single control at least two tuned circuits must be manipulated simultaneously. Let us now see what we must do in order to obtain correct ganging.

## Three Things to Consider

The three things we have to consider are the inductance of the tuning coil, the capacity of the variable condenser and the combined inductance and capacity of the leads connected to the tuned circuit. Dealing first with capacity, let us assume for the moment that we want to "gang" two tuned circuits in which the coils are accurately matched for inductance. Associated with each of these coils there will be a variable condenser and the rotors or moving vanes of the condensers will be placed on the same shaft.

If the low-potential end of both circuits is earthed then we shall connect the moving plates to the earthed side, and there is no need for the two sets of moving plates to be insulated from one another. We should have by us an accurate wavemeter and an indicating device so that we can measure up each circuit at any part of the tuning range. We will start at the lower end setting the dial of the twin condenser at 0.

Now don't run away with the idea that this means there is now no capacity across the coils. The minimum capacity of all commercial variable condensers is quite high, without considering the capacity of associated leads.

## A Practical Example

I have just walked across my laboratory and measured the maximum and minimum capacities of one section of the first ganged condenser I came across. It is of a good make, and I should not hesitate to use it in any good set I might design. Nominally its capacity is .0005 microfarad maximum. Its measured maximum capacity turns out to be .00054, and its minimum is .000028 microfarad, or a little more than a twentieth of the maximum.

I have frequently measured variable condensers having a capacity ratio of only 10 or 12:1, so we have nothing to grumble about in this case. Still, .000028 microfarad is by no means a negligible capacity, so you see that the 0 on the tuning scale in only one sense of the word means nothing!

The first thing we must do, then is to make sure that our minimum capacity is the same in both condensers. This is frequently done, not by making the two condensers so accurately there is no shade of difference between them (this is too expensive a task for the ordinary set manufacturer) but by placing a small adjustable condenser in parallel with each of the sections and adjusting the total capacity of the section which is the smaller so as to bring its minimum up to that of the minimum of the other condenser.

So far so good—but we are not

out of the wood yet. Let us set the condenser dial at 10 degrees and again measure each pair. Repeat the process at 20, 30, 40 degrees and so on until we have covered the whole tuning range up to the maximum. Let us compare figures all up the scale and we shall probably find that at some parts of the tuning scale one condenser has the higher capacity, and at some parts the other.

The maximum may or may not be the same (it generally isn't!), and if we adjust the trimmer condensers once more we can match them again, but by so doing the matching of the minimum position will be immediately lost. What are we to do?

If you examine some ganged condensers you will see that their rotor end plates are saw-cut to make bending easy, and as you probably know that the capacity of a condenser is not only dependent upon the size of the plates but the spacing between them, and as bringing the plates together will increase the capacity, so by bending one or more of the sections the capacity at any given portion of the scale can be increased or decreased.

It is possible, for example, at the top of the scale to bend the plates so that the maximum is increased without having any effect on the minimum, for at this latter point the moving plates are well away from the fixed ones.

This final matching up of the sections of a condenser in a set is quite skilled work, and if you were taken behind the scenes in some set

## The Biggest Set at the Show!



Two visitors at the Radio Show examining the new R.G.D. twelve-valve super-het chassis. Note the Catkin valves in the set and the dual loud-speakers at the bottom of the picture

manufacturers' testing rooms you would appreciate how much time and trouble are devoted to trying to obtain perfect ganging.

I hate to suggest to anyone that they should tamper with the adjustments of a commercial set, and do not take what I am telling you as a suggestion or advice that you should do so, but just how far "out" the ganging is in some parts of the tuning scale of commercial sets can easily be proved by tuning to a station, say, half-way up the dial in a ganged set, judging its strength by ear and then carefully "trimming" the condensers to get a proper match.

In a number of cases the signal strength will be increased several times and indeed sometimes will so increase that the station comes from practical inaudibility to good loud-speaker strength.

Now see how much better off is the real experimenter who has made his own set and has not sacrificed anything for the alleged advantages of single control. I know it is more bother to tune two dials than one, but by so doing you can make your individual circuits very sharp and efficient and on any given station you can bring them both perfectly into tune.

Even the relatively inexpert user can put a refinement of adjustment into his tuning quite impossible in most expert hands with a single-control set. By all means let single-control receivers be supplied to those who want them—those non-enthusiastic people who are content with a good general performance and do not want the very best. Personally I am not prepared to put up with inefficiency just to get advantages I don't want!

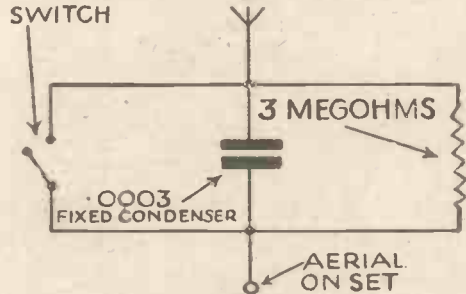


No wonder they look happy! The young lady on the left is handling the 18 lb. of gold and 46 lb. of silver used by H.M.V. for their switch contacts in sets each year

# That Radio Dodge

## REDUCING ATMOSPHERICS

THE use of a simple grid leak and fixed condenser in the aerial lead-in is very effective in reducing interference. The circuit shows clearly the arrangement. One side of the aerial is connected to a fixed condenser of SWITCH



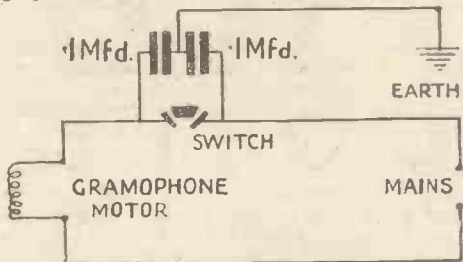
Condenser with parallel grid leak to reduce the effect of atmospheric

.0003-microfarad capacity, and the other side of the condenser is taken to the set. Across the fixed condenser is joined a 2 or 3-megohm grid leak.

The arrangement is easily shorted out by the provision of an on-off switch as shown in the diagram. When the arrangement is in use the interference is allowed to dissipate through the resistance whilst the condenser acts as a coupling for the lead-in. E. M.

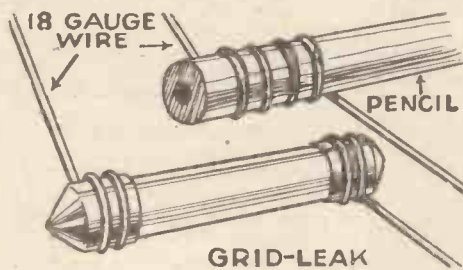
## GRAMOPHONE INTERFERENCE

USERS of electric gramophone motors will find that a centre-tapped .2-microfarad fixed condenser fitted across the motor switch will stop, or at least reduce, that irritating plop which is heard in the loud-speaker every



How to fit a condenser across gramophone motor switch to stop "plop"

time the motor is switched on. The diagram shows the arrangement clearly. The condenser, of course, has three terminals, the two outer ones are connected to the switch and the centre tap is taken to earth. P. B.



Grid leaks can be securely held in small coiled lengths of wire

## HANDY GRID-LEAK CONNECTIONS

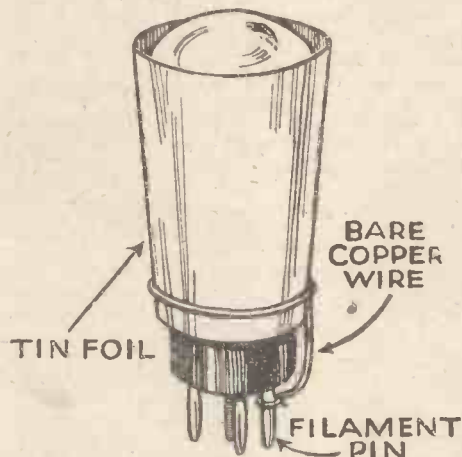
A SIMPLE method of fixing grid-leaks or fixed resistances is described below. Take about 12 in. of 18-gauge wire and at about

4 in. from one end wind four turns fairly close together round an ordinary lead pencil. Slide the wire from the pencil and cut carefully half-way between the second and third loops.

The grid leak is fitted in each loop of wire, the ends of which can be bent and cut to fit any position. Once the two pieces of wire are fitted in the set it is quite easy to change grid leaks. The idea is also useful for anode resistances. A. W. H.

## METALLISING YOUR OWN VALVES

MAYBE you have a number of non-metallised valves in your store cupboard that "go up the loop" when you try them in your up-to-date set. Here is a very simple method of making those old valves just as



Stout tinfoil wrapped round the glass bulb of the valve will effectively "metallise" it

efficient as valves metallised by the manufacturers. A piece of stout tin foil should be wrapped round the glass bulb of the valve. Then a piece of bare copper wire should be tightly bound round the bottom of the glass bulb.

A connection must be taken from the wire to one of the filament pins of the valve. Do make certain that the wire is taken to the pin which goes into the low-tension negative socket of the valve holder. E. B.

## AN AERIAL DODGE

THE following simple idea will be of use to readers who take the precaution of removing the aerial from their set every night. How the switching is carried out is clearly shown in the accompanying sketch. An old grid-leak holder is utilised, one terminal of which is joined to the set and the other to the aerial. Instead of the grid-leak a piece of brass or copper rod must be used.

The idea is simple, yet it saves a deal of



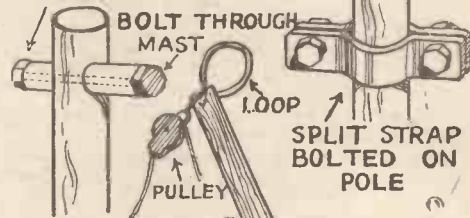
An old grid-leak holder brought into service as a simple aerial-earthing switch

trouble. The gadget can be made of a small piece of ebonite with a pair of grid-leak clips and two small terminals if a complete grid-leak holder is not available. J. B.

## THE TOP OF THE AERIAL MAST

IT is an annoying nuisance when the pulley or the rope fixing the pulley to the top of the aerial mast suddenly gives way. Frequently one has to dig up the mast out of the garden, or, if one is extremely athletic, the pole may

## DISTANCE PIECES MADE OF PIPING



METHOD 1. PROP METHOD 2. Simple methods of fixing aerial pulley so that wire can be replaced easily

be climbed to replace the offending wire. The small sketches show two arrangements whereby the aerial can be fitted to the top of a mast so that it can be replaced with little difficulty.

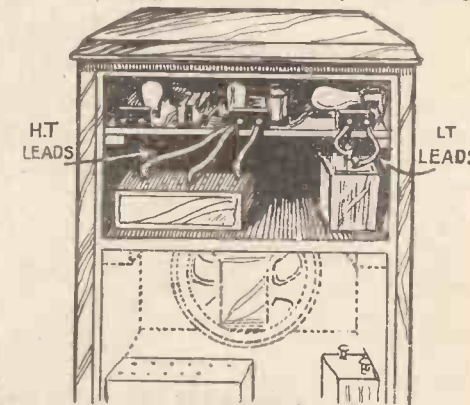
One method is to place a bolt through the mast about 6 in. from the top, and the second is to fit a collar or strap of metal at the same distance from the top. The pulley should be carefully fitted to a metal ring—strong wire would probably be suitable—which can be slipped over the top of the mast and will be prevented from slipping down by the bolt or collar.

If the pulley gives way another can be replaced easily with clothes props fastened together or with a long bamboo pole. E. D.

## BETTER BATTERY ARRANGEMENT

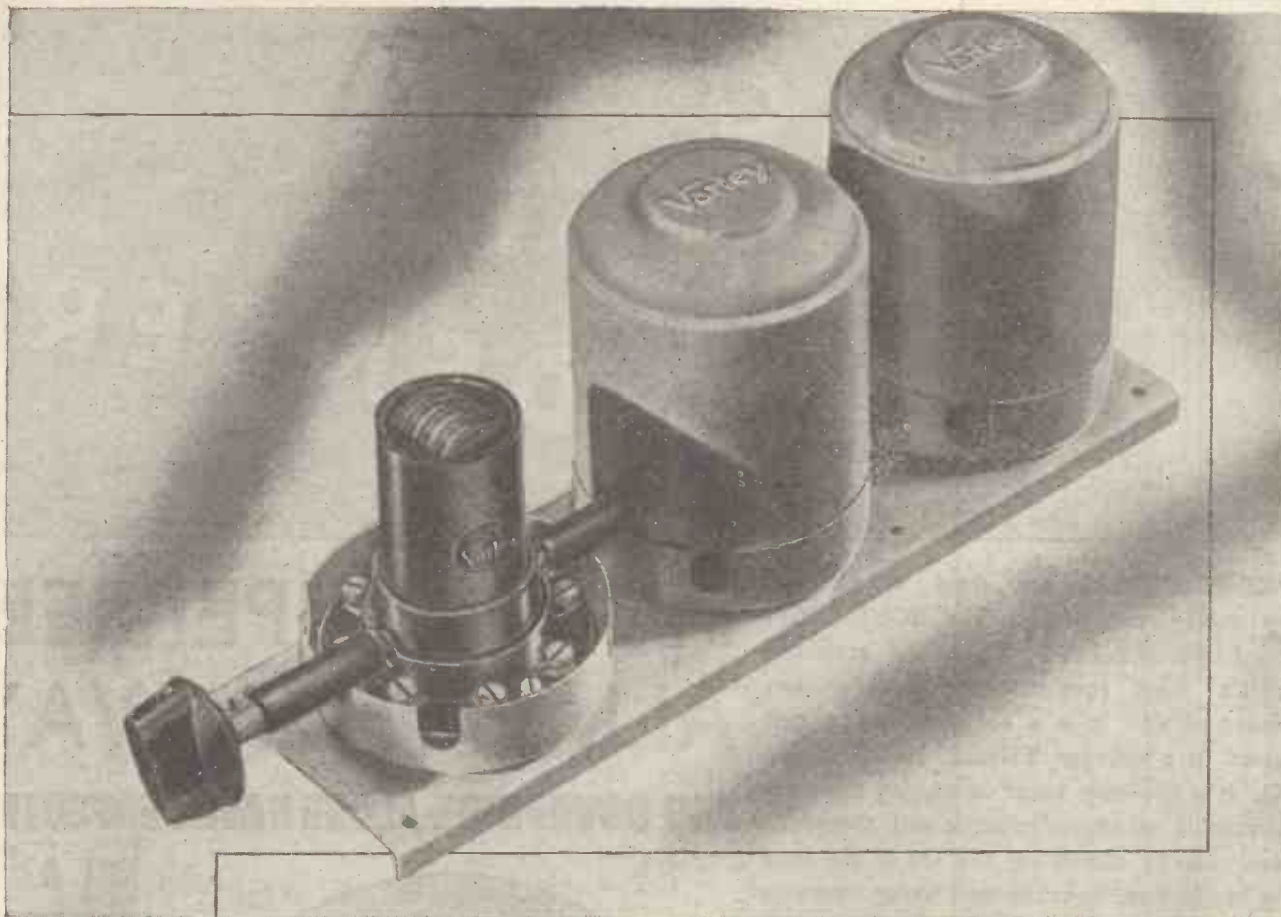
WHEN constructors are arranging the interior arrangement of their home-constructed battery radiograms or pedestal set, most of them stick to the idea of fitting the set at the top, loud-speaker in the middle, and batteries at the bottom. It is a much better idea to fit a shelf immediately underneath the set compartment allowing just sufficient room for the batteries.

This arrangement does away with long,



Long, straggling leads are avoided if a separate battery compartment is fitted just below the set chassis

straggling battery leads—often one of the causes of poor reception and shorting troubles—and incidentally it is more economical for one saves buying yards of flex. W. G. T.



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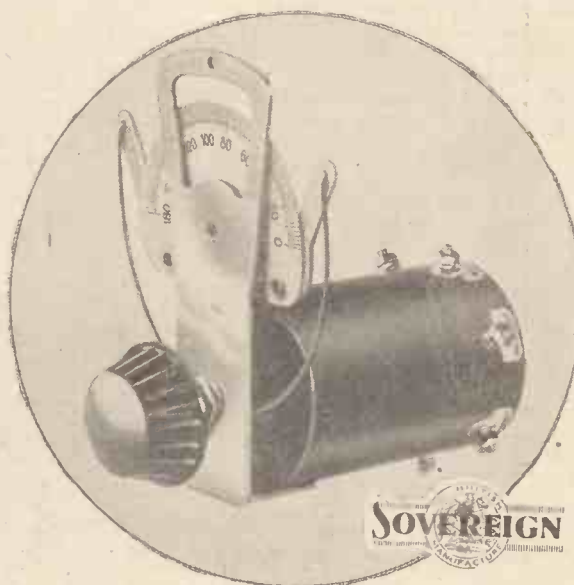
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# At Home with the A.C. Triodyne

Getting the Best Results from the Set Described Last Week

A member of the "A.W." Technical Staff reports on the performance of the set during its two-day test. His notes will be read with interest by all home constructors for he gives useful information for every operator

IT is our aim here to tell you how simple the A.C. Triodyne is to operate; how easy it is for any member of the family to log foreign stations and to emphasise that in spite of the set's capabilities for getting foreigners splendid quality is one of the main features.

### Tested in South London

The set was put through its paces in South London, about twenty miles from Brookman's Park, using two aeriols. One was a typical outdoor aerial about 60 ft. long and the other a 15-ft. indoor aerial consisting of stranded-copper wire fitted in the groove of a picture rail running round the room.

Our first experiences with the A.C. Triodyne were in the early evening from 5.30 p.m. to 7 p.m. The set was rigged up on the bench with the specified loud-speaker and the outdoor aerial was plugged into No. 2 aerial socket—the tapping that cuts out the pre-set condenser in the aerial circuit. The mains voltage was adjusted to suit our particular house mains.

"Hier Westdeutscher Rundfunk" was the first signal heard from the loud-speaker. A few minutes listening to this station—Langenberg on 472.4 metres—then we started turning the tuning control and others roared in at splendid strength and quality.

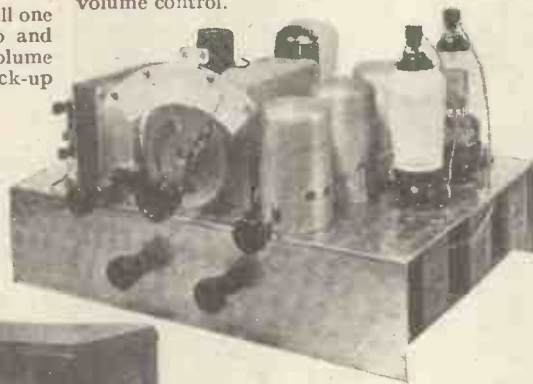
### Very Simple to Operate

Only a few minutes were needed to find that the set was very simple to operate. You can see from the photographs of the set how the controls are arranged. In the centre is the main tuning control; on the left is the mains on-off switch, above the radio volume control, with which is combined the gramo-radio switch; and on the right is the wave-change switch above the gramophone volume control.

Tuning the set is really child's play. All one does is to turn the centre tuning knob and adjust the volume with the left-hand volume control. For record reproduction the pick-up



Full constructional details of the set were given in last week's "A.W."



The absence of reaction does away with all complicated tuning finesse.

Before we started making our list of stations, the set, of course, had to be ganged. Like everything with this set, the job was simple. Poste Parisien was coming through very strong in daylight and we ganged on this station.

## COMPONENTS YOU WILL NEED FOR THE A.C. TRIODYNE VALVES TO USE

### CHASSIS

14 in. by 10 in. by 3 1/4 in., No. 16-gauge aluminium (Peto-Scott).

### CHOKES, HIGH-FREQUENCY

1—Telsen screened binocular (or Wearite, Goltone).  
1—British Radio Gram type 40 (or Lissen, Telsen, Graham Farish, Igranic, Magnum Sovereign, Lewcos).

### CHOKES, LOW-FREQUENCY

1—Igranic type CH4 (or Lissen, Telsen, Graham Farish, Parmeko, Bulgin, Ferranti).

### COILS

1—Set of three iron-cored aerial coils (Lissen).

### CONDENSERS, FIXED

1—.0001-microfarad tubular type (British Radiophone, or Telsen, Dubilier).  
3—.01-microfarad tubular type (British Radiophone, or Telsen, Dubilier).

5—Dubilier 1-microfarad type BB (or Lissen, Telsen, Goltone, T.C.C., Igranic, Ferranti, British Radiophone).

2—Dubilier 2-microfarad type BB (or Lissen, Telsen, Goltone, T.C.C., Igranic, Ferranti, British Radiophone).

1—Telsen 8-microfarad electrolytic 500-volt working (or Dubilier, Peak, T.C.C.).

2—Telsen 4-microfarad electrolytic 500-volt working (or Dubilier, Peak, T.C.C.).

### CONDENSERS, VARIABLE

1—British Radiophone Midget three-gang .0005-microfarad, type 604, with full-vision scale, type 711.  
2—Colvern .00025-microfarad preset (or Sovereign, Telsen, Lissen).

### FUSE

1—Bulgin enclosed twin, complete with fuses, type F9.

### HOLDERS, VALVE

2—Clix five-pin chassis mounting (or British Radiophone).

1—Clix seven-pin chassis mounting (or British Radiophone).

### RESISTANCES, FIXED

1—Graham Farish 350-ohm (or Erie, B.A.T., Telsen).

1—Graham Farish 1,000-ohm (or Erie, B.A.T., Telsen).

2—Graham Farish 5,000-ohm (or Erie, B.A.T., Telsen).

1—Graham Farish 15,000-ohm (or Erie, B.A.T., Telsen).

1—Graham Farish 20,000-ohm (or Erie, B.A.T., Telsen).

Make	H.F. Amplifier	Detector	Power
Mazda ...	ACSGVM	ACHLDD	ACPen
Mullard ...	VM4V	TDD4*	Pen4V
Cossor ...	MVSG	DDT	MPPen
Marconi ...	VMS4	MHD4	MPT4
Osram ...	VMS4	MHD4	MPT4
Six-Sixty ...	4MMAC	—	SS4PenAC
Micromesh ...	VSGA1	11A2	7A2
Tungsram ...	AS4105	—	APP4120

\* To be released later.

2—Graham Farish 40,000-ohm (or Erie, B.A.T., Telsen).

1—Graham Farish 100,000-ohm (or Erie, B.A.T., Telsen).

1—Graham Farish 1/2-megohm (or Erie, B.A.T., Telsen).

### RESISTANCES, VARIABLE

1—Bulgin 25,000-ohm combined with switch, type VS34.

1—Bulgin 250,000-ohm, type VC20 (or Watmel).

### RECTIFIER

1—Westinghouse, type HT8.

### SUNDRIES

Connecting wire and sleeving (Lewcos).

Length of screened sleeving (Lewcos).

Mains plug (Goltone).

2—Belling Lee anode connectors (or Clix).

### SWITCH

1—Bulgin rotary mains on-off type S91.

### TERMINAL STRIPS

2—Clix chassis mounting, marked: A1, A2, E and P.U. (two), L.S. (two).

### TRANSFORMER, LOW-FREQUENCY

1—R.I. Auto-Parafeed.

### TRANSFORMER, MAINS

1—Wearite T8A (or Heayberd, R.L., Telsen, Sound Sales).

### ACCESSORIES

Cabinet (Camco Grosvenor).

Loud-speaker with pentode transformer (Igranic type D9, or W.B., Celestion, Amplion, Ediswan, Epoch, Rola, Blue Spot, R. & A.).

Aerial (Electron).

Earth (Graham Farish Filtr).

Download (British Radiophone Receptor).

Lightning switch (Bulgin, type S99).

The process of ganging consisted simply of tuning in Poste Parisien to its loudest point on the scale and then adjusting the trimmers on the three-gang condenser with a slight adjustment of the main condenser knob, starting with the trimmer nearest the front of the set and turning the knob until the station was heard at its loudest point. We found that this ganging held good over both wavebands.

Our first run round the medium waveband produced an excellent bag of stations. All the British Regional and National stations were heard, together with a number of foreigners. Then we logged Hilversum between North and Scottish Nationals, Fécamp nearly at the bottom of the scale below London National, Brussels No. 2 and Poste Parisien between London and West Regionals.

### During Daylight Hours

Just below North Regional we jotted down Langenberg, our first signal, and just above Brussels No. 1. All these foreigners came in during daylight hours at fine loud-speaker strength and at a quality that should please listeners with those so-called "musical ears."

On the long waves our early evening bag was also good. We heard Heston broadcasting the A.A. weather forecasts, Croydon calling up aeroplanes, the lady announcer at Radio Luxembourg a little further up, then Eiffel Tower, Daventry, Radio Paris, and finally Huizen. Huizen, by the way, was a splendid signal, no doubt due to the fact that this station

has installed a high-power transmitter working on a power of 50 kilowatts.

Adding up the number of stations received during our daylight test we found a total of twenty; really splendid, you will agree.

It was during the main evening test that the set really proved its worth. On the small indoor aerial no fewer than twenty stations gave good entertainment value in the course of a twenty-minute run round the dials between 9.30 and 9.50 p.m.

**Testing for Selectivity**

The next important test was for selectivity; the outdoor aerial was used with aerial tapping No. 1, which put the pre-set condenser in series with the aerial. London Regional was taken as the chief test. The spread of this station—the strongest heard in this district—was quite small and it was possible to hear Scottish Regional above and Brussels No. 2 below entirely free of interference. The spread in degrees of the dial was about 9; quite good for a set with three tuned circuits.

Other interesting notes made during the selectivity test were that Trieste was clear of London National with 4 degrees on the dial to spare; Hilversum on 296.1 metres was a splendid signal and there was no interference from Scottish or North Nationals. The big three—Poste Parisien, Breslau, and Milan—were easily separated; each station gave fine entertaining reception.

The only major test of selectivity that can be made on the long waveband is the separation of Königswusterhausen (which, by the way, is now known as Deutschlandsender) from Radio Paris and Daventry. We could not get the German station quite free, but the interference was so small that the background was only heard during programme intervals.

**Interference from Moscow**

Another interesting point about the long-wave tests was the reception of the new Moscow 500-kilowatt station on 1,481 metres. This station is very close to Eiffel Tower and interference made enjoyable listening impossible.

You will notice from the list of stations that the wave ranges covered by this set are quite adequate for ordinary use. We managed to pick up Plymouth, one of the small British relay stations which works on a wavelength of 218.5 metres.

We tried the set with the new Columbia

model 12 pick-up and were pleased with the results. Although the gramophone volume control did not reduce the volume to zero, the minimum point gave just enough volume for a small room.

You will like the quality of the set both on radio and with electrical reproduction of records. The tone is well balanced, both high and low notes being represented in the correct proportions. The pentode gives an output of nearly 2.5 watts; a big noise in a small room.

We know that the keen radio man enjoys a tour of Europe on a Sunday morning. During our Sunday-morning tour we picked up over a dozen foreign stations, all of which were well worth hearing.

Besides the pleasure in constructing such a fine set, we can assure you that the results will be worth while. The results you obtain depend, of course, on the locality in which the set is used, but we are perfectly safe in saying that on most nights the set will give you a choice of at least thirty programmes.

**STATIONS RECEIVED**

**Long Waveband**

Station	Dial Reading	Station	Dial Reading
Croydon	14	Daventry National	60
Luxembourg	30	Königswusterhausen	
Motala	42	en	65
Warsaw	42	Radio Paris	71
Eiffel Tower	50	Huizen	84

**Medium Waveband**

Plymouth	2	London Regional	45
Fécamp	6	Scottish Regional	50
Nurnberg	10	Toulouse	52½
Trieste	14	Leipsig	54
Frankfurt	15	Midland Regional	56
London National	16	Sottens	58
Moravska Ostrava	17	Athlone	63
Rennes PTT	19	Rome	70
Turin	20	Milan	73
Heilsberg	21	Beromuenster	75
Scottish National	23	Lyons la Doua	77
Hilversum	26	Langenberg	79
North National	27	North Regional	81
Bordeaux	28	Prague	83½
West Regional	30	Florence	86
Breslau	35	Brussels No. 1	87½
Poste Parisien	36	Vienna	89
Milan	38	Munich	94
Brussels No. 2	40	Budapest	98

**The Hexode**

**A New Super-het Valve**

**By J. H. REYNER, B.Sc. (Hons), A.M.I.E.F.**

A SPECIAL six-electrode valve is suggested for super-hets. It is intended to act as a combined oscillator and first detector and it is claimed that it gives better results than two separate valves.

Many designers have tried to evolve a satisfactory circuit for the oscillator and first detector of a super-het, using only one valve. But with existing types this is not satisfactory, because the characteristics required for a good oscillator are not those of a good detector. Added to this, we have to consider volume controlling on the first detector, which is often necessary, and this again requires different characteristics.

**Undesirable Interaction**

Screen-grid valves and pentodes have been tried, using one grid for the oscillator and another for the detector, but there is always interaction between the two, so that the circuit fails in some particular. The hexode has been developed to overcome these difficulties. It contains a cathode, an anode, and four grids, and the simplest way to understand it is to consider it as being made up of two separate valves.

The two inside grids are connected to an oscillator circuit just like an ordinary triode. The first grid is a control grid and the second acts as an anode, being connected to H.T. + in the usual way. Electrons are attracted from the cathode and the current is controlled by the voltage on the inner grid.

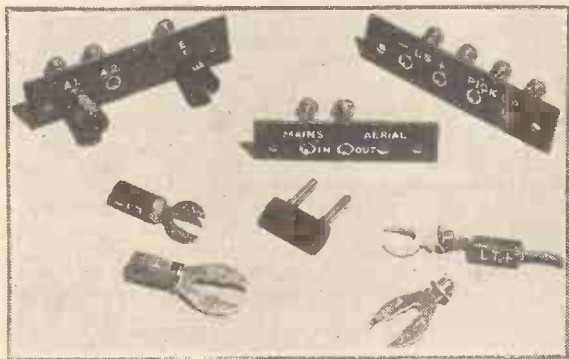
Since the second grid is not solid, however, quite a number of the electrons shoot through to the other side. Immediately outside the second grid is the third grid connected to H.T.—. This chokes back the electrons and prevents them from going any farther, so that we are left with a cloud of electrons which have shot through the second grid, but cannot get any farther.

Outside, the whole assembly is an anode of the usual type, connected to H.T.+. This, together with the third grid and the cloud of electrons, act like another valve. If the third grid is made positive, some of the electrons in the cloud are released and shoot through to the anode and we can control the current by varying the voltage on the third grid.

**Detector Portion of the Valve**

This portion of the valve acts as the detector. The third grid is connected to the aerial and the signals picked up control the voltage on the grid and allow current to flow in the usual way. The source of current, however, is intermittent because the number of electrons which shoot through from the oscillator portion varies according to the oscillation. When the oscillator circuit is drawing current, there are no spare electrons available. Thus the electrons come through in bursts, so that we automatically obtain the necessary mixing between the incoming signal and the local oscillation.

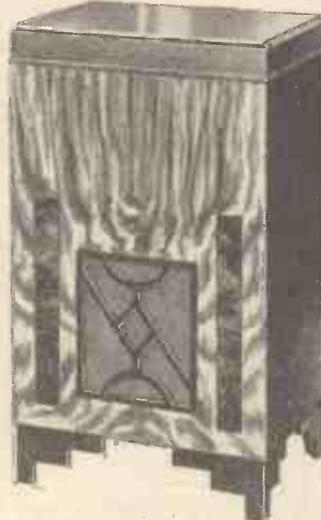
The arrangement is very simple and the characteristics of the detector and oscillator portions of the valve can be quite independent so that each function is performed with maximum efficiency. Because of this it is suggested that the hexode will supersede all other valves for use as a first detector.



Above: A selection of terminal strips for chassis sets, wanders, plugs, and spade terminals from the extensive range of Clix products



Left: The new Goltone impedance coupler allows the use of a long lead-in between the aerial and the set so that any external electrical interference is minimised



Remember—if you get this issue of "A.W." on the day of publication—that Radiolympia closes on Friday, August 24

Right: The latest version of the well-known Peto-Scott Adaptogram cabinet, of inlaid walnut

# Round the Radio Show

By the "Amateur Wireless" Technical Staff

**T**WO days of the Radio Show still to go. A last look round to sum up our many and varied impressions of Radiolympia. Whether you have been to the Show or are one of the last-minute brigade, no doubt you will be interested to swap experiences with us. So here goes:

What staggeringly low prices, to be sure. A three-valver for £3 10s. or a radiogram, complete in every way, for 20 guineas. Intermediate prices are just as representative of the new values.

### A Typical Example

Take, for example, the many four- and five-valve super-hets, all ranging around 14 guineas. Consider the Ekco model 74 at 13 guineas—a five-valve super-het with two high-frequency pentodes, automatic volume control, and working from A.C. and D.C. That is just a typical example.

Kits, which everyone was saying would die a natural death with the coming of the cheap factory-built sets, are in stronger force than ever. Think of the Lissen three-valve chassis kit, complete with valves for £4 19s. 6d.

Or the Cossor kit at £6 7s. 6d. A three-valve set with single-dial control and a very modernistic cabinet.

### Constructor's Super-het Bargain

Among kits we must mention the Lissen Skyscraper super-het seven, priced at £8 17s. 6d., complete with valves. Never before has such a kit-constructor's bargain been available.

Did you see the Page car-radio set? It is a super-het using Catkin all-metal valves, with a very neat remote control, which includes wave-change switching—that will give the Americans something to think about.

Television is still coming but not yet here, according to what one can see at the Show. Grafton Radio were showing a mirror-drum television set, the special point of interest being the projector, which gives a picture  $9\frac{1}{4}$  inches by  $4\frac{3}{4}$  inches. At 65 guineas this will unfortunately be caviare to the general public.

Other television exhibits included the Sound Sales cathode-ray instrument, and this type of television was also shown on the Baird stand. Stand No. 10—the AMATEUR WIRELESS exhibit—was as practicable as any in its television offering, a complete home-constructor's mirror-drum.

Naturally, the constructor's interest is held largely by the stands showing radio components and accessories. Perhaps the most novel component at the Show was the Sovereign permeability tuner, which we gave exclusive details about in our issue of August 5, 1933.

Hosts of keen amateurs have flocked to this firm's stand as the result of this development, backed up, of course, by the details we have published on the New-Style Three in the issue of August 12.

Iron-core coils, of which permeability tuning is, of course, a sequel, are found on nearly all component stands. Notable are the Lissen, Colvern, Varley, and Telsen and Wearite coils of this type.

Short waves show no diminution of interest. The interest has shifted very largely from the normal shortwave bands around 30 metres down

to the new and little explored 5-metre range of wavelengths.

Stratton's stand is full of super-regenerative sets for this work, backed up with 5-metre transmitters of great simplicity. Double-gang condensers for short-wave work are also a big feature of the stand.

Tone control is now almost a standard-fitting on commercial sets, but component makers have shown much ingenuity in developing separate controls, notably the combined tone and volume control at 10s. on the Bowyer Lowe and A.E.D. stand.

Tuning dials really have improved. The general impression after looking round the show

is that the tuning scales of these devices are much larger. Often they are marked in wavelengths, or even in stations. A hair-line or a very fine pointer is favoured.

The development of class-B amplification has, of course, brought in a large number of special components, notably transformers for the driver and output stages.

A good example is the Wearite BJ21 transformer, price 8s. 6d., a step-up transformer designed for the new Marconi B21 class-B valve.

### Decisive Tendencies

Among the most decisive tendencies in component design must be counted the combination tuning units, including variable tuning condensers, usually a three-ganger, and a complete set of coils, iron-cored and individually screened.

One of the most admired of these units is the J.B. Linacore pack, consisting of three iron-core coils, three-gang condenser, and some of the smaller coupling condensers. Of course all the wave-change switching is self-contained.

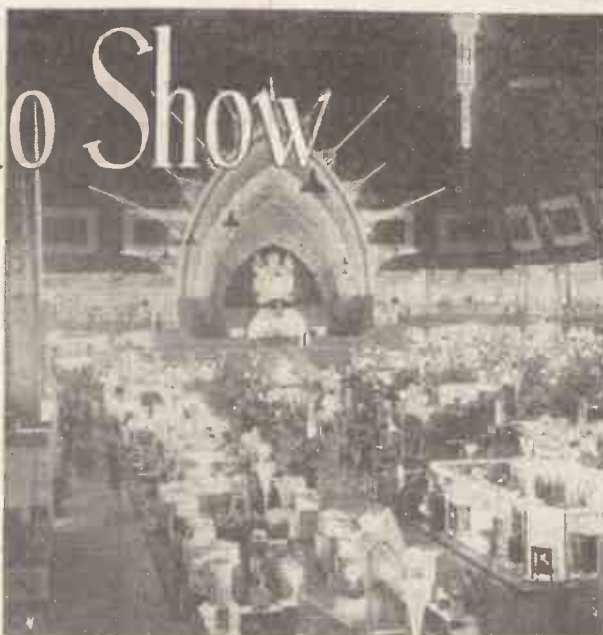
Talking of switching, we might mention the fine idea on the R.G.D. set. As the switching mechanism would be rather heavy if actuated in the normal way, the designers have used a little bevel, which connects with a geared wheel. By rotating the wheel, a gearing action is obtained whereby the switch turns over very easily. The set in which this novel mechanical idea is incorporated is probably the most elaborate at the Show—twelve valves, twin speakers, with 6 watts output—105 guineas!

### Fascinating Micro Waves!

While on sets, we recall the Marconiphone set of the future, giving us an idea of what may happen to radio design. Some of the gadgets are quite bizarre, but we were technically fascinated with the use of micro waves—the waves that Marconi had such faith in for the future of radio.

Not the least interesting aspect of the show was the display of accessories, including large-capacity high-tension batteries of very reasonable price.

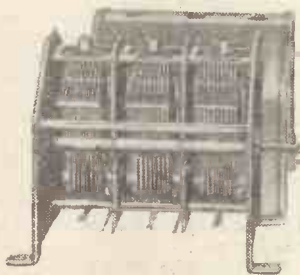
The idea is to educate the public to give up the small-capacity batteries, which are so expensive in the long run, and not very satisfactory at any time, in favour of the larger ratings, especially now that class B and quiescent push-pull have made battery sets so good in reproduction.



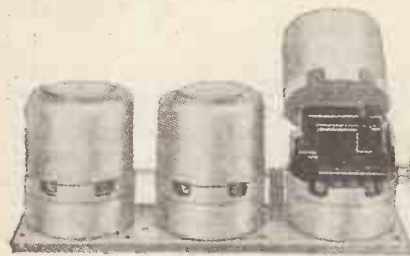
There are still two more days in which you have the opportunity to visit Radiolympia. Here is a general view of the Main Hall



A fine radiogram cabinet in mahogany by Osborn



Above: The new Ormond-three-gang condenser. Below: The Victory low-frequency transformer by British General



A set of Colvern Ferrocart coils mounted complete with switch



# British Valves Top the List!

A Short Review of Present American "Tubes"

A FEW TYPICAL AMERICAN VALVES											
Filament Volts	Type No.	Purpose	Filament current	Anode Volts	Amplifi'on Factor	Slope M/R	Output (Milliwatts)				
2-volt Battery Valves	34	Variable-mu ...	.06	135	360	.6	—				
	30	Triode ...	.06	180	9.3	.9	—				
	31	Power ...	.13	135	3.8	.9	185				
	33	Pentode ...	.26	135	7.0	1.4	700				
2.5-volt A.C. Valves	51	Variable-mu ...	1.75	250	400	1.11	—				
	58	Variable-mu ...	1.0	250	1,280	1.6	—				
	56	Triode ...	1.0	250	13.5	1.4	—				
	29	Triode ...	1.0	180	30.0	1.45	—				
	45	Power ...	1.5	250	3.5	2.0	1,600				
	47	Pentode ...	1.75	250	150	2.5	2,500				
	59	Triode (class A) Pentode ... Triode (class B)	2.0	250	100	1.6	1.2	3,000			
									400	—	2.2
6.3-volt A.C.—D.C., Battery Universal Valves	39	Variable-mu ...	.3	180	750	1.0	—				
	69	Triode ...	.3	180	30.0	1.45	—				
	LA	Pentode ...	.3	135	100	1.9	700				
	KR5	Pentode ...	.3	165	100	2.1	1,200				
	89	Triode (class A) Pentode ... Triode (class B)	.4	160	9.7	—	—	300			
135									—	—	1,500

### New Valves at the Rad'io Show

WE find, in looking over the latest valve productions, many highly specialised valves designed to work with battery filaments. Thus a long-standing complaint is met, and designers will have now an immense scope to develop really "hot" battery sets, comparable in every way with the new mains sets.

Prominent among the latest battery valves is the *high-frequency pentode*, which, we were told, would be impossible as a battery type owing to the strain on the filament. Now comes the Marconi and Osram VP21, which, with a 1-ampere filament, has quite amazing characteristics.

The theoretical amplification factor is 900. From tests already made this should mean about a 50-per cent. increase in amplification per stage.

A very useful adjunct for A.V.C., is the new Mazda L2DD, a *double-diode-triode* for 2-volt accumulators. It has the amazingly high slope of 1.6 milliamperes per volt, and when used as a second detector in a super-het it provides full-wave rectification, and an easy means of A.V.C.

Another valuable driver valve for class B is the new steep-slope Mazda type P215. This has a high-power output and is an ideal driver when you want the maximum class-B output of 2,000 milliwatts.

The most interesting new mains valve is the Mazda AC2Pen, because it has a slope of 9 milliamperes per volt. Perhaps this does not convey much to some readers; in practice this valve will give its maximum output *with only 3 to 5 volts on the input grid*. You can connect a pick-up through a transformer directly to the grid of the AC2Pen and obtain an output of over 2,000 milliwatts.

The Mazda AC2PenDD is a development of the above valve, and can be used as a detector either in a straight or super-het set. As second detector in a super-het it also provides A.V.C. The *double-diode-pentode*, as represented by the Mazda AC2PenDD, solves a big problem.

While in the Mazda range we must mention the AC/S2/Pen, which is a high-frequency pentode with a slope of 6, giving theoretically an enormous stage gain. This can be used in almost any sort of set, but it must have a seven-pin valve holder.

The Mullard people have concentrated on A.C. valves and at the Show you can see their improved Pen4V, now called the Pen4VA. This is an output pentode with a mutual conductance of 3.5 milliamperes per volt and will handle 15.5 volts input with an output of 3,600 milliwatts.

This valve is available with seven-pin base, and for those who want to use it in an existing set it can also be had in a five-pin base. A good output valve for almost every sort of set.

The new Mullard TDD4 is an indirectly heated *double-diode-triode*, the diode portion being used for detection and delayed automatic volume control, with the triode for low-frequency amplification.



A battery class-B valve — the Six-Sixty 220B

ALTHOUGH few of us have opportunities of trying out American valves, there is considerable interest attached to the recent publication of what is said to be the first comprehensive list of valve types used on the other side of the Herring Pond.

The first striking feature is that it is so much shorter than a similarly complete list of our own. The total number of receiving valves in all classes, does not reach sixty, whereas we struggle along with some 500 types, to which newcomers are added at frequent intervals.

But a second inspection shows us that no manufacturers names are given, and here we have the clue to this apparent simplicity—standardisation!

Most of the prominent American valve makers have for years listed identical ranges under identical type letters and numbers, so that by recommending, say, one A.C. screen-grid valve, type 24A, the designer may cover in one line the products of as many as sixteen factories.

This does not apply to every type shown, but until quite recently it was 90 per cent. true,

and it is only the necessity for novelty which has led to a departure from the ideal.

While we have benefitted in efficiency from the intense competition between our own valve makers, we have paid for the greater gain per stage in higher prices, less uniformity and a confusing maze of type numbers through which even the expert finds his way with difficulty.

There are five well-defined ranges. These are: two battery groups operating at 2 volts and 5 volts; the A.C. group at 2.5 volts; the new 6.3-volt universal range; the D.C. range operating at .3 to .4 ampere, and at voltages between 12 and 30 volts.

When we compare them with our own divisions, there is little in it, for we possess 2- and 6-volt battery valves (if we can count

the 4-volt range as being obsolete), 4-volt A.C. valves and six ranges of D.C. valves.

Going further and taking individual types, we find that in each range there is again a marked similarity in the number of valves available. One or two screen-grid, one or two variable-mu, a choice of two or three triodes and the same number of super-power valves and finally one or two pentodes. In the 2.0-volt range the total number of valves listed is 6, in the 2.5-volt A.C. range, 16; and in the new universal 6.3-volt range, 19.

Compare this with our total of 300 2-volt and A.C. types. And then consider the fact that in spite of this enormous list we have really no more variety; that the complexity is largely due to the insistence of each manufacturer in applying his own ideas of nomenclature.

### A Worth-while Idea

We import many ideas from over the Herring Pond, but here is one which would seem to be well worth while, which we yet neglect.

As a matter of fact, we have less choice than our American cousins, for in addition to covering all the useful types we possess, they have a number of extremely interesting developments which we have not yet seen. One of these is the triple-purpose output valve (such as type 59) having pentode construction with the "earthed" grid brought out to a separate terminal so that it may be used as pentode, class-A or class-B triode.

Finally, our survey would not be complete without a comparison of the relative efficiencies of similar British and American valves.

In the battery class our conductances average two to three times the American throughout; in the A.C. mains range the ratio is about three, and we can pick examples reaching nearly six times the best American figure. This is where competition benefits us.

So that on this score we can really pat ourselves on the back and say after all that British valves are the most efficient in the world.



The Hivac type PX230 battery power valve



The Ferranti LP4 is a mains power triode

Programme Criticisms by Whitaker-Wilson



Mr. Petre—Good and Bad :: A. C. Astor's Technique :: Fun Racketeering :: Another Play for the Kiddies :: Promsters Welcome Sir Henry

**H**ILAIRE BELLOC'S *Mr. Petre* probably set some of you thinking. Also swallowing. It took some swallowing—that story of a man who lost his memory on landing in England from the States with exactly £63 in his possession, but who contrived (by unconsciously impersonating an American millionaire) to make £3,273,764 6s. 2d. in six months.

Even when the real millionaire brought an action for wilful impersonation and fraudulent conduct he lost the case and had to pay costs, while our friend's memory suddenly returned through accidental contact with someone he had known.

Very entertaining, though highly improbable. Still, it sounded feasible enough and made good broadcasting because of Belloc's powerful satire of modern financial methods.

It was also easy to follow. Mr. Lance Sieveking may congratulate himself on the clarity of his arrangement of the story for the microphone.

**How Production Suffered**

The production suffered from two main faults. The first was over-inflection and exaggerated affectation of speech in some of the minor characters, the women especially.

The second was the incidental music. This can only be described as hideous. An orchestra (or a record of one) burst in every few minutes with a succession of the vilest harmonies imaginable, and an organ either meandered along with meaningless chords or else went mad and imitated the orchestra.

If this music was introduced to indicate the passage of time, it was unnecessary, for when it was not used the effect was perfect.

Silence is so artistic, but nobody at Broadcasting House believes it. They imagine us to be such imbeciles that we shall not understand. They are quite wrong. At all events, the music in *Mr. Petre* was exceedingly distasteful.

Christopher Stone gave a breezy talk on the Proms. during the week. The very man to do it because he insisted he was one of the general public. Knowing fellow, Christopher! He gets us every time.

Jeanne de Casalis must have made you golfers thankful you have never played with Mrs. Feather, but you probably admired the lady's frankness in admitting she gave up each hole after twelve strokes, being a little superstitious.

A. C. Astor's ventriloquism would take some beating for sheer technique. His was one of the best vaudeville turns I have heard for some time.

I wish he would introduce me to his friend, Nurse Tonsils. She was so-called at the hospital because all the doctors wanted to take her out.

Max and Harry Nesbitt — splendid! Good

duets and effective accompaniments on a ukelele.

Read this. It is vaudeville dialogue.  
 "Where do you live?" "With my brother."  
 "Where does he live?" "With me." "Well, where do you both live?" "Together." "I know that." "Then why ask?"

Admittedly, a quotation is a hard form of criticism. For that reason I always hesitate before quoting anybody with the idea of finding fault.

Nevertheless, will Haver and Lee kindly read the above, twice each, and then discuss its value? Also, will one of them repeat this, at least four times: "I know you from your chilblains to your dandruff."

Perhaps they will tell each other that they spoil their excellent turn by the former, which is not really funny, and by the latter which is well, which speaks for itself. Then we shall not forget they are the *Fun(ny) Racketeers*.

Those of you who live near the Midland Regional transmitter may have heard the relay of Gwen Lewis's Entertainers from the Montpelier Gardens, Cheltenham. Good enough to "come to London," surely?

I had quite forgotten Rubinstein's *Trio in B Flat* (violin, cello, and piano) was so beautiful. The Canadian Trio made it intensely so.

Coming from Munich, Mozart's *Magic Flute* was naturally played in German. Just as well. The story is so silly that it hardly bears a performance in English.

Being a comic opera, part of the dialogue was spoken, which made poor broadcasting, although it must be said that some of the German inflection was a pleasure to hear.

There were spaces, too. Spaces where nothing happened to entertain us, whatever may have happened in the Residentztheater. Rather unsatisfactory. Incidentally, how musically Germans laugh!

My conclusion over that relay was that stage performances of opera should be limited to grand opera, where there is no spoken dialogue.

*There's More Magic in the Air*, described as



Haver and Lee . . . "are the Fun(ny) Racketeers"

an adventure in broadcasting, proved to be another of these juvenile plays out of position. Charming, simple, babyish, it would appeal to any child.

Why, does the B.B.C. give us these things in the evening?

It was indeed pleasant to have Nina Boucicault playing again after all these years, but even her welcome presence in the studio hardly made the play interesting to anyone who had entered his or her teens.

You need Celtic blood in your veins to appreciate the meaning of the Royal National Eisteddfod of Wales. I liked parts of Hopkin Evans's *Harlech*, but I do not pretend to understand Welsh music as a Welshman understands it.



A. C. Astor's . . . "ventriloquism would take some beating" Lance Sieveking . . . "may congratulate himself"

No doubt it found its way into the hearts of hundreds who could feel it racially.

I hope none of you have been writing to the B.B.C. and complaining that there are no new works in the Prom programmes, for that is what a good many people have been doing.

Sir Henry Wood tells me that there were thirty-eight new works. "New to me, that is," he added. Well, if they are new to him, you will not have heard them, or I either.

The first Prom went off fairly well. The Promsters gave Sir Henry an extra yell or two because he has been so ill recently, but settled down to listen quite quickly—for them.

Not very successful. Things went wrong, here and there, but not enough to make a fuss about. We shall hear some very fine performances before the season is over.

Henry Hall tells me he is off to America very shortly. He will be back by the end of September, on the last day of which he will give a feature programme in order to tell us about the places he has visited and the people he has met.

Then, I suppose, he will give us a recital of some of the American classics he has heard over there. Oh dear!

Listen to *The Mulberry Bush* on August 28-9. I have not seen a script, but it is by E. M. Delafield. Her plays are worth hearing.

# The PRACTICAL

In Company with *The Experimenters*

Eleven Practical Circuits for the Experimenter



WE have been looking round this year's Radiolympia show with the idea of finding material for experiments. Certainly we have come across some very exciting stunts, which will keep us busy for many weeks to come, but, in the meantime, we think you will like to have some advance details of the more promising developments.

This, then, is not a true record of our experiments, since we have hardly had time to do much with the new ideas for ourselves. Nevertheless, the material presented in this article is essentially practical and can be utilised by the average constructor in his existing or projected set.

## A BATTERY-CURRENT ECONOMISER

FOLLOWING our experiments with the Westector unit for high-tension battery economy—see our article on page 153 of the August 12 issue—we were naturally interested with the system adopted by the Philips engineers in their economy battery set.

On looking into the circuit arrangement we were pleasantly surprised to find that it is a very simple arrangement.

The A.C. output of the power valve is rectified and passed through a resistance to give a voltage drop, which is then applied in opposition to the voltage of the battery already negatively biasing the grid of the power valve.

The chief difference found in the Philips set's system of economy is that a valve is used for the rectification. The effect is just the same, whether a metal or valve rectifier is used.

We give the circuit of the Philips method, from which you can easily grasp the method of working if you once know that it is the rectified current from the output valve that is controlling the grid bias. See Fig. 1.

About this grid bias. In the first place, we will consider a valve that, when normally working, takes about 10 milliamperes. We increase the negative bias on the grid of this valve until the current is reduced to about 2 milliamperes.

Now suppose a strong signal is applied, as by tuning in the local. What is the effect on

the circuit shown? Well, it's all very easy, really; the A.C. output, or speech current, as it is often called, will naturally increase, and this will cause an increased current to be rectified by the "economy" valve, and in turn this will mean an increased voltage drop across the bias potentiometer.

Finally, since this voltage is in opposition to the voltage of the bias battery, the real result of applying a strong signal in the first place is to reduce the grid-bias on the valve. The anode current then assumes its normal working condition—remember we over-biased in the beginning to a point that would have caused serious distortion on a strong signal.

The overall advantage is that when the signal is small in strength, the current in the anode circuit is also small, because the opposition grid-bias is reduced, whereas when the signal is big the biasing swings back to normal and there is no distortion.

As in class B and other new systems, this economy idea means you only use the maximum anode current at times when the amplitude of the signal justifies it, and that at all other times there is a great saving of current.

## VISUAL TUNING

IN the modern set with its hair's-breadth tuning the old-fashioned tuning scale is no longer capable of coping with station location. The difficulty is in knowing exactly when the station is in tune. On either side of the correct point distortion and interference are experienced.

Some highly ingenious ideas have gone into the design of tuning arrangements, but probably the most advanced idea is "visual" tuning. By this is meant the illumination of the tuning scale *only at the correct tuning point*.

In this system, which we noted in the Standard range of sets, the idea is seen to very great advantage. A cathode-ray oscillograph is used—a miniature design modified to suit this new application.

## What the Oscillograph Really Is

Before we go any further let us remind you what a cathode-ray oscillograph really is. It is a special kind of vacuum tube, in which is arranged a filament and a cathode, with a deflecting plate and an anode. The cathode,

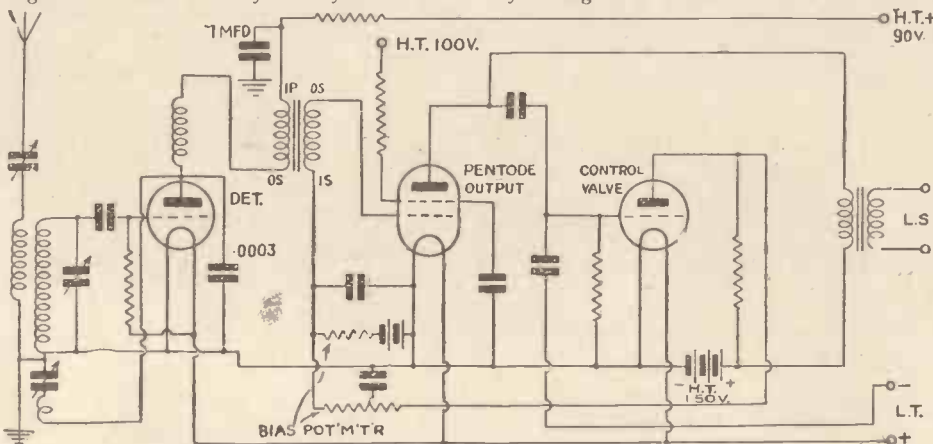


Fig. 1.—Philips arrangement to obtain power-valve current economiser

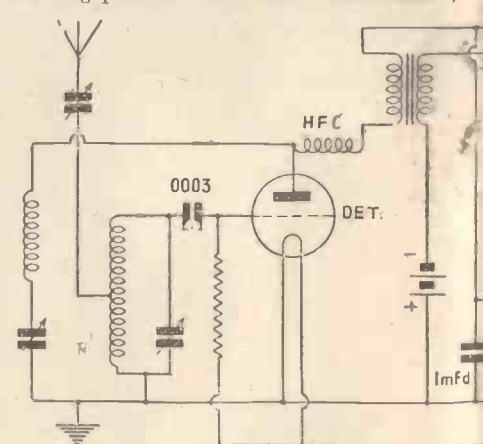


Fig. 3.—The G.E.C. grid-glow tube in use

# MAN Looks at OLYMPIA

## Who Explain How to Use the Latest Gadgets

when heated, gives off a visual ray of electrons, which can be deflected on to the top flat end of the bulb.

In the Standard tube the deflector plate is arranged so that the ray is projected on to the side of the bulb instead of to the flat-top end. The advantage is a greater length of illumination.

In practice the tube, or Tunograph, is connected as in the circuit, that is in parallel with a resistance, which is in series with the anode-circuit components of the intermediate-frequency valve.

The A.C. voltage across the anode resistance is applied to the oscillograph tube.

When this current rises, as with strong signals, the cathode is caused to emit, and the tube is illuminated.

The point to bear in mind is that the greater the signal strength, the greater is the illumination. As the tube is very sensitive to voltage input it is found in practice that even a small change in the signal strength will cause a big change in the illumination.

A variation of this system has been invented by the G.E.C., who use instead of a cathode-ray tube a grid-glow tube. See Fig. 3.

This is a device we think will be most interesting to the battery man. It needs only a very small input to obtain a big glow.

This grid-glow tube can be put into almost any type of set without any circuit alterations.

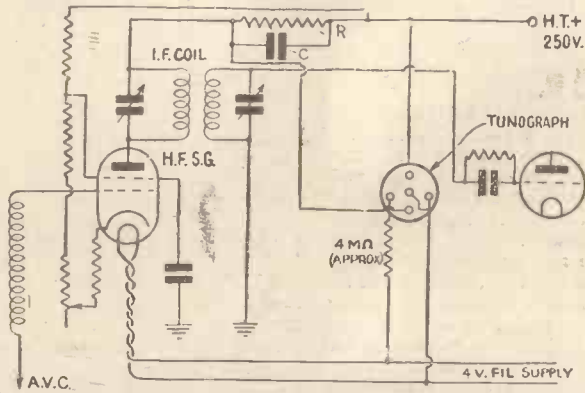


Fig. 2.—How a visual tuning device—special oscillograph—is connected in a super-het

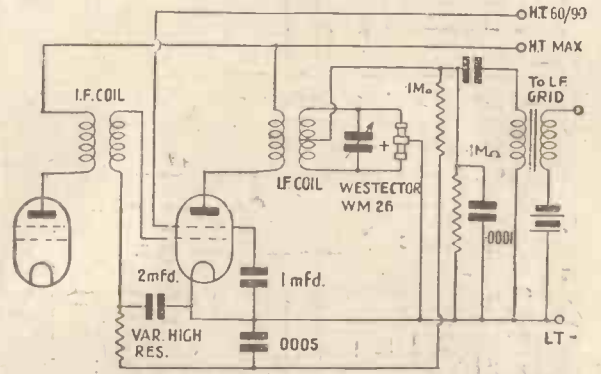


Fig. 5.—Full-wave Westector used as second detector in a super-het to give automatic volume control

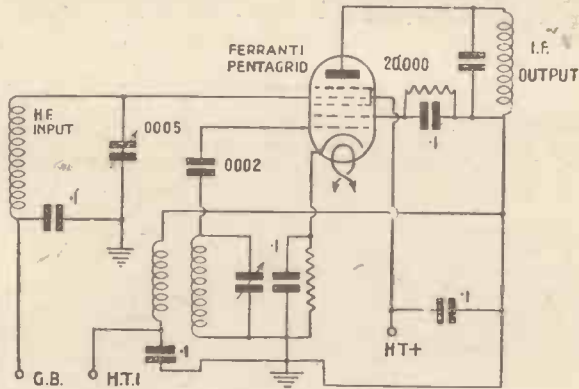


Fig. 6.—Ferranti pentagrid valve used as an oscillator-detector in a super-het. This arrangement is for mains sets only, of course

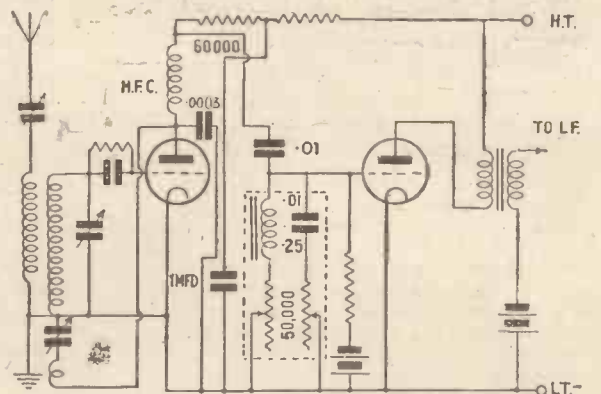


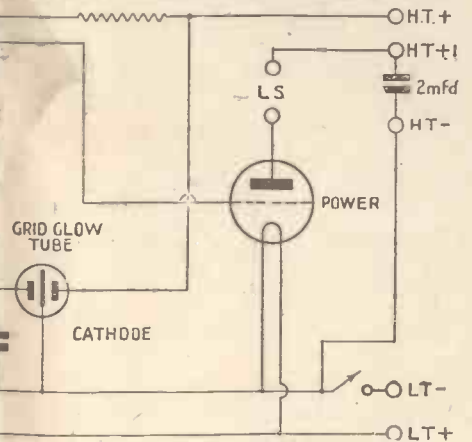
Fig. 7.—Detector and low-frequency-amplifier stage with dual tone-control arrangement. Tone-control components are enclosed by dotted line

### A.V.C. WITH THE WESTECTOR

MANY of the most advanced designs at the Show incorporate some type of cold-metal valve. The Westector has certainly come into its own this season. It has many applications, as our set designers have evidently discovered.

We ourselves were rather surprised to find how widely the device has been used. Especially for automatic volume control has the little metal rectifier come into the limelight.

Fig. 4 shows how to use a Westector as a half-wave rectifier for A.V.C., as we have ourselves been able to use it, in an ordinary straight set and *not* in a super-het. Automatic



erted after a detector for visual tuning

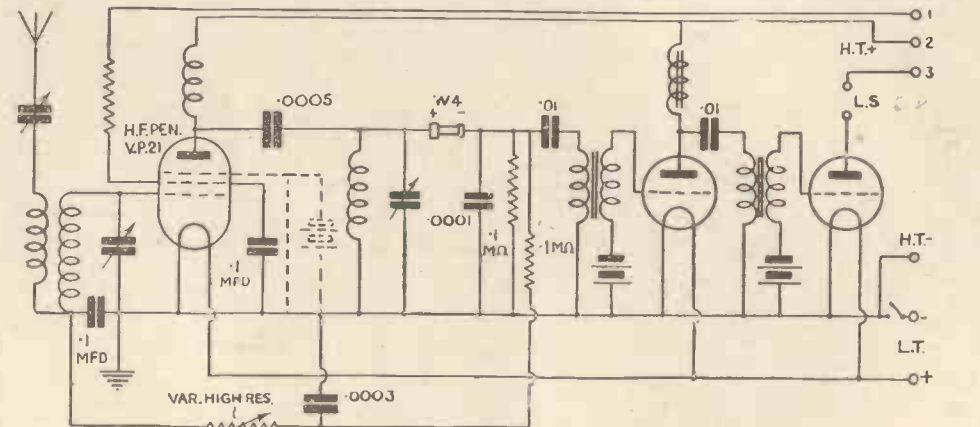


Fig. 4.—A half-wave Westector in a straight set to give automatic volume control

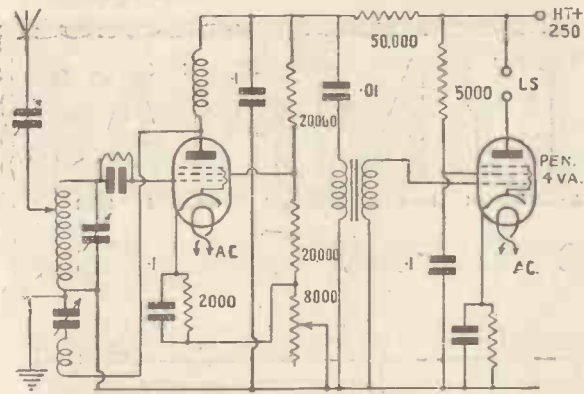


Fig. 8.—Modern A.C. two-valver with Mullard high-frequency pentode as detector and low-frequency pentode as amplifier

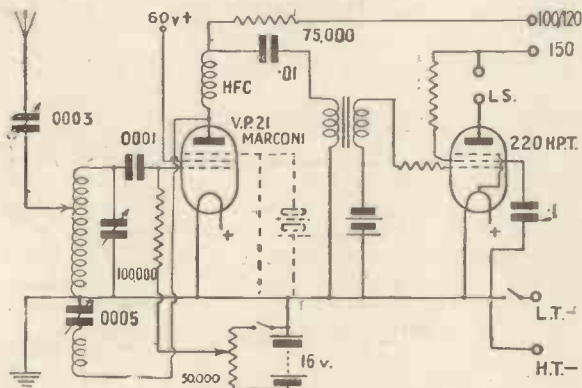


Fig. 9.—Battery version of the Fig. 8 circuit, using the Marconi VP21 as the detector

volume control is possible in straight sets, as you can see from this circuit.

All you have to do is to take a tapping from the black or negative side of the Westector to the "earthy" side of the high-frequency tuning coils through a resistance big enough to give a good voltage drop.

We have found the best thing here is a variable resistance of very high value, such as the Igranic Megostat.

With a super-het it is advisable to use a full-wave Westector as the second detector, as microphonic noises are entirely eliminated. It will handle up to 72 volts input, and will give an output of .5 milliampere.

The automatic volume control is best achieved in a super-het with a full-wave metal rectifier. This is used with a tuning coil having a centre tap, as can be seen from the Fig. 5 circuit.

Apart from all the advantages we have mentioned about the Westector there is still the little-appreciated advantage of complete freedom from microphonicity. No matter how close you put the loud-speaker to the set chassis no "singing round the ring" can be set up by the second detector.

NEW VALVE FOR SUPER-HETS

ALTHOUGH we have trooped right round the Exhibition we have been able to find only two makes of set—there may be others, of course—using the new pentagrid valve, a combined oscillator-detector for super-hets.

The other name of the pentagrid—meaning a seven-electrode valve with four grids—is the electron-coupled frequency-changer!

The derivation of this awe-inspiring title is not difficult to understand. In a normal set the first detector and the oscillator circuits are in some way coupled together, but in the pentagrid circuit, when you have virtually two valves in one bulb, there is no connection other than the common electron stream inside the valve bulb. See Fig. 6.

REAL TONE CONTROL

MORE than one good set at the Show, we noticed, was making a shout about its improved tone-control. Normally, as you know, tone-control is a bit of a misnomer, because all the average control does is progressively to cut the top notes.

Never, in the ordinary way, does such a control add bass or emphasise it directly, though through the cutting of the top the overall tone often sounds lower in pitch because the general balance has been upset in favour of the existing low notes.

Actually, there is no difficulty in controlling the tone of a receiver in the full sense of the term. With the control we describe here you can cut top or bottom notes at will, and not just cut top in the usual inadequate way.

We are not suggesting that the circuit we show is that adopted by the set-makers this year—actually there are several ways of controlling both top and bottom notes, and our system is merely typical.

In the Fig. 7 circuit our tone control is interposed between the usual .01-microfarad coupling condenser of a resistance-capacity unit, and the resistance in the grid circuit of the low-frequency valve.

It consists of two separate tone controls, one passing bass notes and the other passing high notes. The 50,000-ohm resistances can either be arranged in "fader" fashion, or two variable resistances on one spindle—the latter being the more practicable idea.

The choke is a .25 henry, or a tapped choke can be obtained from Varley. The other component is a standard type of fixed condenser of .01-microfarad capacity.

HIGH-FREQUENCY PENTODE DETECTION

ONE or two sets have gone beyond screen-grid detectors, and are using the latest high-frequency pentodes in the detector position.

The advantages are not yet appreciated. Very great amplification is, of course, expected, and is in practice obtainable. Moreover, the screen or auxiliary grid voltage does not have such a marked effect on the amplification factor of the valve as a screen-grid valve, so the average user is likely to obtain a better magnification even when the voltages are not properly adjusted for maximum results.

We show an A.C. circuit at Fig. 8—a high-frequency pentode detector and a low-frequency pentode output valve—a little set that will give 2,500 milliwatts from the locals, and that will pick up quite a number of foreigners at good strength owing to the high detector efficiency. Fig. 9 shows a battery version.

By following "The Experimenters" you will always be able to keep right up to date in your experimental and constructional work!

CUTTING OUT THE HETERODYNES

HIGH-PITCHED whistles, even in the best sets of to-day, still creep in and cannot be cut out by selective tuning alone.

For this reason the whistle filter should be a standard fitting, at least in the high-class models. Really the idea is very simple and not at all expensive. In fact, by varying the capacities across the choke shown by the circuit arrangement of a typical whistle filter, you can have a lot of fun varying the frequency cut-off. You can, for example, cut out needle scratch from record reproduction.

Fig. 10 shows how simple is the idea. A high-frequency choke with two condensers in series across it—the centre point of the condensers being taken to earth. If you do not want to make up the device but would like to take advantage of its undoubted boon, you can buy one from several firms, such as Wright & Weaire.

LATEST SCREEN-GRID DETECTION

RUNNING round the show we could not help noticing how very many sets are now using some form of screen-grid valve for the detector.

Now a high resistance in the anode circuit means a fairly big drop in voltage on the anode itself, with a resulting loss of sensitivity. We have found a way of overcoming this snag. We have used a combination of direct and parallel-fed circuits as at Fig. 11.

The high-tension voltage to the anode of the screen-grid valve is still fed through a high resistance, which is variable.

When the signal is weak you can increase the value of the anode resistance to obtain the maximum amplification of the valve; whereas with locals, when the full amplification is not wanted, you can reduce the value of the anode resistance, which will decrease the amplification, and at the same time this will increase the high-tension voltage and improve quality.

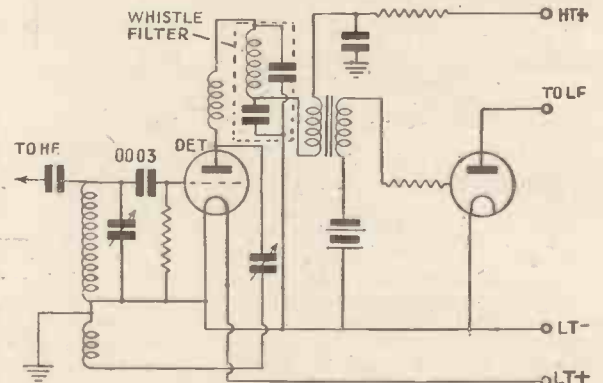


Fig. 10.—How a whistle filter can be added, as shown by dotted lines, to a typical detector and low-frequency circuit

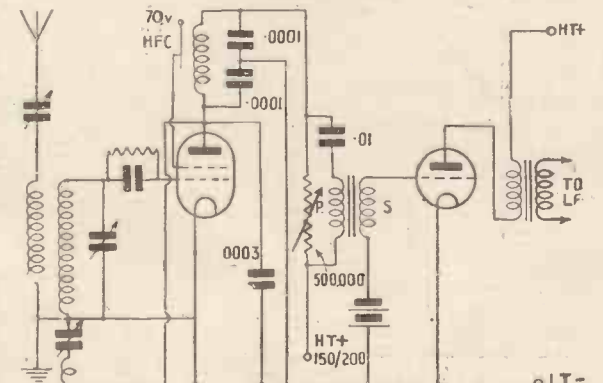


Fig. 11.—Screen-grid valve as detector, with method of coupling to the low-frequency stage



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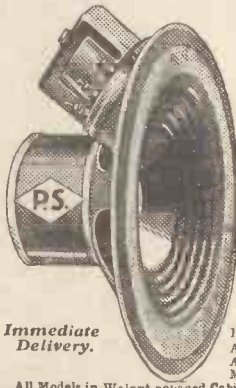
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CHART  
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VALVES  
£8.17.6**

**LISSEN**

**THE CONSTRUCTOR'S LUXURY SET**

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Publicity Dept., Isleworth.  
Please send me FREE CHART  
of the "Skyscraper" Seven Valve Superhet.

NAME .....

ADDRESS .....

..... A.W. 334

**"SKYSCRAPER"**

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

**AMPLIFIED  
AUTOMATIC  
VOLUME  
CONTROL**

**MOVING COIL  
LOUDSPEAKER**



Price complete with Inlaid Walnut  
Cabinet and Moving Coil Speaker

**£11-10s.**

**IN BEAUTIFUL  
WALNUT CABINET  
WHICH YOU PUT  
TOGETHER YOURSELF**

**BETTER TO  
BUILD THAN  
TO BUY!  
SUCCESS IS  
CERTAIN!**

**CHART  
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Never before has there been any receiver for Home Constructors on such an ambitious scale as this new Lissen "Skyscraper" Seven Valve Superhet. It embodies every up-to-the-minute advance and refinement of the most luxurious factory-built superhets—it gives the constructor the opportunity to build a £20 receiver for less than half that price.

The circuit of the Lissen "Skyscraper" Seven Valve Super-het incorporates a 6-stage bandpass filter giving exact 9-kilocycle channels and therefore providing a standard of selectivity never before achieved by a home constructor's kit set and very rarely found except in laboratory apparatus. Amplified Automatic Volume Control is provided, a special valve for this purpose having been produced by Lissen for use in this receiver. The use of this Amplified Automatic Volume Control constitutes an entirely new experience in listening; no "fading," no "blasting"—you will find yourself enjoying every word of every programme, however near or however distant, without the slightest

temptation to interfere with the receiver once you have tuned it. This is radio listening as it should be enjoyed!

Lissen Class "B" Output through a new full-power Lissen Moving-coil Loudspeaker—glorious rich tone and majestic volume, actually more faultless in its reproduction than anything you ever heard from even the most powerful mains receiver, yet working economically in this Lissen "Skyscraper" from H.T. batteries.

Tuning is something new in single-knob control—in fact, not only single-knob control but single station tuning. You never hear two stations together, you never need to think about separation. The 9-kilocycle tuning peak of the circuit ensures "one station at a time" all round the dial, and the Amplified Automatic Volume Control adjusts the receiver automatically to provide the same volume from each transmission. This simplicity is the true luxury of listening—and this is the Luxury Receiver for Home Constructors.

Lissen have published for this great new "Skyscraper" Seven Valve Superhet a most luxurious Chart which gives more detailed instructions and more lavish illustrations than have ever before been put into a constructional chart. It makes success certain for everybody who decides to build this set; it shows everybody, even without previous constructional experience, how they can have a luxury receiver and save pounds by building it themselves. A copy of this Chart will be sent FREE in return for coupon on the left or your radio dealer can supply you. Get your FREE CHART now!

**SEVEN VALVE SUPERHET**

**A TELEVISION DEVELOPMENT**

# CONVERTING LIGHT INTO ELECTRICITY WITH THE NEW ZWORYKIN CATHODE-RAY TUBE

*Here are details of a new cathode-ray tube which has been developed in America. If the claims made for it are substantiated it will mean a big advance in television progress*

WHEN a ray of light falls on to an ordinary photographic plate or film, the wave-energy breaks up some of the molecules of the sensitive emulsion and forms a new chemical compound. This is afterwards "fixed" in a suitable solution so as to preserve the photographic image.

When a cathode-ray tube is used to reproduce a televised picture, a somewhat similar effect takes place, though in this case, of course, the fluorescent image is not fixed or permanent but continually changes to give the effect of motion.

It must be remembered that the cathode-ray tube was first developed in connection with X-rays, which are themselves invisible, though they have the power of stimulating fluorescence in certain bodies.

Actually, fluorescence is the result of a stepping-down in wavelength. The very short X-rays are converted by the fluorescent medium into longer waves and so become visible to the naked eye.

The cathode-ray stream as it passes through the tube is not a form of wave energy, but it is probable that it creates X-rays where it strikes against the end of the bulb. Now, X-rays are simply very short light waves, and these in turn are "stepped-down" into the fluorescent light seen on the viewing screen.

**A New Discovery**

In television transmission we use still another photo-electric effect not very far removed from those already discussed. The effect of a light-ray falling upon the vacuum type of light cell is to cause the sensitive cathode to emit electrons. These are then collected by the positive anode, so that an electric current passes through the cell. In other words, light energy has been converted into an equivalent electric current.

Dr. Zworykin has recently announced the discovery of a substance which—like a photographic plate—is sensitive to the impact of

light of varying intensity. Instead, however, of making a "permanent" chemical record, the new substance responds to the light by accumulating a corresponding electric charge. In this respect its action is not unlike that of the

ordinary photo-electric cell, which by losing negative electrons assumes momentarily a positive charge.

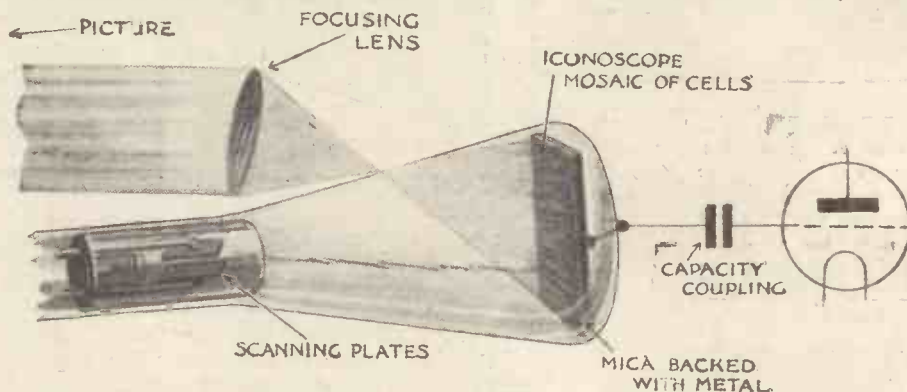
The Zworykin Iconoscope or image-receiver really consists of a mosaic of several million tiny photo-electric cells, held in solution and laid on a mica coating, backed with metal, at the large end of the cathode-ray tube. The actual composition is not yet known, but the action is as follows:—

The picture to be transmitted is focused by means of a lens on to the Iconoscope mosaic which immediately responds by acquiring a number of electric charges. These individual charges correspond at all points to the varying light-and-shade values of the picture.

The cathode stream from the tube is then sprayed to and fro over the charged surface. Wherever it strikes against a particular cell it wipes off the electric charge from that cell, and so creates a tiny current. This is passed on to a powerful amplifier and is afterwards used to modulate the outgoing carrier wave.

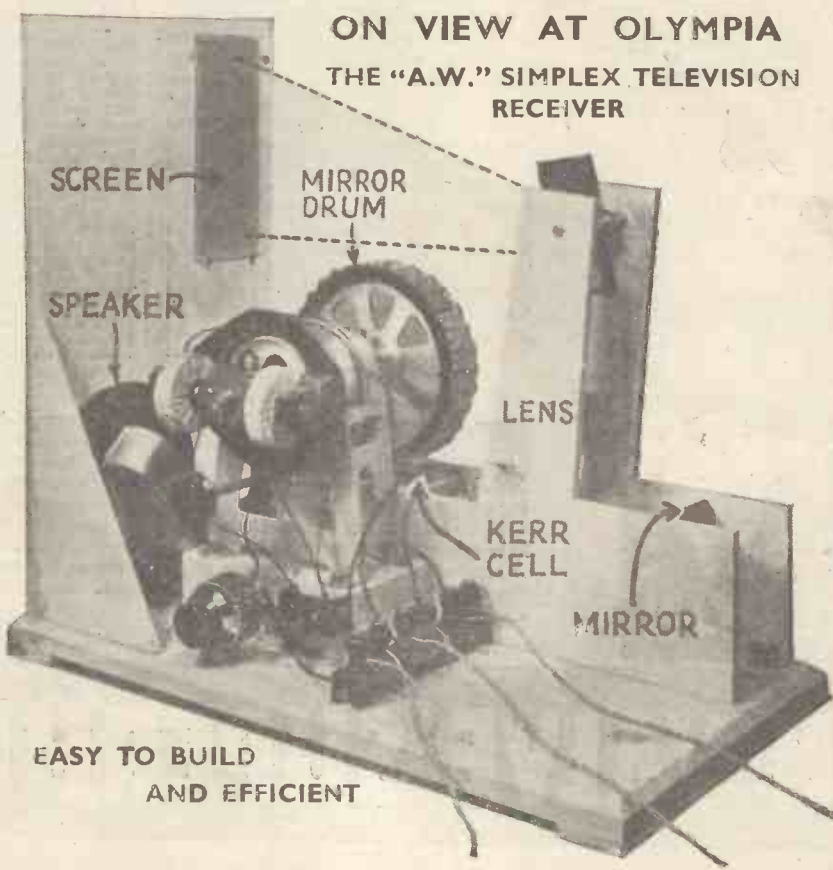
The photo-sensitive cell surface, after it has been scanned, immediately assumes a new charge from the focused image, and so the process goes on, to record the movements of a "living" picture.

The system is said to be capable of transmitting pictures with as many as 250 lines to the inch. This compared with the present 30-line scanning used in the B.B.C. programmes should mean an enormous gain in brightness and definition. The pictures so transmitted can be reproduced by any standard type of cathode-ray receiver.



*This is a schematic drawing of the Iconoscope, which presents a mosaic of sensitive cells to the cathode beam*

**ON VIEW AT OLYMPIA THE "A.W." SIMPLEX TELEVISION RECEIVER**



**EASY TO BUILD AND EFFICIENT**

*See page 328 for details of a new commercial combined mirror-drum television receiver and radio set*

**WATCH FOR DETAILS OF THE NEW "A.W." TELEVISION RECEIVER IN NEXT WEEK'S ISSUE**

# ON TOP AT OLYMPIA



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**£5·12·6**

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Please send me FREE CHART of the All-Wave  
 All-World "Skyscraper."

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ADDRESS .....

A.W/334

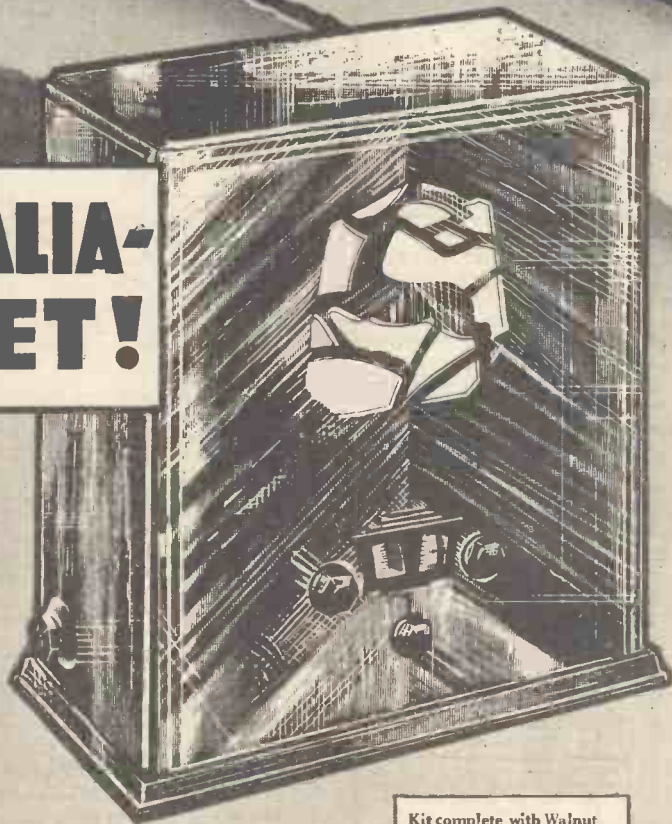
**COUPON BRINGS YOU**  
**FREE CHART**

# RADIO AT LAST! MEDIUM WAVES • LONG WAVES

## AMERICA • AUSTRALIA • ALL ON ONE SET!

### DOUBLE BALANCED PENTODE OUTPUT AND MOVING COIL SPEAKER

At last the day of All-World Radio has arrived, and you can build with your own hands the first receiver to give you not only England and Europe, but America and Australia direct. The Lissen All-Wave All-World Skyscraper 4 tunes from 12 to 2,100 metres. It brings two complete new wavelength ranges within reach of the ordinary listener—stations and programmes which before he was never able to receive—Ultra Short and Short Wave transmissions from the ends of the earth. And remember you get these stations through Double Balance Pentode Output giving brilliant reproduction on a Moving Coil Speaker—as much power as a Mains Set from ordinary high-tension batteries. Lissen have made this All-Wave All-World radio available to Home Constructors first, because it brings back the thrill of conquest to hear America and Australia direct on a set you have built yourself, it makes you an enthusiast to realise what a wonderful thing you have created!



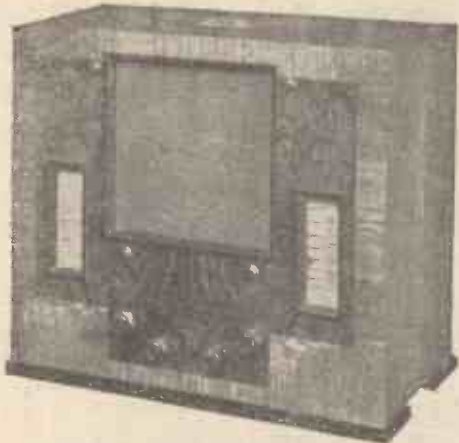
Kit complete with Walnut Console Cabinet and Moving Coil Speaker  
**£8.2.6**

## NOW BUILD THE SET THAT SPANS THE WORLD!



## Sets of the Season

## H.M.V. Super-het Selective Five



Two separate tuning scales are fitted vertically on the front of the H.M.V. Super-het table set, to clarify the wavelength and station markings for medium and long wavebands

SCIENCE and art are harmonised to perfection in this H.M.V. wireless set. The science lies in the fulfilment of many months of research to eliminate the well-known drawbacks of super-heterodyne reception. The art is the art of the cabinet maker, interpreting the modern tendency towards simple severity of line in a way that is at once aesthetically pleasing and highly utilitarian.

## Latest Super-het Advances

Here we have the latest technical advances in super-het design embodied in a first-class table-cabinet receiver. There are four stages only, the fifth valve being for rectifying the A.C. mains supply.

The four-stage circuit is built up into a crystalline-enamelled metal chassis, housed in the lower part of the cabinet, leaving plenty of space for the moving-coil loud-speaker at the top.

The cabinet is luxurious even for an H.M.V. product. Perhaps this effect of luxury is

## BRIEF SPECIFICATION

Makers : The Gramophone Co., Ltd.

Price : 15 guineas.

Valve Combination : Super-het circuit, comprising screen-grid frequency-changer (Marconi MS4B) intermediate-frequency amplifier (Marconi VMS4) power-grid second detector (MH4) and pentode output (Marconi MPT4) with mains rectifier (Marconi MPT4).

Power Supply : A.C. mains.

Power Consumption : 65 watts.

Type : Table-cabinet set with everything in the cabinet except the aerial and earth.

Remarks : First-class super-het receiver, notable for freedom from background noises, for well-balanced tone, and for exceptionally simple control.

derived from the choice veneering of the light walnut wood. Whatever the reason, we are sure that it is a cabinet that will make an instant appeal to all lovers of good furniture.

The dimensions of the cabinet are : Height, 16 in.; width, 18 in.; and depth, 11 in. This is a square-shaped cabinet designed not merely for art's sake, but to avoid undue bass-note

resonance in the self-contained loud-speaker's reproduction.

Convenience is the keynote of the control layout on the front of this cabinet. Undoubtedly the most attractive feature of the control arrangement is the separation of the tuning scales—long waves on the left and medium waves on the right.

These vertical scales are easy to read, the pointers moving up and down as the tuning knob is turned, locating not only the wavelengths but most of the names of stations of Europe. These scales light up when the mains are switched on.

Four knobs below the scales provide complete control of the instrument. On the extreme left is the volume control knob, which works smoothly and over a wide range of sound output for radio, with the additional advantage of controlling the output of a gramophone pick-up, if this accessory is connected to the back of the chassis.

Next comes the tone control, which gradually cuts off the top notes down to the bearable limit of top-note cutting, giving a welcome relief from excessive background noises on distant foreigners; mush and heterodyne whistle noises are appreciably subdued without undue sacrifice of quality.

The third knob is for tuning, working the gang condenser of the super-heterodyne circuits as well as the pointers that move up and down the vertical scales. On the extreme right is the combination switch knob, a control with many jobs.

It changes the wavelength band from medium to long as required, brings into circuit the gramophone pick-up if that is connected, switches the mains off, and lights up whichever scale is wanted for tuning.

External connections are for the aerial and earth; and the pick-up, if wanted. If the set is worked within a reasonable distance of a broadcasting centre, the mains aerial connection may be used instead of an external aerial wire, though even a short wire provides better all-round reception.

An earth connection is desirable, especially on noisy mains supplies, but our tests showed that with a normal supply the background noise from the mains, never objectionable, is not audibly increased by removing the earth lead; nor are stations greatly reduced in strength.

From the family point of view it is interesting to find that an external loud-speaker can be added, and that this can be of either high or low resistance.

Tests of the Super Selective Five justified the maker's claim of freedom from "images" in reception. But for the exceptionally high

degree of selectivity in the tuning we might have been working a straight set, so entirely free from "noises off" was the reproduction of the many programmes within range.

Talking of range, we must emphasise that this is a very sensitive set, needing only a short wire of, say, 50 feet, erected in or out of the house, to bring in a plentiful selection of foreigners. Even during daylight, full-strength signals were obtained from such stations as Brussels and Fécamp.

## Testing the Selective Action

At night we were able to test the selective action of the circuit. Locals were cut out within the prescribed 9 kilocycles, enabling adjacent foreigners to be brought in without interference. This fine station separation was equally good on the long waves, where the sensitivity also impressed us.

Quality is definitely better than the average of last year, a wider range of frequencies being



A crystalline-enamelled metal chassis fits into the lower part of the H.M.V. Super-het's cabinet, with the moving-coil loud-speaker at the top

adequately handled by the moving-coil loud-speaker, which, judging by a comparison with an externally connected loud-speaker, has also the merit of increased sensitivity.

The makers are right in saying that the cabinet does not cause bass-note "boom." There is just a suspicion of emphasis on the low notes, an advantage every listener of experience will appreciate, especially as, at all settings of the tone control set, the top notes are well enough in evidence.

Operation is a sheer delight, the facility of the two vertical tuning scales being highly appreciated as the other is toured by adjusting the single tuning knob. Volume is always well under control, and, thanks to the careful graduation of this device, a critical setting is never essential to produce any desired degree of volume.

## News for the Set Buyer

WHILE class B apparently superseded Q.P.P. in most of the commercial receivers, it is surprising to hear that Columbia are using Q.P.P. in their C.Q.A. battery radiograph, model 1003. The C.Q.A. will give 1,250 milliwatts for an anode current of 9 milliamperes.

This receiver is one of the few battery-operated radiographs available and at £21 is excellent value for money. We are pleased to see that a 166-volt high-tension battery is supplied, which will allow for the reproduction to be above the average for a battery set.

Slektun Products, Ltd., are known more for their components than for complete receivers, although last year they did introduce their Scout three-valve kit. They are showing at Olympia two receivers, designated the R. & R.

All-Electric Twin and the R. & R. class-B receiver.

The All-Electric Twin has a very ambitious specification and at £9 9s. is undoubtedly well worth the money. A novelty is the use of eight different aerial tapplings to give adequate selectivity in every part of the country.

The circuit otherwise is quite normal, consisting of a three-electrode detector transformer-coupled to a pentode output valve giving 2,000 milliwatts.

The battery model is very original. It consists of a detector valve which also acts as the driver for the class-B output valve. With an average consumption of 5 milliamperes, 1,500 milliwatts output can be obtained. The moving-coil loud-speaker provides an unusually level response. The price of this set is £8 8s.





# PERFECT MATCHING

for ANY Receiver

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P.M.6 - - - Complete 32/6

With the new "Microlode" unit and famous "Mansfield" magnetic system.

"No less than seventeen transformer ratios—that means you get really accurate matching, not approximate, but accurate matching, to any power or pentode valve. What's more, there are four ratios for Class-B or Q.P.P., all available on one speaker."

"It's an astounding development. This W.B. 'Microlode' feature means a lot to me!"

"And to everyone! No matter which of the hundred different output valves or output systems is used the speaker is matched perfectly to any set. Instantly, too, because you can easily hear the improved volume and better reproduction when you have found the correct ratio."

"The volume and reproduction must be such as only a very high-class moving-coil speaker and perfect matching could provide."

"Quite all that! And yet how comparatively low in price these W.B. 'Microlode' moving-coil speakers are."

## W.B. "MICROLODE" SPEAKERS

(Regd. Trade Mark)

See them at Stand No. 128 RADIOLYMPIA. Or write for the new folder. Whiteley Electrical Radio Co., Ltd., Dept. A, Radio Works, Mansfield, Notts.



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CONDENSERS

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... in ANY CIRCUIT mean

# EFFICIENCY



POLAR No 2.S.M.

The Polar fast and slow-motion condenser. Made in aluminium. Ball bearings. Robust construction and rigid framework as illustration. .0005 } 6/6  
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POLAR COMPAX

Solid dielectric. Suitable for tuning or reaction. Supplied with knob. .0005, .0003, .00015 } 2/6  
.0001, .00005 }

THE COMPLETE POLAR RANGE AWAITS YOUR INSPECTION ON

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RADIOLYMPIA



POLAR APERTURE

Latest design. Slow-motion control. Baseboard mounting. Pleasing appearance. Fitted lampholder.

.0005, .0003 7/6

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Insulated spindle. Improved design. Supplied with knob. .0001, .00015, .0003 (each side). 3/6



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- 1 A brass cap tightly affixed to the carbon rod forms the positive connection.
- 2 The cell is sealed by means of a waxed washer over which paraffin wax is poured. This washer assists in centralising the sac in the cell.
- 3 An air space is left between the top of the sac and the washer to allow for the expansion of the electrolyte during discharge.
- 4 A substantial zinc container which forms the negative pole of the cell.
- 5 The sac consists of a highly efficient depolariser, tightly compressed round the carbon rod, the whole being securely wrapped and tied.
- 6 Electrolytic paste of a special chemical composition which fills the space between sac and zinc container and activates the cell.
- 7 A waxed paper disc which insulates the sac from the bottom of the zinc container.

## EDISWAN H.T. BATTERIES

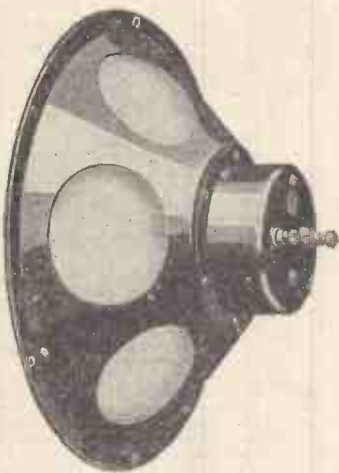
THE EDISON SWAN ELECTRIC CO. LTD. PONDERS END, MIDDLESEX

Bring your lighting problems to EDISWAN B225

# If your set will not satisfactorily operate a moving coil speaker—

—if your output valve is one of the small power type, your loud-speaker should be a differential armature or similar type. Such types, however, are generally deficient in bass response and fidelity of reproduction.

**R & A TYPE 60 DIFFERENTIAL ARMATURE REPRODUCER** has been specially designed to give good bass response with absolute fidelity of reproduction. It is difficult to realise one is not hearing a moving-coil instrument, so rich and full is the reproduction. Ask your dealer to demonstrate the TYPE 60. It is the only moving-iron type with moving-coil performance.



21/-

# If your output valve is a super power or pentode, Q.P.P. or Class B., choose the appropriate "CHALLENGER" P.M. Moving Coil Reproducer

Standard Model for use with Super Power and Pentode Outputs. Includes 3-ratio Transformer.

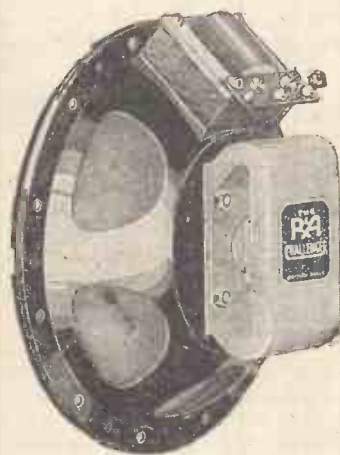
OTHER "CHALLENGER" MODELS—

- TYPE "B" for Class B Amplification. (B8 for Cossor, and B15 for Mullard and Mazda Class B Valves).
- "P" An extension instrument for Commercial Receivers.
- "Q" for Quiescent Push-Full (15,000 ohms Plate-to-Plate Load.)

EACH MODEL

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Ho'dens

# Sidelights on Modern Mass Production



Top left.—The special electric furnaces that heat all Cossor valve parts in an atmosphere of hydrogen so that all trace of unwanted gas is driven from the metal; the temperature used is often 15,000 degrees Fahrenheit



Top right.—This remarkable machine seals the electrode supports into a glass flange, popularly called 'the pinch'



Bottom left.—Spot welding on the new Cossor DDIPEN. The metal is so clear that only one or two volts are required to drive a current of several hundred amperes through the joint to be welded



Bottom right.—One of the battery of multiple-head winding machines used for winding Cossor transformers

## What is the Future of "Centimetre" Waves?

### Possible Uses for the Ultra-short Waves in Telephonic Communication

THE wavelengths below 10 metres have been of great interest to the experimenter, but formerly were considered to have little practical use for communication. From our present knowledge it would appear that they are almost useless for long-distance transmission, although the fine work done by the amateur transmitters on their band of wavelengths round 10 metres has shown that this frequency can be used for inter-European contacts and even farther afield. Conditions, however, vary to such an extent as to make communication over these distances extremely unreliable.

#### No Reflection from Heavyside Layer

As we get lower even this possibility disappears, as no waves are reflected from the Heavyside layer, as is the case with the higher wavelengths. The service range of stations working on ultra-short wavelengths must, therefore, be the area covered by their ground waves.

Experiments are being conducted in America and Germany and by the British Broadcasting Corporation with a view to establishing broadcasting stations on these wavelengths to supplement the existing services. In some respects this would be an ideal arrangement. Firstly there is almost an entire absence of atmospherics. Secondly, a large number of stations can be accommodated without fear of mutual

interference, even if using the same frequency, provided the listener is not within the ground-wave area of both. But against this must be set off the fact that, owing to the restricted service range of an ultra-short-wave station, no alternative programmes will be available unless each area is served by duplicate stations.

Exactly what this service range will be is difficult to forecast. British amateur transmitters using wavelengths of 5 metres have bridged distances up to forty miles, but this was in the country. In a town the waves are absorbed by buildings, etc., and it is doubtful whether reliable signals could be received over distances greater than twelve to fifteen miles. Again, owing to the absorption by buildings, many listeners within the service area will be unable to receive any benefit, and in any case the lack of the many programmes, which can be received on the present broadcast bands will prevent any great popularity of these wavelengths among listeners.

The ultra-short waves, however, seem of definite use to the Post Office and other message-handling concerns, who only wish to use them for point-to-point communication as against covering a definite district as in the case of a broadcast service. It is reported that the Post Office is already experimenting with wireless to link up part of their local telephone system.

It will be remembered that in March last year signals were sent across the English Channel on a wavelength of 18 centimetres, using bowl-shaped reflectors, and that during this year Sardinia and Rome (a distance of about 170 miles) were in communication with each other on a wavelength of 58 centimetres, also using reflectors.

With these "centimetre" waves Britain could readily establish contact with the islands round her coast and with the Continent, without the expense of laying and maintaining cables. Large towns could be linked together without the fear of snow and gales bringing down the overhead wires.

#### Unauthorised Listeners

The great objection to a wireless link in a telephone system is that unauthorised listeners may overhear the conversations. But if wavelengths of under 10 metres, and particularly the centimetre waves, are used, few people have receiving apparatus capable of working on them, and by the use of reflectors on the official transmitting and receiving apparatus the radio waves can be kept in a comparatively small beam, thereby minimising the risk.

It would seem, therefore, that these waves are of greater use for purely commercial purposes, rather than the broadcast services.



## SUPERCHARGED WITH POWER!

**M**ORE and more *power*: that is the demand of the modern radio set. And no battery is so densely packed with power as the Grosvenor. For, by the Grosvenor process, MERCURY protects the all-important zinc cells against corrosion. So long do the cells last that, to use them up, they are crammed with extrachemicals by hydraulic pressure. That is why Grosvenor batteries give such astonishingly long life. For sheer value-for-money try Grosvenor next time, and see for yourself!

## MERCURY means ENORMOUSLY INCREASED LIFE

GROSVENOR  
**MISCANLITE**  
ELECTRIC  
**TORCHES**

Beautifully made from the new material MISCANLITE. Very strong, will last for ever, and finished in artistic assorted colours. Buy one now, for autumn and winter use. All sizes and types, priced from

**1/6 to 12/6**

Grosvenor Mercury Batteries are made in three grades for every Radio need.

Grosvenor Red Line 5/6 to 11/-  
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Also long-lasting Grosvenor Mercury Batteries for Torches, Pocket and Cycle Lamps.



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These popular High Voltage Dry Electrolytic Condensers have been still further improved, and are now even better value than ever.

4mfd. (500 v. D.C. working) 4/6  
8mfd. (500 v. D.C. working) 5/6

New types of dry electrolytic condensers are now available including low voltage types. Types 3001, 3002 and 3003, which are fitted into wax impregnated cardboard tubular containers with rubber-covered connecting wires; types 401 and 402, which are enclosed in an aluminum container designed for one-hole fixing, type A.D. which is supplied in a rectangular metal container and is employed for smoothing out hum due to rectified A.C. supply on low voltage moving-coil speakers.

Prices: Type 3003 (25uF 00 v.) 4/-  
Type 401 (10uF 50 v.) 2/6

Our new catalogue gives details and prices of the full range. Write for your copy!

**Dubilier Condenser Co. (1925) Ltd.**  
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**GROSVENOR ELECTRIC BATTERIES LTD.**  
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E2

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



# Strange Uses for Vacuum Tubes

By L. A. C. Lawler, F.R.S.A., A.M.I.R.E.

It is relatively but a short time since Dr. Fleming produced his first thermionic valve in the Ediswan works, and a still shorter time since it was made commercially practicable, and yet what wonders it has opened up for mankind! Twelve years ago the vacuum tube was unknown to the non-technical public, yet to-day it is found in almost every home, and in many offices and factories.

Thermionic radio valves are, however, but one of the benefits resulting from Dr. Fleming's (now Sir Ambrose Fleming) discovery, and its applications are almost innumerable. The industrial uses of the vacuum tube are many, and its possibilities incalculable. The following list shows a few of the services it renders us:

### Many Strange Uses

- Measurement of candlepower.
- Automatic light control (switching on as darkness approaches).
- Relays.
- Light-controlled locks.
- Talking films.
- Detection of foreign bodies in various substances.
- Accurate matching of colours.
- Reversing machinery.
- Safety guards on dangerous machines.
- Counting.
- Maintaining tension on wire while being reeled.
- Grading by size, colour, etc.
- Sorting.
- Temperature, fire, smoke, and burglar alarms.
- Tabulating.
- Inspecting articles in course of production.
- Foot-candle meters.
- Colour analysis.
- Measurement to one hundred thousandth of an inch.
- Temperature measurements.
- Automatic recording.
- Starting equipment for electric motors.
- Current regulators.
- Food preservation.
- Temperature control.
- Control of clocks from a master clock.
- Control of paper thickness during manufacture.
- Heating of inaccessible metal parts.
- Frequency converters.
- Rectifiers: from a few volts to many thousands.
- High-tension switches.
- Lightning arresters.
- Voltage regulators.
- Synchronising equipment.
- Remote switching and control.
- Electrical recording of gramophone records.
- Television.
- Musical instruments.
- Aids to the deaf.
- Treatment of diseases.
- Counting bacteria.
- Analysis of muscle sounds.
- Bloodness surgery.
- X-ray.
- Blood analysis.
- Radio compasses.
- Radio beacons.
- Altimeters.
- Photo-electric telephony between moving vehicles along a light beam.
- Depth sounders.
- Measuring currents as low as 1/100,000,000,000,000,000 of an ampere.
- Revolution counters.
- High-voltage measurements.
- Frequency indicators.
- Stroboscopes.
- Pressure measurement.
- Gas analysis.
- Sign flashers.
- Locating minerals.
- Detecting flaws in steel rails.
- Emotion recorders.

Let us examine one or two of these operations more closely.

Wire drawing, for instance, is an operation which demands great care as any slight variation in thickness (that is, gauge) means that resistance calculations made from the makers' wire table will be inaccurate, particularly in the finer gauges of resistance wire.

For this reason, and because of the risk of breaking the wire while it is being wound, it is necessary to provide some means of regulating the speed and tension of the wire. The speed of the spool on to which the wire is being wound must constantly be decreased as the diameter of the wire on the spool increases.

This is how it is done: The coarse wire is passed through the drawing machine, whence it emerges the desired size, and is finally wound on to a spool. This spool is called a re-reel spool and is driven by a small direct-current motor supplied with power from an alternating-current source via a pair of thyatron tubes. A small reactor controls the power supplied by the tubes, the position of its core being the controlling factor.

This position is governed by the re-reeling operation itself, the wire running over a rider pulley which is connected to the reactor core. As the loop on which the rider pulley runs decreases when the motor runs too fast, the core is drawn into the reactor, thus causing its reactance to increase and permitting the tubes to pass a smaller current and so slowing the motor down, and vice versa.

Although the reactor core weighs only an ounce or so the control exercised can govern the speed of a large motor of several horsepower.

A novel application of the photoelectric cell (also a vacuum tube), associated with three-electrode amplifying valves, is in connection with burglar alarms. A photoelectric cell is situated on one side of a wall or door, and a ray, invisible to the human eye, is directed upon it from the opposite side of the room, door or window as the case may be.

Although the ray would be invisible to your eye—or mine—the electric eye detects it without difficulty. If, however, the ray is interrupted by any solid body, the resistance of the electric eye alters, causing a change of current which is amplified so that it acts a suitable relay and rings a bell or operates any other type of alarm.

It can even be made to direct a searchlight and a train of bullets from a machine-gun at any desired spot, say, a safe door.

Counting goods in process of manufacture is yet another field into which the vacuum tube has been pressed into service. The apparatus is practically identical in principle with the burglar alarm, but in this case there is no objection to the use of visible light.

### Detecting Failure at Light Source

It is, indeed, to be preferred, because any failure at the light source can at once be detected without the need for special apparatus. Its operation, as far as counting is concerned, is simple. A photoelectric cell, or electric eye, is situated, together with its amplifier, on one side of the channel through which the goods are to be passed. On the other side there is the light source.

The sensitivity of the electric eye is so great, and its operation so rapid, that it will accurately check the number of goods passing, however quickly they are moving, or whatever their size as they interrupt the light beam in passing.

It is known that the human eye is, to a certain extent, colour blind and it has, in the past, rendered really accurate colour matching practically impossible. Some persons are more colour blind than others, and most of us will find that, if a coloured object is examined first with one eye and then with the other, the shade appears to alter with the change of eye.

This slight colour blindness is of little importance in our everyday life, but there are

### European Broadcasters

#### LJUBLJANA (Yugoslavia)

Approximate distance from London 760 miles. 577 metres (520 kilocycles) 7.5



kilowatts. Occasional English and French announcements as well as Slovene. Transmits at intervals from 11.15 a.m.

### European Broadcasters

#### REYKJAVIK (Iceland)

1,200 metres (250 kilocycles), 21 kilowatts. Works on the same wavelength as Istanbul



and the 40-kilowatt Moscow Popoff station. Occasional morning transmissions.

certain cases where even a slight discrepancy cannot be tolerated. It is here that the electric eye comes into its own.

In the analysis of blood, for instance, colour is frequently a determining factor. The photoelectric cell can detect critical differences in colour with far greater accuracy than any human eye and, moreover, the result can be amplified and a permanent record made.

The vacuum tube, indeed, has not only contributed a vast amount to our well-being—it has done more. It has opened up vast fields of investigation hitherto undreamed of—and who is to prophesy what blessings it will ultimately confer upon humanity?

## Short-wave Notes

By Kenneth Jowers

I AM often asked my opinion as to the merits of the super-heterodyne and super-regenerative receiver for wavelengths of 10 metres and under. The general opinion is that the super-regenerative is more efficient, more simple to get working, and consequently is at the moment more popular than the super-heterodyne.

I have been able to examine some figures taken over a long period as to which type of receiver would be the most efficient and reliable, not considering the difficulties of designing. These figures show that while the super-regenerative is quite simple to construct, its efficiency cannot rise beyond a certain point, and background noise is always very prevalent, even though it does decrease when the set is tuned to a station.

### Super-het Advantages

The super-heterodyne, if carefully designed, is not only more efficient, but is easier to tune and has a comparatively quiet background.

Whether or not you decide to construct a super-heterodyne is a problematical point, and so far it appears that the super-regenerative is gaining in popularity even in spite of its many drawbacks.

While there are many who are sceptical as to the advantages of 5-metre work, it must not be overlooked that in the home counties, at any rate, there is growing enthusiasm amongst listeners and transmitters. At a rough guess I should say that there are at least fifty 5-metre stations within 40 miles of London who transmit at regular times.

It is now quite well known that experiments on a large scale with ultra short-wave television will very soon be an accomplished fact. Twelve months ago there was comparatively little doing on short-waves below 15 metres, so that a receiver was rather a waste of money if it was wanted for entertainment only.

Reception conditions on the normal short-wave band are at the present time rather poor, unless you are particularly careful to choose the right waveband. During the past week, W2XAD and W8XK on the 19-metre channels have been coming in well.

The commercial stations are as reliable as ever. Occasionally it is possible to pick up some of the tests between Rugby and Tokio. The Tokio station—J1AA—operates on about 19 metres.

### Jamming On Short Waves

The German short-wave relays come through at amazing power, and are inclined to make themselves rather a nuisance. Selectivity is becoming more and more a problem and, what with the German and Empire stations, the more popular wavebands are becoming more and more jammed up. During the afternoon it is quite difficult with a straight set to pick up W3XAL on the 16-metre channel, as we have Eindhoven, Zeesen, and Daventry all practically on the same wavelength.

I have not heard Schenectady, W2XAF, for quite a while, but I think this is my fault because he does not come on the air until after midnight. By the way, VK2ME, Sydney, has been improving in strength just recently—for the last few Sunday mornings at about 7.30 signal strength has been averaging R7/8 on phones.

A band which is not often explored is between 20 and 25 metres. The amateurs on 20 metres and W2XE are coming in quite well at the moment, while just above 23 metres Rabat is usually an R9 signal.

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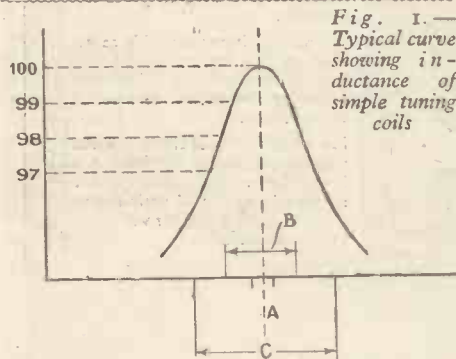
# How the Amateur Can Beat the Set Manufacturer

A Special Article by  
W. JAMES

If you bought one hundred coil formers and proceeded to wind them with eighty turns of wire, you would probably find the inductive values of the finished coils covered a range of from normal to plus and minus 3 per cent.

You would find a few coils having the correct inductance. There would be a number having an inductance of 1 or 2 per cent. below the standard and others above the standard, and so on.

In fact, if you measured the lot and then drew a curve to show how the coils came out, you might obtain a result as in Fig. 1. The



curve here is made regular and is used to bring out a point, which is this

If you take a number of formers of, say, paxolin tube, all of which are supposed to be a certain diameter, such as 1 1/2 in., and wind on them the necessary number of turns, the inductances will vary over a fairly considerable range. Many of them will be quite close to the standard; others will be a little different.

Probably all would be used in a set having separate tuning condensers, but something must be done if the coils are to be connected in a gang tuning set.

The differences in the inductances are due to variations in the dimensions of the coils, as there is an equal number of turns in each coil.

We can, therefore, start to improve the product by measuring the formers and rejecting those not exact to size.

## Correct Inductive Values

We could also measure the wire, and if now we made sure that each coil is of a given diameter and length, and has the right number of turns, the inductive values are bound to be correct.

Alternatively, the spacing of the end turns of wire could be adjusted or the number of turns be altered in order to get the right inductance. But this might well involve us in an amount of waste. The cost would increase because of this wastage, and the wire spoilt in testing, but the coils would be good ones.

Now we are practical people, and there is no sense in paying dearly for greater accuracy than is necessary. We know that a set of efficient (really low loss) coils will tune very sharply. Slight errors will, therefore, greatly affect results, tuning being broader than necessary and the magnification below normal.

With coils of lower efficiency (greater losses) the tuning will not be as sharp, and slight errors in matching will not have so

pronounced an effect upon the selectivity and amplification as in the case of the most efficient coils.

If we go still further and compare the results when definitely inefficient coils are used, what we find is that slight errors in the inductive values do not make much difference to the results. The tuning is fairly broad anyway, and a slight mis-tuning, due to lack of accurate matching, produces no great effect.

We may therefore conclude that, in the case of really good coils, the inductive values must be practically identical as marked by the range A at Fig. 1. For coils of the next grade, being slightly less efficient, the allowable error becomes a little greater, say covering range B.

For the worst coils, an even greater error can be tolerated, covering range C.

At this point, let me make it quite clear that I am using the illustration to explain a point of view. I should want accurate coils and good coils anyway. The thing I do want to bring out is the broad fact that if our standard is to be a very high one (class A, that is, in the range A) there may be a number of rejects, and the cost will be relatively high.

With class-B coils, however, the results will be, shall we say, a good commercial average, both as to performance and cost. The other coils, class C, are of course, less efficient and probably cheaper still.

I have taken the case of coils, as it will be easily understood. Apply the results to complete receivers and you will see what I am getting at. If you design everything to a laboratory standard, the finished product will be as efficient as possible and have an exceptional performance. To achieve so high a standard involves added expense for

testing and wastage, as a proportion of the vital parts used in the construction may not have the necessary accuracy.

If we can design a set which puts up an acceptable performance for the price and there are few vital parts which must be of great accuracy, then the design is a good one. The few vital parts can be watched, and the sets passed through the workshop will come out, to all intents and purposes, like the standard. Each and every set puts up a good acceptable performance.

## For Exceptional Performance

Take now the case where exceptional performance with few valve stages is required. Many parts must be practically dead accurate. If all are right, the set will be fine. But if, as is quite likely, one or two parts are a little below normal, then, instead of the set having a brilliant performance, it will be merely average, and the time and money spent in using the finest parts will have been wasted.

You can see these points very clearly by taking a number of typical examples. Suppose we have a really "hot" set using exceptionally good coils and a fine gang tuning-condenser. The set is very carefully ganged. After a time a valve goes. You fit a new one. Its characteristics are slightly different from those of the old one, the electrode capacity being smaller or greater, and the "slope" of the new valve perhaps 10 per cent. up or down. The stages concerned must be carefully re-ganged and the set may be unstable.

With a more ordinary set, however, the results are likely to be used more consistent with changes of valves. Most troubles in a receiver are in the high-frequency side. I am not referring to breakdowns, but to factors affecting performance. Coils, gang condensers and valves are the chief items. Fixed resistances and condensers are usually not difficult to deal with. A batch of loud-speakers usually come out with good uniformity.

In many respects the careful amateur should be able to beat the standard commercial product, because he can make a slight adjustment here, and another there, in order to get the last ounce out of the set. But he knows that a little thing going wrong will make a big difference to the results from a "hotted-up" set. A new high-frequency valve may upset things until the circuit is ganged again, and perhaps the screen voltage is adjusted.

## Differences in Components

It should be noted that if all valves were alike and the parts correct to the standards, sets would have equal performances when properly wired. But normally there are slight differences in components, and the results will therefore vary.

Super-heterodyne receivers may be particularly troublesome, as the tuning is normally fairly sharp. In this case, if a very good band-pass input filter circuit is used, the accuracy must be maintained throughout the tuning range. With a broader tuning filter the working is more easily made satisfactory over the whole range, but the selectivity of the set is not as good.

The aim is always to provide the best average results which can be consistently maintained. If very low loss coils are used in the filter circuit between the aerial and first valve, sets which happen to be right will give good results, but those which are not quite right will be noticeably below the standard.



A good example of an amateur-built console receiver. Why not have a shot yourself at the Signpost Four or the A.C. Triodyne?



Potted Biographies—I.

# Maurice Winnick

Dance-band Leader

NO doubt you have been hearing Maurice Winnick and his orchestra a good deal lately. He has been one of Henry Hall's deputies. Perhaps you knew him in the days when he played at the Piccadilly Hotel, or even the Carlton.

You may even have known him in his very early days, when he played in a cinema at the age of fourteen, or have met him on one of his tours. At the age of twenty he toured most of our variety halls.



Three years later he played on liners ploughing between here and the States, making at least twenty trips to New York.

Naturally, while in America, he did as the Americans did, or at least made some attempt to do as they did. He studied jazz.

Most people did in those days. Now it seems that they are trying to forget some of it, and are turning to some other form of dance music.

Maurice Winnick, however, was caught by the prevailing craze of the moment,

and set himself to learn all about jazz and its possibilities.

Then he learnt the clarinet. Not content with proficiency in that exceedingly beautiful instrument, he turned his attention to its younger sister, the saxophone. Was it Hugh E. Wright who described a saxophone as a clarinet gone wrong? At all events, Maurice learnt to play it.

He returned to England in 1927. Then followed busy years at the home of the British International Film Company's studios at Elstree. His was actually the first dance orchestra to appear in a British film.

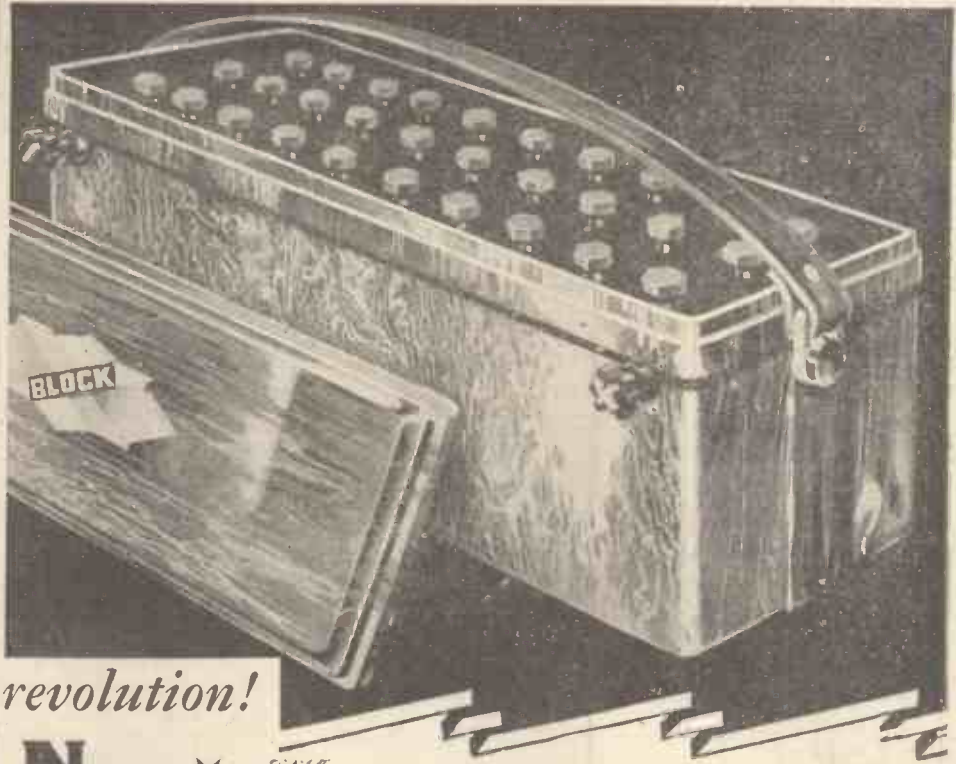
Winnick broadcast for the first time in April, 1931. The public liked him, and the B.B.C. liked him. So much so that they asked him to broadcast every week until November of that year.

Last year Maurice re-formed his band for the Carlton Hotel. When the Carlton closed down for the summer holidays he deputised for Henry Hall.

Winnick can be heard this week and next. So if you are interested you should take an opportunity of hearing him. W.-W.

## Call Signs

RADIO stations other than broadcasting stations, must, of course, have call-signs. Land stations use call-signs of three letters (such as GNF), ships use four letters (such as GLSQ), aircraft have five letters (GAAUG), and amateur and experimental stations use call-signs consisting of a national prefix followed by a numeral not more than three letters (such as G2AA). "G" is the prefix for British stations and other nations begin their call-signs with other letters—D for German stations, W for U.S.A., etc.



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# We Test for You

A Weekly Review of New Components and Tests of Apparatus  
Conducted by J. H. REYNER, B.Sc., A.M.I.E.E.

### LISSEN CLASS-B TRANSFORMER

THE Lissen Hypernik class-B driver transformer is exactly similar in appearance to the standard intervalve model. It is housed in a neat mottled brown bakelite case, the necessary terminals being mounted at the side near the bottom. These terminals are provided with soldering tags to facilitate connection.

The inductance of the primary winding when carrying no direct current was 134 henries, this dropping to approximately 60 henries with 2.5 milliamperes D.C. in the winding. The secondary resistance was

approximately 420 ohms, or 210 ohms each half, while the the primary was 575 ohms.

The efficiency of the transformer was estimated to be 77 per cent. on full load at 500 cycles. This is a little lower than usual, but is offset by the high primary inductance, which will maintain the bass response to an unusual extent. It retails at 12s. 6d.

### W.B. MICROLODE LOUD-SPEAKER

THE new W.B. PM4A Microloode loud-speaker, which is very similar in construction to that reviewed in these columns some

weeks ago, employs a built-up type of permanent magnet, having a laminated end-plate type of construction claimed to give a very high efficiency. The diaphragm is of the one-piece type and is suspended from a metal chassis which is itself bolted to the front of the magnet. The centring device is of conventional design and mounted behind the diaphragm. The loud-speaker is fitted with an aluminium stand, thus making it completely self-supporting.

In this stand is located a universal transformer having several taps. The selection of the taps required is made by means of a small two-arm switch fitted to the loud-

speaker. The transformer is also centre tapped on the primary side, and is thus suitable for use with all types of push-pull circuit, including Q.P.P. and class B.

Comprehensive instructions are supplied with the loud-speaker and a multitude of ratios varying between 10 and 100 to 1 are obtainable by setting the switch according to the table included with the instructions. The impedance of the speech coil is approximately 3 ohms and this, in conjunction with the table of ratios, will enable the loud-speaker to be accurately matched to any type of output valve.

We tested the loud-speaker on all classes of signal and the overall results obtained were good, the response being uniform over the range. Compared with our standard, which has a rising-bass response, the lower registers were a little thin, but the reproduction will suit most listeners. The reproducer is one which will appeal to the experimenter and can be recommended. The retail price is £2 2s.

### FOR HOME CONSTRUCTORS

A MATEUR constructors should note the special advantages of the new metallised baseboarding produced by the Peto Scott Co., Ltd., of 77 City Road, London, E.C.1.

With this new boarding, which is known as Metaplex, you obtain all the advantages of an ordinary baseboard covered with metal foil.

Holes can be drilled into the Metaplex wood just as easily as in ordinary wood, so that components can be fixed with the minimum of work.

A cabinet made up of Metaplex has the screening properties of a metal box, with advantages in ease of assembly and component fixing that have to be tried to be realised.

The high-frequency resistance of Metaplex is very low, and sets made up with this material will be just as efficient as when made with the best of metal screening.



The Lissen Class-B driver transformer gives particularly good results. One of these is used in the Signpost Four



A back view of the W.B. Microloode loud-speaker showing the two switch arms

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### NEWS!

Many new transformers, including three for the HT.12 and HT.13 Westinghouse rectifiers, have been added to the existing range. Improved home battery chargers are available at no extra cost. Mains units and assembled kits have new and unique safety fuse arrangements — in other respects they cannot be improved. Portable amplifiers and battery chargers are new lines worthy of your inspection.

Whatever your problem with regard to mains working; whether its a question of choosing the right mains unit or battery charger, or whether it's a circuit and list of components to build your own mains unit—Heayberd can help you. Since broadcasting began, Heayberd have been producing first-class mains apparatus and they have always catered for the home constructor—that is why Heayberd components are constantly specified in wireless journals. The materials and workmanship are the best procurable and these are backed by sound engineering design and thorough testing. Inspect them for yourself on Stand 16, or write for details.

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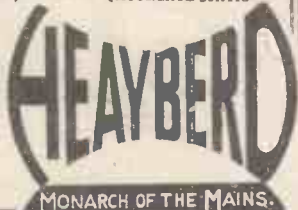
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## Notes and Jottings

THE public-address system installed in the theatre at Olympia this year was supplied by the British Thomson-Houston Co., Ltd. The gear used consists of two B.T.H. 10-watt all-mains amplifiers with a special input-control system to receive signals from the B.B.C. microphones installed on the stage. Listeners at the theatre will have noticed that the two big B.T.H. directional loud-speakers are placed so as not to cause interference with the microphones installed on the stage.

Midland Regional's principal light show for the week beginning September 3 is another startling Charles Brewer production called *Sultana*, a "currant" tale of the East with plums from the musical comedies. The cast for this show will include Dorothy Summers, William Hughes, Peter Howard, and the Midland Revue Chorus and Orchestra will be conducted by Frank Cantell. The author of the show is Dorothy Eaves.

On page 252 of last week's issue we gave an incorrect description to an R. & A. photograph. Actually the photograph was of the special diaphragm support of the new Alpha permanent-magnet moving-coil model, which sells at £2 12s. 6d. complete with a six-ratio transformer.

From F. C. Heyberd & Co. we have received a copy of their new 1934 handbook and catalogue entitled "Mains Power for Your Radio." There are thirty-six pages in the book, which can be obtained from F. C. Heyberd and Co., of 10 Finsbury Street, London, E.C.2. The principal contents are a complete catalogue of Heyberd mains transformers and chokes, mains units, several useful circuits for mains units, and two pages of helpful hints. A charge of 3d. is made to cover the cost and postage.

Highland listeners will be interested to hear that the Inverness Gaelic Musical Association, conducted by Lewis J. Owen, is to give a recital of Gaelic songs on August 31. The programme will be relayed from the East Hall, Inverness.

Siemen's Electric Lamps and Supplies, Ltd., have transferred their Leeds office and stores to 54 Wellington Street, Leeds, 1.

### In the Ediswan Range



The D.C. model of the Senior R.K. moving-coil loud-speaker



The B.T.H. Minor pick-up

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- 1914 T.C.C. introduce Mansbridge Condensers, and manufacture under original licenses.
- 1915 T.C.C. working on Condensers for War Office, to Admiralty—Air Service—etc.
- 1918
- 1920 T.C.C. manufacture heavy duty Transmitting Condensers.
- 1922 T.C.C. manufacture Power Condensers.
- 1926 T.C.C. contract with B.B.C. to supply Condensers for 2LO.
- 1927 T.C.C. discard Mansbridge type, and introduce Rolled Condensers using Aluminium Foil of higher conductivity—and greater reliability.
- 1928 T.C.C. introduce Dry Electrolytic Condensers of very high capacity for low tension smoothing.
- 1929 T.C.C. introduce Dry Electrolytics for 100 volt working.
- 1930 T.C.C. introduce Moulded-in Mica Condensers—the now famous "M" Type.  
T.C.C. introduce Non-inductive condensers.
- 1931 T.C.C. introduce Wet Electrolytic Condensers.
- 1932 T.C.C. manufacture Dry Electrolytic High Voltage Condensers—(550v. peak).  
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- 1933 T.C.C. research still building up data, still adding to its specialised knowledge so that Radio Technicians may have available not only a "pedigree" range of condensers, but a range ahead of time.

# T.C.C.

ALL-BRITISH  
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# A Fine Range of Sets



This photograph shows the striking appearance of the new Ekco black-and-chromium radio set, which can be obtained with or without a chromium stand.

**E.** K. COLE, LTD., have an ambitious programme for the coming season. The first of the new products is the "74" series, consisting of the A.C.74, D.C.74, and the B.74—A.C., D.C., and battery-operated respectively. These are all five-valve seven-stage super-heterodyne receivers costing

£14 14s. in black and chromium, and £13 13s. in walnut bakelite cabinets.

The A.C. and D.C. versions of the set are similar—consisting of two high-frequency pentodes, double-diode-triode, second detector and a high-output low-frequency pentode. Both mains models include delayed automatic volume control, and a novel combined light-beam and shadow-pointer tuning scale.

A detachable loud-speaker fret enabling the silk colour to be changed to match any colour scheme is another novel idea. Chromium-plated steel stands are available at £1 15s. each.

The cabinets, stands, and prices for the B.74 are the same as for the A.C.74 and D.C.74, although the circuits are totally different.

The B.74 consists of a seven-stage super-het with a combined detector-oscillator, one intermediate-frequency amplifier, second detector, driver, and a class-B output stage.

Some of last year's models are being carried over, notably the SH25, a five-stage super-het for A.C. and D.C. mains costing £15 15s. The M.23, a three-stage console set for A.C. or D.C. at £10 10s., and an all-electric radio gramophone, model R.G.23. The R.G.23 is a three-stage set costing £24 3s. for A.C. mains, or £26 5s. for D.C. mains.

The new black-and-chromium cabinet marks a distinct departure in design and should prove very popular. The cabinets are made of bakelite and we were recently able to see these being made in the gigantic presses which have been installed at the Ekco works.

## A Year's Progress— A Brief Review

**S**HOW TIME at Olympia marks a climax in the year's work, when one can reasonably pause and take stock of what has been going on during the preceding twelve months. For the moment I am more concerned in taking a brief survey of the progress made in wireless generally, than with the details of this particular type of set or that.

And from this point of view it may be said at once that we have been passing through a very "live" period. In fact, the flood of invention has been almost too much for manufacturers to keep pace with.

### Automatic Volume Control

A typical case in point is the arrival of automatic volume control. This is not exactly new in principle, because telephone engineers have been using something of the sort for many years, but it is certainly making good for the first time in wireless reception. That is to say, we are now able to produce sufficient biasing voltage in the set itself, to take care of "fading" and to keep the loud-speaker volume at a constant level, in spite of wide variations in signal strength.

But inventors have gone a good deal beyond most of the makers in this respect. The double-diode rectifier and the double-diode-triode have both contributed largely to the practical success of "straight" automatic volume control. They did this by relieving the three-electrode detector valve of the task of producing a "control" bias in addition to carrying on its ordinary job of work. By

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<b>ONE-VALVE SETS (1s. each)</b> B.B.C. One-valver .. .. . AW387 Portable Short-wave One .. .. . AW354	<b>FOUR-VALVE SETS (1s. 6d. each)</b> Melody Ranger (SG, D, RC, Trans) with copy of "A.W." 4d. postage .. AW375 "A.C. Melody Ranger" (SG, D, RC, Trans) .. AW380 Signpost Four (SG, D, LF, Class B) .. .. AW398 Table Quad (SG, D, RC, Trans) .. .. WM1303 "Words and Music" Radiogram (2SG, D, Trans) WM307 Home Short-wave (SG, D, RC, Trans) .. WM1311 "Words and Music" Radiogram de Luxe (SG, D, RC, Q.P.P.) .. .. WM307a Empire Short-waver (SG, D, RC, Trans) .. WM1313 Calibrator de Luxe (SG, D, RC, Trans) .. WM1316 D.C. Calibrator (SG, D, Push-pull Pen) .. WM1328 All-metal A.C. Four (2 SG, D, Pen) .. .. WM1329 All-progress Four (Battery Super-het) .. .. WM1335	<b>SEVEN-VALVE SETS (1s. 6d. each)</b> Super Senior (Super-het) .. .. WM256 Seventy-seven Super (A.C. Super-het) .. WM305 Q.P.P. Super 60 (Super-het) .. .. WM319
<b>TWO-VALVE SETS (1s. each)</b> Clarion-voice 2 (SG Det, Pen) .. .. AW371 Home Station A.C. 2 (D, Pen) .. .. AW374 B.B.C. National Two (D, Trans) .. .. AW377 Melody Ranger Two (D, Trans) .. .. AW388 Full-volume 2 (SG Det, Pen) .. .. AW392 "A.W." Iron-core Two (D, Trans) .. .. AW395 "A.W." Iron-core Two with Q.P.P. .. .. AW396 Screen-grid Two (SG Det, Trans) .. .. WM289 A Two for 7 Metres (D, Trans) .. .. WM295 New-style Radiogram (D, Trans) .. .. WM299 A.C. Quality Gem (D, Trans) .. .. WM312	<b>FIVE-VALVE SETS (1s. 6d. each)</b> James Short-wave Super (Super-het) .. AW328 Simple Super (Super-het) .. .. AW340 Super-quality Five (2 HF, D, RC, Trans) .. WM1320 Ideal Home Super (Super-het) .. .. WM280 Easytune 60 (Super-het) .. .. WM284	<b>PORTABLES (1s. 6d. each)</b> General-purpose Portable (SG, D, RC, Trans) AW351 Midget Class-B Portable (SG, D, LF, Class B) AW389 Holiday Portable (SG, D, LF, Class B) .. AW393 Town and Country Four (SG, D, RC, Trans) .. WM282 Everybody's Portable (five-valve super-het) .. WM291 Welcome Portable (6-valve Super-het) .. WM322 Welcome Portable with Class-B output .. WM325
<b>THREE-VALVE SETS (1s. each)</b> James Push-push Three (SG, D, Q.P.P.) (1/6) AW378 Everybody's Home Radiogram (SG, D, Trans) AW381 Home-lover's New All-electric 3 for A.C. mains (SG, D, Trans) .. .. AW383 Our Up-to-the-minute Three (SG, Westector, LF, Trans) .. .. AW384 Class-B Three (D, Trans, Class B) .. .. AW386 S.S.3 (A.C.) (SG, SG Det, Pen) .. .. AW390 "Up-to-the-minute Three" with Class B, 1/6 .. AW384B New Britain's Favourite Three (D, LF, Class B) AW394 A.C. Triodyne (SG, D, Pen) .. .. AW399 Multi-mag Three (D, 2 Trans) .. .. WM288 Percy Harris A.C. Radiogram (D, RC, Trans) .. WM294 Prosperity Three for Batteries (SG, D, Pen) .. WM296	<b>SIX-VALVE SETS (1s. 6d. each)</b> New Century Super (Super-het) with copy of "A.W." 4d., post free .. .. AW363	<b>AMPLIFIERS (1s. each)</b> A.W.'s Push-push Amplifier .. .. AW376 Universal Push-pull Amplifier .. .. AW300 "A.W." Record Player (LF, Push-pull) .. AW319 Battery-operated Amplifier .. .. AW362 Class-B Gramophone Amplifier .. .. AW391 Five Q.P.P. Output Circuits .. .. WM315
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Copies of "Wireless Magazine" and of "Amateur Wireless" containing descriptions of most of these sets can be obtained at 1s 3d. and 4d. respectively, post free. Index letters "A.W." refer to "Amateur Wireless" and "W.M." to "Wireless Magazine"

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—at **Olympia**  
by **Morton Barr**

sharing the burden between a combined diode and triode, the double task is now made easy.

But—as is often the case—as soon as one problem is solved another raises its head. And so we find “straight” automatic volume control already making way for “corrected” automatic volume control, in which the control is applied both to the high-frequency and low-frequency valves. Still another last-minute improvement is “quiet” or “delayed” automatic volume control in which the noisy background heard when tuning an automatic volume control set from one station to another is automatically cut out.

Naturally this involves a slight complication in the original circuit arrangement, such as putting in an extra valve—or using a double-diode pentode in place of a double-diode triode—but it is only in this way that “perfect” automatic volume control can be attained.

**Class B and Q.P.P.**

Another prominent development of the year concerns the push-pull amplifier. Here, again, the principle is not strikingly new, but all the same, the practical effects of Q.P.P. and class B have been immediate and remarkable.

In Q.P.P. both valves are biased to the bottom-bend of their curves, so that they take practically no high-tension current, except what is actually transformed into sound in the loud-speaker. The resulting economy in high-tension consumption is such that a battery-operated set is now equal, so

far as volume and quality are concerned, to one driven from the mains.

The second new variety of push-pull—the class-B amplifier—is perhaps even more remarkable. Here no definite potential is applied to the grids—they are at zero bias—but since the valves are specially designed to pass very little high-tension current under these conditions they are remarkably economical in operation.

**Iron-core Coils**

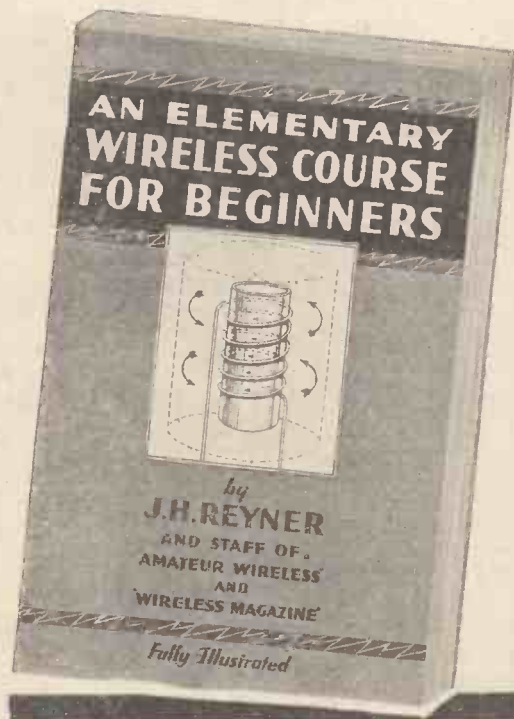
We come now to another important development, of which it is difficult at the present time to estimate the full worth. I refer to the use of powder-core tuning-coils.

Curiously enough, one has again to admit that iron-cored high-frequency coils are not really new. They were first used many years ago, though they did not prove a success. What has made all the difference, in the latest type, is the discovery that when the iron is used in the form of an extremely fine powder, one gets rid of all troublesome eddy-currents. I am willing to prophesy that powder-cored coils have come to stay and to find wide application in all types of circuit. In addition they are very much more compact and convenient than the ordinary air-cored variety.

If the core is made movable in and out of the windings we get what is known as permeability tuning. It is quite on the cards that this may finally solve the problem of wave-band switching. In theory, at all events, it is possible to cover a range of from 200 to 2,000 metres on a single powder-cored coil by ganging the moving core to a variable condenser control.

In conclusion the year has produced an amazing crop of new valves. The all-metal Catkin valve, the Westector, the Micromesh series, the pentagrid converter, and a variety of multi- $\mu$  screen-grids and pentodes are some of the more notable.

**PUBLISHED TO-DAY!**



**I**NTENDED for the Listener who wants to know how his wireless set works, this Course takes the reader in easy stages through all the processes of wireless reception, from the aerial to the loud-speaker. Written by J. H. Reyner in collaboration with the technical staff of “Amateur Wireless,” the authors have successfully avoided text-book style, yet every line in the book is technically accurate. The unique illustrations are a remarkable feature and constitute the finest series of explanatory diagrams ever included in any volume on the subject.

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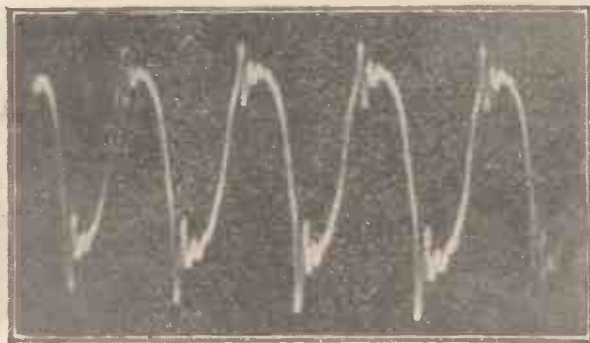


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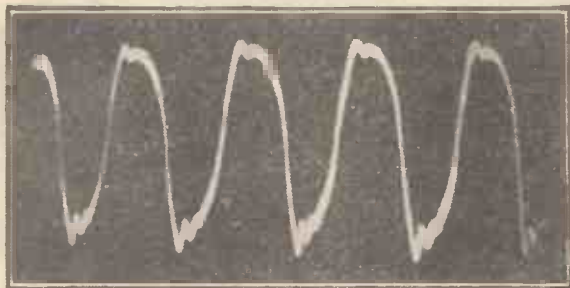
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## A New Class-B Valve

Better Quality : : More Economical Running



A special type of photograph, called an oscillogram, showing how a normal class-B valve distorts the A.C. output or speech current



Another oscillogram showing how the new B21 class-B valve reduces the distortion of the A.C. output

EVERYONE knows now that class-B amplification means big volume with a reasonably small current drain on the high-tension battery. Perhaps it is not so generally appreciated that there is a certain amount of inherent distortion in class-B amplification, and that valve makers have been striving to reduce it.

and filament current, because in place of the small power valve we can use a low frequency valve for the driver.

Actually, the quality of the B21 should be appreciably better. We know that the sensitivity is increased, and this in itself means that less loading of the stage is needed to give good volume.

In the new Marconi B21 we see a definite attempt to reduce this inherent distortion.

The characteristics have been altered so that for correct operating conditions the B21 valve needs a negative bias of about 3 volts instead of a zero bias as with the normal class-B valve.

The result is an increase in the efficiency of the valve—the output for a given input is higher. A transformer with a step-up ratio of about 1 to 2 can be used instead of the usual step-down driver transformer. We can use a smaller driver valve than usual, and still load the grids of the class-B output stage sufficiently to give good volume.

With zero-bias class-B valves the resistance of the secondary winding of the driver transformer must not be more than 200 or 300 ohms.

This is why a rather large valve has usually to be used for the driver.

Even if the B21 gave no better quality than normal class-B valves, there is a distinct saving in anode

There are two ways of using the B21. First, to provide maximum volume of about 2,000 milliwatts; secondly, to provide 1,250 milliwatts.

With a 120-volt battery,  $4\frac{1}{2}$  volts grid bias will be needed for the B21 and the same bias for the L21 valve used as a rest or standing current of 1.6 milliamperes and 1.7 for the driver, a total for the two valves of 3.3 milliamperes. The maximum output is 750 milliwatts under these conditions, with an average consumption of 13 milliamperes.

If we increase the high-tension voltage to 150 and the bias to 6 volts, the rest current rises to 4.4 milliamperes, with an average of only 14—but the output is 1,250 milliwatts.

For super-volume requirements you can use 150 volts high-tension,  $4\frac{1}{2}$  volts on the B21, and an LP2 valve with 7.5 volts bias. The average rest current will be 7.5 milliamperes.



The Marconi B21, showing the domed shape of the glass bulb

## No-condenser Tuning Catches On!

THE most startling development—and one of the most interesting components for the home constructor at Olympia this year—is undoubtedly the Sovereign permeability tuner. The exhibition bristles with new ideas in receiver design and original cabinetwork, but the home constructor has to look more closely to discover new ideas that can be used in the family set.

### Small in Size—and Simple!

Permeability tuning is the latest idea this year, and will undoubtedly change the design of many of the more simple commercial receivers. Think what it means to have a three- or four-valve set that can be tuned by simply turning a single knob in the same way as a tuning condenser; but instead of having the expensive and bulky double- or triple-gang condenser behind the panel, there are only two small black cylinders—smaller than the average tuning coil!

We have already explained (on page 123 of AMATEUR WIRELESS for August 5) just how this novel tuner works. These details were written after a preliminary test of some experimental samples, followed up by the New-style Three in our August 12 issue.

We have now been able to gauge the efficiency and popularity of this method of tuning; we feel that it has been the most popular development for a long time.

The New-style Three was a very simple receiver that normally would only use one tuning condenser, so by using the Sovereign tuner the saving in cost was not very great—only a matter of shillings. Consider a more ambitious set with two high-frequency stages, detector, and low-frequency stage. In the

usual way a four-gang condenser would be required to tune the band-pass high-frequency, and detector-grid coils.

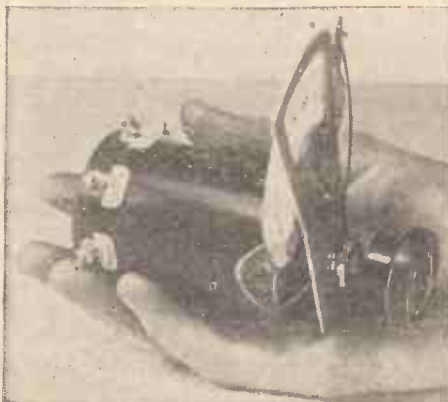
By ganging up four permeability tuners, the four-gang condenser can be dispensed with, allowing for a considerable saving in space and about 10s. saved in actual money—worth considering.

At the moment this type of tuning is not too well known. Perhaps this is because there is only one make of tuner *actually available*, but there is absolutely no doubt that from the point of efficiency alone—disregarding the saving in space and money—this new development cannot be ignored.

During our experiments we realised that this

tuner is more sensitive to aerial damping—that is, too lengthy an aerial—than the normal air-cored coil. Consequently, the non-technical user who simply substitutes the tuner for his existing coil might—if he has a long aerial—be disappointed in the results.

The tuner is very efficient, so an aerial of more than about 50 ft. is quite unnecessary. In series with the medium-wave winding is a small preset condenser—it is very important that this be used in a sensible manner. This condenser will vary the minimum wavelength of the coil by as much as 50 or 60 metres, so when your receiver is completed adjust this condenser to enable the coil to tune down to about 220 metres.



The Sovereign permeability tuner which was used with such success in the New-style Three, described in the August 12 issue of "A.W."

One of the new plays that will be heard this autumn is *The Fantastic Battle*, which has been specially written for the microphone by Leslie Bailey. The dates fixed for the performances are September 11 and 12. This is not Leslie Bailey's first production; he was responsible for the 150-years-ago episode in the "As it Might Have Been" series. In his last play, the part of Mrs. Siddons was taken by Mrs. Giles Borrett, who is now the "lady announcer" at Broadcasting House.

In the caption to the Varley set on page 234 of last week's issue we described the set as model AP48; actually the set illustrated was model AP50, a five-valve console super-het incorporating a form of automatic volume control. On this set, which gives an undistorted output of 2,250 milliwatts, there is provision for the addition of a pick-up

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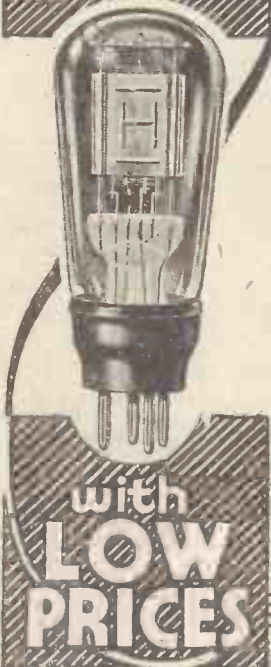
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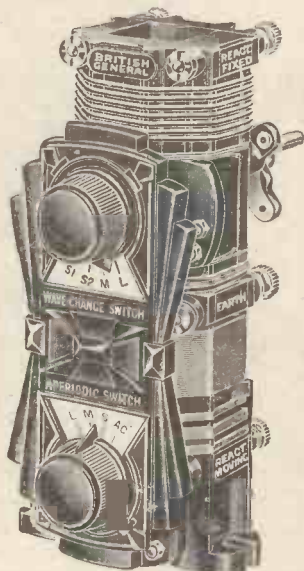
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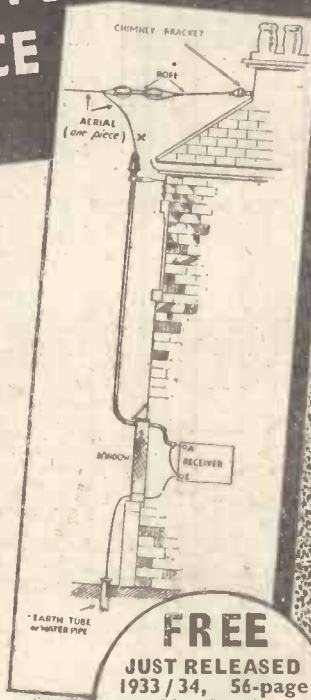
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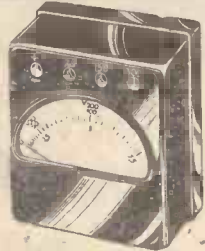
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**THE BATTERY SUPERSEDER** makes H.T. from your L.T. 2-volt battery, rectified and smoothed, Gives 3 tappings and lasts indefinitely. A boon to those who are not on the mains. Reduced from £3/15/-. New and Guaranteed 37/6.

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**MAKE A RADIOGRAM OR GRAMOPHONE** Our 64-page Illustrated List for 8d. will tell you how and show you a great variety of Spring and Electric Motors, Turntables, Tone arms, Soundboxes, Horns, Loudspeakers, Pickups, Cabinets, Hinges, Lidstays, door-locks, knobs, handles, and catches. Also Receivers, Kits, complete Gramophones, accessories, springs, needles, and repair parts at lowest prices: wholesale or retail.

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**FULL-SIZE BLUEPRINTS FOR EVERY TYPE OF SET CAN BE OBTAINED POST FREE FROM THE "A.W." OFFICES**

**What's New in Sets**

**I**N reviewing the new sets at the Show, we must emphasise the fact that kit sets, so far from dying, have this year gained in importance and popularity. Lissen, for example, are so confident of this tendency that they have designed two special kits, one a four-valve Q.P.P. set, and an ambitious super-heterodyne seven-valver.



A photograph showing the electrode arrangement of the new Mul-lard Pen 4VA

This is a six-stage band-pass circuit, amplified A.V.C. and class-B output. It has a single-dial control calibrated in wavelengths, tone control and the price is amazingly low—£8 17s. 6d. complete with valves.

At last really ambitious radio is brought within the reach of the man in the street. Lissen, Ltd., must be congratulated on their achievement.

As we go to press we hear of the introduction of the new Pye all-electric super-het, a mains version of the now well-known P/B. It is called the P/JAC, and the price is only 15 guineas. The circuit embraces A.V.C. and has an output of 1,250 milliwatts. It can be used on 25-cycle mains if specially ordered.

A newcomer to custom-built radio sets (built to order, in other words) is the Page

Car Radio Co., showing this year three sets, all for use in cars. The first is an ambitious five-valve super-het, in a steel case for sinking below the floor board.

Includes A.V.C., remote control, Catkin valves and wave-change switching, the last being a unique car-radio feature, among British sets, anyway.

The second set is a straight three with Ferrocort coils. This is a dashboard set, without remote control. The third set is a two-valver, using bigrid valves for head-phone reception. Plenty of listeners prefer headphones and this well-designed set should be popular.

Atlas sets were popular last year, so this year the makers, H. Clarke & Co., have greatly increased their range. Among the new sets are the B4, a four-valve class-B set giving 1,500 milliwatts, with an average consumption of 8 milliamperes, price £11 17s. 6d. This is available as an A.C. model—A4—price 12 guineas.

The new price level is well illustrated by the extremely

low figures for Philips sets. The 834A, for example, is only 11 guineas, and this is for a four-valver with screen-grid, detector and pentode, and moving-coil loud-speaker, all in a walnut cabinet.

The 834C is a five-valver for D.C., costing only 12 guineas, which is extraordinarily cheap, we think.

C.A.C. has come ahead with sets, and this year they are bringing out a fine super-het, using a pentagrid frequency changer—quite an innovation in this country, though almost standard now in the States.

One of the snappiest sets we have come across is the Philco model 261, a four-valve super-het using a pentagrid frequency changer, followed by a variable- $\mu$  high-frequency pentode, feeding into a double-diode-triode and then into a pentode. This, of course, has automatic volume control and must be one of the very "hottest" sets in the Show. It is the Baby Grand in the Philco range, and the price is only 17 guineas.

**Real Value in Inexpensive Sets**

Among the inexpensive sets is the new K.B. model 333, the price being only £8 15s. It has a screen-grid high-frequency stage, a screen-grid detector and pentode output, driving a moving-coil loud-speaker, all contained in a modernistic cabinet. Real value!

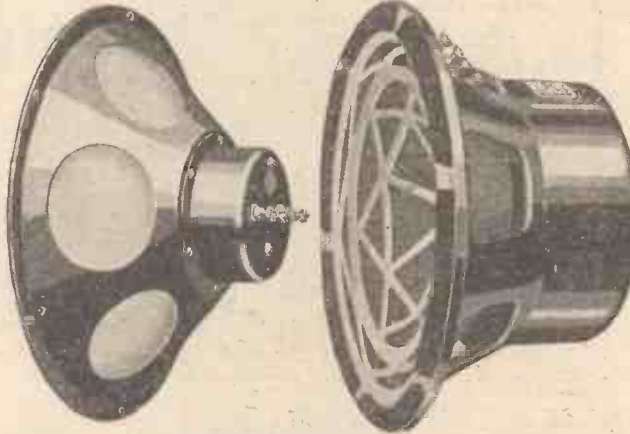
We must not forget to mention the new television sets at the Show. One that has not been mentioned much is the Grafton Radio model, consisting of a complete mirror-drum television and radio receiver and all the projection apparatus for showing the images.

The television receiver consists of two screen-grids, and diode detector, fed into a three-stage direct-coupled amplifier.

A separate synchronising circuit is used, which has a tuned transformer that accepts only the synchronising frequency.

The G.E.C. have some exceptionally fine sets this year. There is a very cheap set with detector and two low-frequency stages driving a moving-coil loud-speaker. The price is £5 17s. 6d. including valves and batteries.

The other end of the range we find the super-het eight, embodying automatic volume control, noise suppression, high-frequency pentodes and Catkin valves.



This is the new R & A type 60, a four-pole balanced-armature loud-speaker. One of R & A's big loud-speakers is the Victor, which has a special form of diaphragm support

**WHAT IS MISSING AT OLYMPIA?**

**"UNIVERSAL KITS."** Work from either A.C. or D.C. supply without alteration. 2v. Set: £5 15s., 3v. £8 15s.; 2v. Amplifier £4 4s.; 3v. £5 5s. All-electric Radiogram Kit, complete £12 18s. All prices include Valves, Rectifier and full size Blueprint.

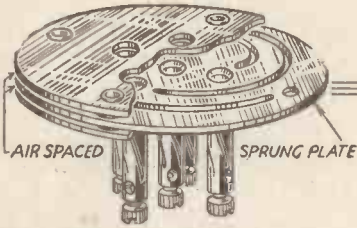
The only really UNIVERSAL high voltage mains valves. Work direct off either A.C. or D.C. supply. No transformers or resistances required. Remarkably free from mains hum. ALL TYPES as previously advertised, and a range of NEW ones, including the K 8560, a valve with maximum dissipation of 15 watts. D.139, a high- $\mu$  valve of outstanding characteristics. For Detector, 1st L.F. stage or as H.F. Ask for particulars and circuits. It's cheaper and easier to build a new mains set or convert an old one if you use only OSTAR-GANZ valves.

The OSTAR-GANZ High Voltage Mains Valves Obtainable through dealers or from Sole Agent for Great Britain: **EUGEN FORBAT** 28/9 Southampton St., Strand, London, W.C.2. Telephone: Temple Bar 8608



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The most outstanding development in Valve-holder Design.



**ANTI-MICROPHONIC  
NON-METAL  
CHASSIS-MOUNTING**

The trend of modern design in receivers makes a valve-holder of this type a necessity.

It is designed to:

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The sockets of this valve-holder are practically air-insulated, thus making it also ideal for Short Wave work.

4 Pin 1/2 : 5 Pin 1/3

Clix Valve-holders specified for the TRIODYNE 2, 5-Pin Standard Type, 9d. each (or "AIRSPRUNG," 1/2 each), 1, 7-Pin Floating Type, 1/-.

"A Matter of Connection," Clix New Folder (A) gives details of over 30 components for Perfect Contact.

# CLIX

Cheapest Perfect Contact

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12 EXIDE W.H. HIGH-TENSION ACCUMULATORS (120 volts, 5,000 Mfd.). The cheapest and best. High-Tension Supply where Mains are not available. Cash Price £3/15/-. And 11 monthly payments of 7/-. **7/-**

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THE LONDON RADIO SUPPLY COMPANY

11, OAT LANE, NOBLE STREET, LONDON, E.C.2

Famous Makers' Offer! **£5** Radio-Gram CABINET for **65/-** 7 DAYS' FREE TRIAL (OR 10/- MONTHLY.) Polished Oak and Piano built. The acoustic tone brings a thrill. Makers to Radio-Press, B.B.C., 3,000 clients. Other Models 35/- to £15. Photographs and List FREE. **PICKETTS** Piano-Tone Cabinets, (A.M.) Albion Road, Bexleyheath, £6-15-0

**RADIO SUPPLIES** Send your list of radio needs for our quotation. Kits, Parts, Sets, etc. Everything in Radio stocked. Prompt delivery; seven days' approval. Catalogue free. Taylex and Standard Wet H.T. replacements stocked. **A. TAYLOR, 9 GROVE ROAD, BALHAM, S.W.12.**

## Listeners' Forum

Letters from Our Readers

### RE-DIFFUSION AND WIRE DIFFUSION

To the Editor, AMATEUR WIRELESS.

SIR,—While there has always been a certain amount of controversy over rediffusion—the system of land-line relaying of programmes to homes equipped with loud-speakers—few listeners seem aware of the fact that an entirely different idea is being developed. This, in my opinion, constitutes a real menace to the authority of the B.B.C., because it does not actually come under the scope of wireless broadcasting at all.

The system is often referred to as wired wireless, although I think wire diffusion would be more appropriate. Under this system programme signals would be impressed on the existing electric-light conduit and received with a complete wireless set in each home on the circuit.

Certain advantages of such a scheme, which I understand is now technically practicable, are self-evident. There would be complete freedom from interference from foreign stations and no foreign country would have to be consulted as to which wavelength might be used for any programme transmission.

Furthermore, and this seems to me to be the most significant point in the scheme, there would be no need to rely entirely on the B.B.C. for programmes. The possession of a set would entitle the listener to use his wireless set how and when he liked, as at present, but, in addition to all existing facilities in receiving the B.B.C. and foreign programmes via ether, he would be able to tap the resources of the programme compilers feeding the wiring system.

As to how such a system would support itself remains to be shown, but obviously there would be scope for the advertising interests that have been trying so hard to break down the B.B.C. charter for years past. J. B. (S.W.2).

### ARE SHORT WAVES ANY GOOD?

SIR,—At this time of the year, when foreign stations on the medium waves are supposed to be at their lowest ebb, we are often exhorted to tune down below 100 metres, where, we are assured, there are plenty of world-wide stations to be heard for the asking.

Well, where are these wonderful world-wide stations? I have searched and searched, for a week at a stretch, for something like a loud-speaker signal from America, and all I can get, on a good adaptor used with a powerful A.C. set, are a few weak headphone signals.

On the other hand, when I tune to the broadcast band, even in daylight, I hear such stations as Trieste at full loud-speaker strength.

Now, then, short-wave fans, justify yourselves—if you can! R. J. (Liverpool).

### GROUSE ABOUT THE SHOW

SIR,—Why do the organisers of the Radio Show at Olympia perpetuate the stupid practice of coupling up every stand's loud-speakers to the B.B.C. amplifier? Since there are now only three or four leading makes of loud-speaker used in factory-built sets, it seems obvious that no useful comparative tests of quality of the sets can be made by a visitor.

I should like to see some effort to give prospective set buyers a chance to compare such important attributes as selectivity, volume control, effect on quality of the tone control, and so on. Admittedly it is asking a lot to expect much in the way of sensitivity tests, owing to the notorious difficulty of working sets in large buildings.

But, short of a comprehensive demonstration of the set's abilities, it does seem rather futile to give us merely the output of the loud-speakers of the sets. A. N. (Harrow).

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The most popular and efficient type of fixed resistance for all general purposes. "Better than wire wound." All values 50 ohms to 5 megohms. 100 deg. F. Temperature rise.

Ohms	Milliamps	Ohms	Milliamps
1,000	40	20,000	8
2,000	35	30,000	6.75
3,000	29	40,000	6
Other values pro rata, 100,000		3.5	

Heavy Duty type, approximately double the above ratings.

## OHMITE RESISTANCES

# 1/6 EACH

### HEAVY DUTY TYPE 2/3

Ensure a safe and efficient Aerial and Earth. The new AEROFICIENT KIT provides all you need. 6/6 complete.

Send for copy of New Catalogue ready shortly.

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Export Office: 11/12 Fenchurch Street, E.C.3

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**USED AND NEW RADIO COMPONENTS AND SETS ON EASY TERMS.**—Dual-wave Coil, 5/6. L.F. Transformers, 4/9.—Arlin, 44 Ranelagh Road, Westminster, S.W.1.

**THE "Highbury Special" 4-VALVE ALL-MAINS RECEIVER.**—1934 model, in walnut cabinet, moving-coil speaker, 40-50 stations at full strength with knife-edge selectivity, fully guaranteed. Sent on 7 days' approval. A.C. or D.C., £9/10/6 or 19/6 deposit only.—G. W. Foster and Co., Ltd., 74 Highbury Park, Highbury Barn, London, N.5. Phone: North 4430.

**REAL SERVICE.**—Keen quotations or price list; all makes components, speakers, eliminators, etc.—Childs', Radio Factors, 29 Moray Road, London, N.4.

**"UNIVERSAL" RADIO BARGAINS.**—Burgoyne Trans- portable Three, complete all batteries, Mullard Valves, 57/6. Dario Super Transformers, 3/6. Lissenola Speaker Units, 1/11. Millgate Pick-ups, 4/6. Soundex Moving Coil, 13/3. "Universal" Permanent-Magnet Moving-Coil Speakers, massive Magnet, 12/11. Ready Radio Meteor kits, including Walnut Cabinet and Soundex Moving Coil, in sealed carton, 62/6. Valves from 1/11. Harlie, 27/6 Pick-up, 13/6. Thousands of other bargains. Stamp for list and print of our Super Three. Peckham Agents for Milnes H.T. Units.—"Universal," 20 Victoria Road, Peckham, S.E.15.

**BANKRUPT BARGAINS.**—List free with 3v. diagram. 3v. Kits 17/-. ST300 35/-. ST400 45/-. Triotron valve 3/6. Power 4/6. SG 0/-. Class B transformers 6/-. Ferrocoat coils, all types of M.-C. speakers in stock. Transformers from 1/6. .0005 from 10d. Dual coils from 2s. 6d. Kolster Brandes PUP complete 35/-. Kobra 90/-. D.C. PUP 65/-. Class B portables £6 10s. Celestion PPM60, 32/6. ST300 coils 5/6. .0005 SM 3/6. All new goods. Part exchange. I will take your old set or parts in part exchange for any new goods. Trade supplied with Triotron valves.—Butlin 143B Preston Road, Brighton. Preston 4030.

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**TELEVISION APPARATUS.**—We specialise in all components. Illustrated list free.—Sanders, 4 Grays Inn Rd., London, W.C.1.

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**SITUATION WANTED.**—Dry battery maker, expert, with secret formulae, seeks position. Has held positions as foreman, works manager, etc. Low salary. Would advise firms or teach anyone battery making for moderate fee. Write—Davis, care Editor, AMATEUR WIRELESS, 58-61 Fetter Lane, E.C.4.

## INFORMATION BUREAU

Will every querist please observe the following revised rules.

Please write concisely, giving essential particulars. A fee of one shilling postal order (not stamps), a stamped, addressed envelope and the coupon on the last page must accompany all queries. Not more than two questions should be sent at any time.

Slight modifications of a straightforward nature only can be made to blueprints. For more serious alterations the minimum charge is 2/6.

Blueprints supplied by us will be charged for in addition, but of course, readers may send their own blueprints for alteration.

Modifications to proprietary receivers and designs published by contemporary journals cannot be undertaken. Readers' sets and components cannot be tested by us. 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.

We do not answer queries in cases where the fee is omitted.

Queries should be addressed to the Query Department, "Amateur Wireless," 58/61, Fetter Lane, London, E.C.4.

## Postcard Radio Literature

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. Please write your name and address in block letters.

## From Lissen

LISSEN have sent me an interesting broadsheet giving really glowing details of their new 1934 all-wave "Skyscraper" kit. Briefly the set is a four-valve using all-wave coils which tune from 12 to 2,000 metres. The valve combination is a variable-mu screen-grid high-frequency amplifier, screen-grid detector with two pentodes arranged in quiescent push-pull. All you want to know about the set is on the leaflet even to the length of wires used in building. There is a choice of table and console cabinets in walnut. 24

## Varley's New Programme

From Varley I have received two new catalogues, one about their new season's sets and the other a comprehensive guide of the well-known Varley components. Outstanding among the new components in the latter list are iron-cored coils and a high-frequency choke, the Nicore automatic volume control unit and a range of new tubular resistances with wire ends. The set catalogue gives some interesting technical details of the new Varley four- and five-valve super-hets, and the super-het radiogram. Do not forget that Varley's have a three-valve A.C. set costing as little as twelve guineas. 25

## Mullard Midget Guide

One of the smallest reference booklets I have ever received has just come from Mullard's, the valve people. The book, which has twenty-eight pages, measures a little over 2 in. by 5 in. One of the features of the booklet is that there is a small note answering that provocative question about the maximum life of a valve. The major part is devoted to giving all the usual operating data of Mullard valves, including the new high-frequency pentodes. Copies are free through this service. 26

## From Ward &amp; Goldstone

A new catalogue, which I particularly recommend to the home constructor, is the Ward & Goldstone 1933-1934 edition. It would be impossible in this short survey to give you a complete list of the components listed. However, the leading lines are coils, chokes, mouldings, switches, wire, screened down lead, the Stratoformer, an impedance-matching device and a range of meters and charging plants. There are fifty-six pages in this new publication. 27

## New Pertrix Folder

Pertrix have just issued a small folder in which they have managed to crowd a deal of useful information. Not only do they give details of their range of dry batteries and accumulators, but they give a table of suitable Pertrix batteries for use with a number of well-known portable and transportable sets. A useful battery guide! 28

## All About Soldering

A particularly interesting booklet is one called "A Profitable Pastime," which I recently received from W. T. Henley's Telegraph Works Co., Ltd. Not only does this booklet give full technical details of the Solon soldering bit but, what is just as important, it tells you how to use the bit so that your soldering is of the very best. 29

## New Rawwood Parts

I have just received a useful leaflet from the Rawson Electrical Co. This concern manufactures a complete range of mains transformers, low-frequency transformers and chokes, and three types of power pack. The leaflet gives full technical details of the complete range. 30

## A Good Baffle

One of the latest Lamplugh productions is the Timpani Tone baffle. This special patented baffle can also be supplied in cabinet form, and if you are interested in getting the most out of your speaker then I advise you to get the latest details from Lamplugh. 31

## A Complete Television Receiver

INCLUDED in a very comprehensive range of wireless receivers marketed by Grafton Radio, Ltd., this season is a complete mirror-drum television receiver, the whole equipment including sound and vision receivers, amplifier,

loud-speaker, and mirror-drum projection gear being in the one cabinet.

A very compact arrangement has been secured by an ingenious arrangement of the optical system, which is all in the upper part of the cabinet. At the bottom there are two receivers, one for sound reception, which feeds a moving-coil speaker fitted directly under the viewing screen, and the other for vision. The latter has two screen-grid variable-mu high-frequency stages feeding a diode rectifier, followed by a direct-coupled amplifier. It is, of course, A.C. operated.

The light source is placed right at the top of the cabinet and it is modulated by a Kerr cell, after which it is reflected down on to the upper side of the mirror-drum and then again reflected on to the viewing screen. Synchronising is carried out on the Baird system by means of a cogged drum on the motor shaft controlled by synchronising coils. A feature of the whole equipment is that the sound receiver can be used quite independently of the vision apparatus. We have not as yet had an opportunity of seeing the instrument in operation, but judging from the design we should say that excellent results will be obtainable.



The Grafton television receiver is entirely self-contained within the one cabinet.

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If your face is sore and tender and you feel that you never have a proper shave, send the coupon for a sample tube of Parke-Davis Shaving Cream and enjoy a whole week's holiday from shaving troubles—free. Parke-Davis Shaving Cream has a most soothing effect on the skin and makes the most stubborn beard yield to the razor. You can buy a large tube for 1/6 from your chemist.

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Box 135/27, EUTHYMOL, 50, Beak Street, London, W. 1  
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## WESTINGHOUSE METAL RECTIFIERS & WESTECTORS



Post **COUPON** to-day!

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13/- DEPOSIT and 6 monthly payments of 6/-.  
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**SIZE OVERALL**  
 Height, 3 ft. 3 in. Width, 1 ft. 8 in. Depth, 1 ft. 4 in.  
 Allowing ample room for all pick-up turntables and sets with best beads up to 18 in. by 14 in. and 7-in. panel, also speaker and all accessories. Hinged motor bead for easy use.  
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