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NEW 2-in-1 VALVE
INVENTED BY "THE
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YOUR RADIO TOOL
KIT FOR 3/-

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TWO RADIOGRAMS FOR YOU TO BUILD!

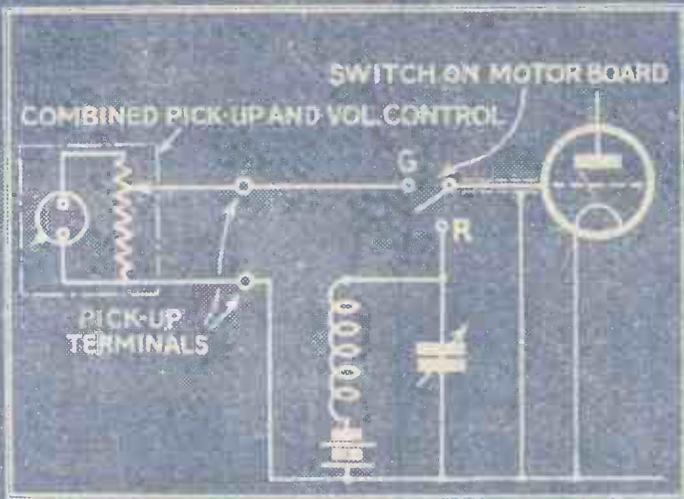
SPECIAL
SECTION

The Beginner's
How and Why of
the New
Radio

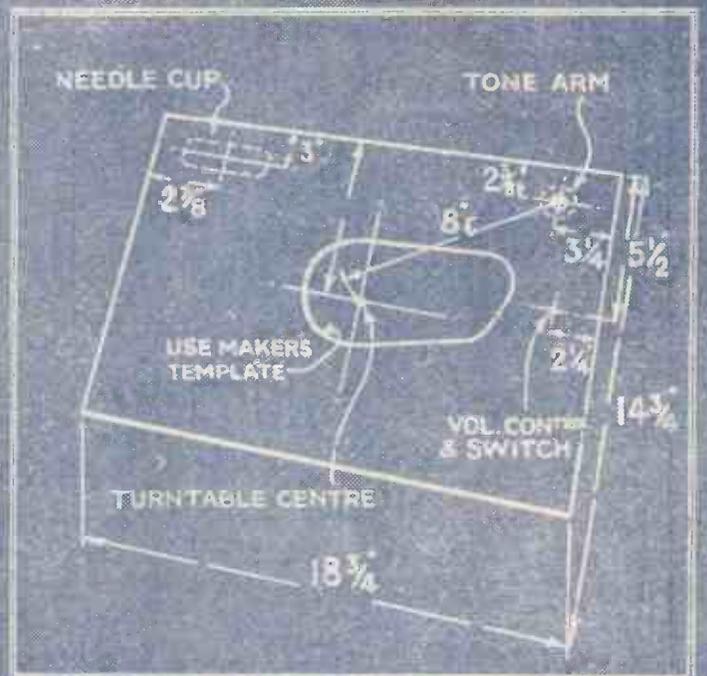
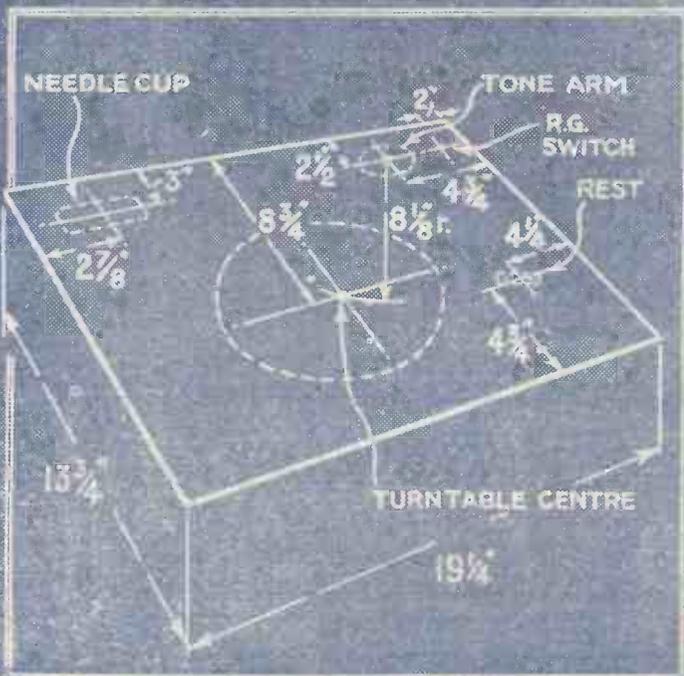
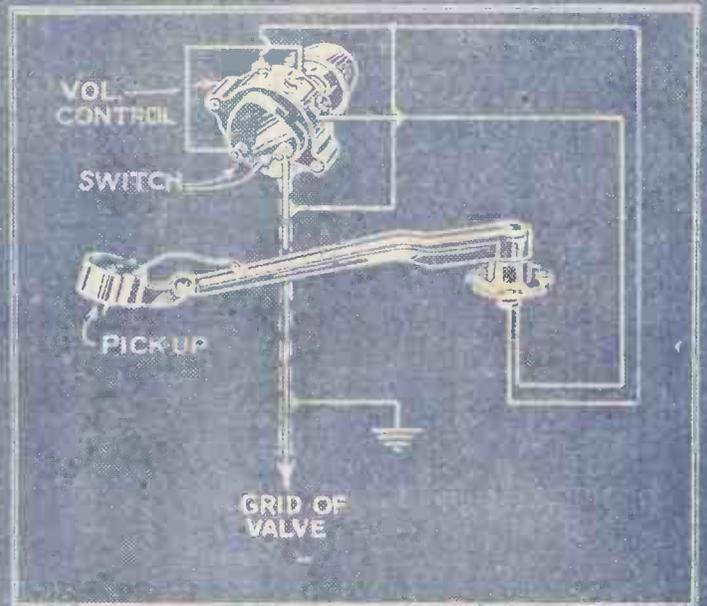
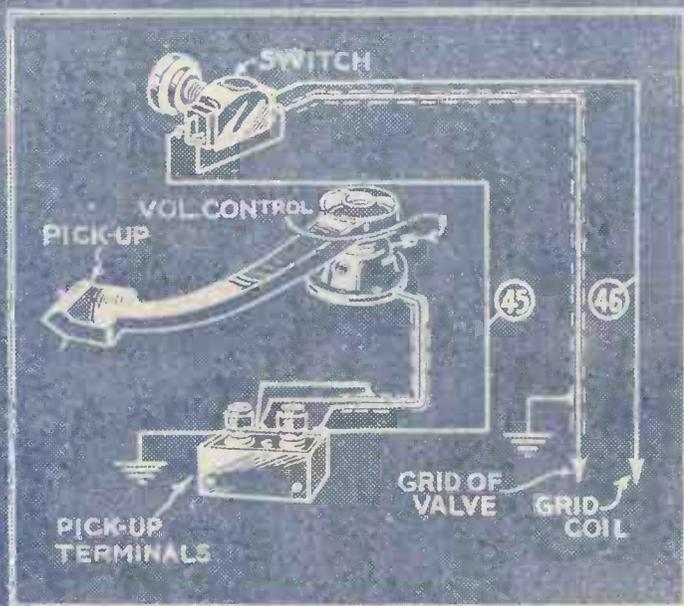
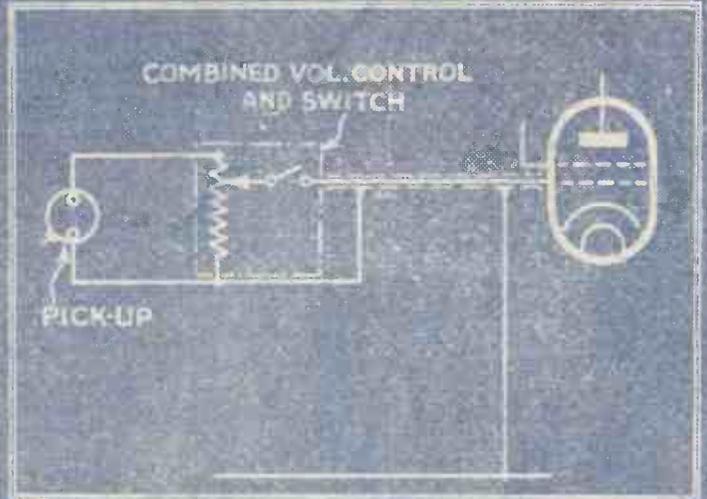


CONVERTING the IDEAL FOUR
and the CONSOLELECTRIC TWO

**THE IDEAL FOUR AS A RADIO
GRAMPHONE (See page 530)**



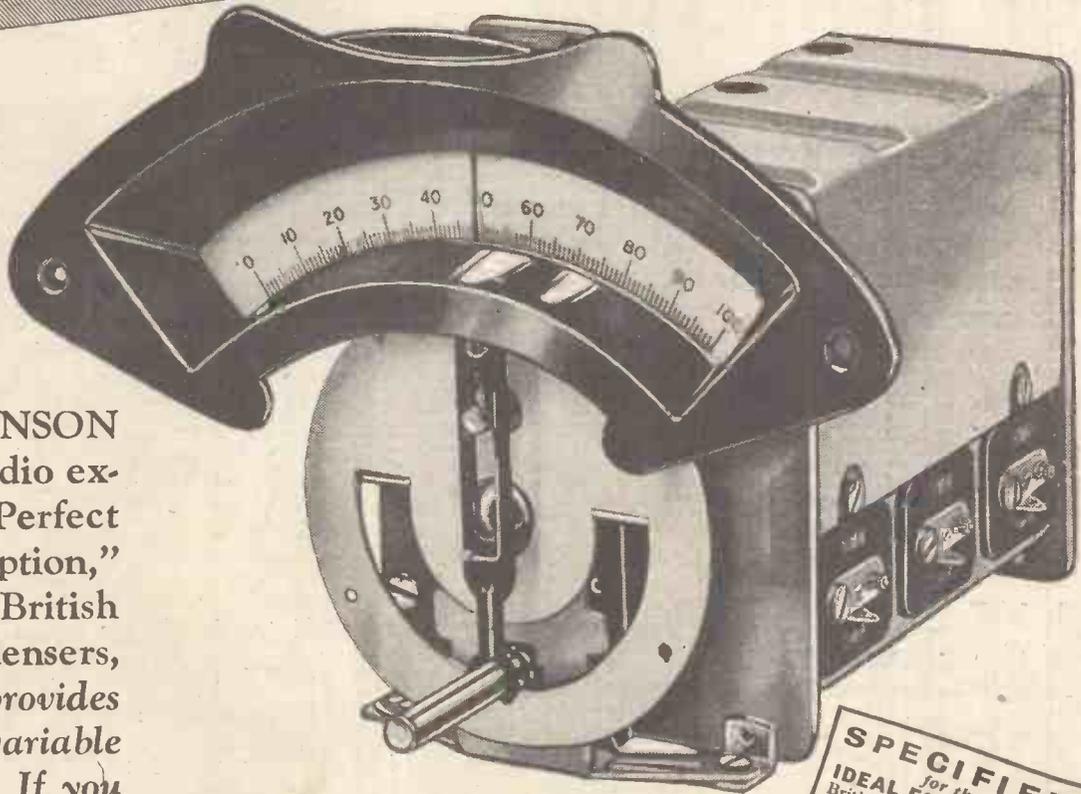
**RADIOGRAM VERSION OF THE
CONSOLELECTRIC TWO (See page 539)**



RADIOPHONE

MATCHED PERFECTION

**YOU CAN'T GET BETTER
than the Best!**



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the well-known radio expert, author of "Perfect Broadcast Reception," etc., etc., says of British Radiophone Condensers, "This firm still provides the very best variable condensers made. If you want the best there is no alternative."

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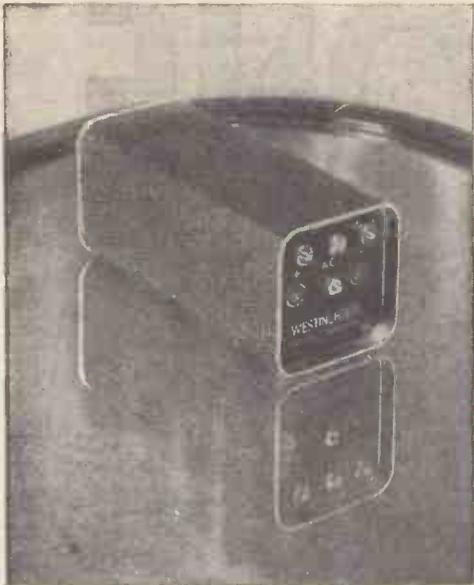
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Ratio 1/4
(saves an extra 30 per cent. H.T.) ... Price **17/6**
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Those who do not wish to interfere with the wiring of their present set can buy this simple unit. Just plug in adaptor to last valve stage and enjoy Class "B" advantages ... Price **37/6** (less valve).
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10/6

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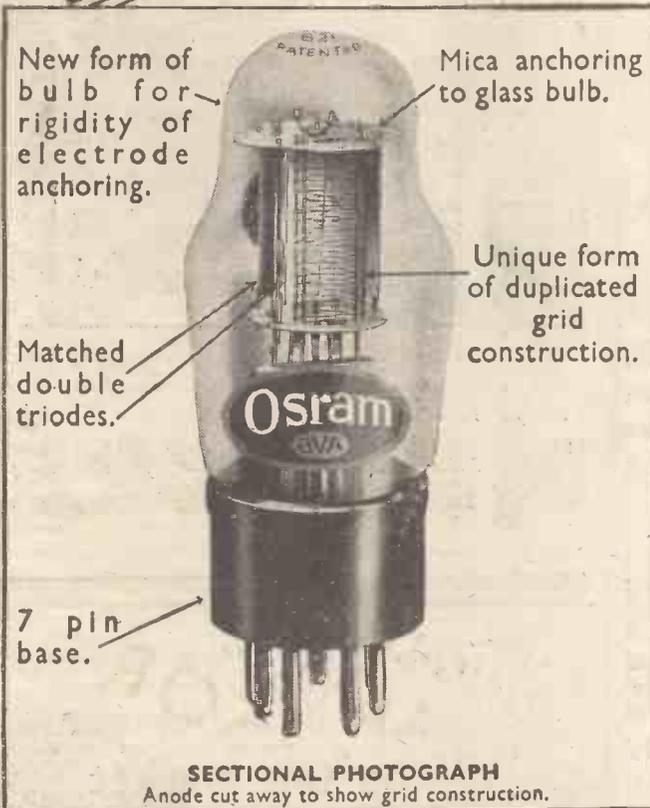
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FOR EVERY RADIO CONNECTION

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CLASS "A" QUALITY
with
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VOLUME



OSRAM
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TYPE B.21
(For use in 2-volt Battery "Class B" Sets)
PRICE 14/- each

The Osram B21 double triode "Class B" valve sets a new standard of quality in "Class B" amplification.

NOTE THESE POINTS.

1. New and unique duplicated grid construction in each half of the double valve — giving a higher power output to input efficiency.
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- OSRAM 2-VOLT BATTERY VALVES**
For use with type B21.
- NEW OSRAM S23 Screen-grid Price 15/6
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Osram
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Valves

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WRITE for the OSRAM VALVE GUIDE (1933 Edition) sent post free.

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... IT IS OBVIOUS THE VALVE HAS GONE .."

"It took me only a very short time to discover that—thanks to the 'All-in-One' Radiometer. With this invaluable instrument to help me I'll guarantee to track down any trouble in a few moments."



The "All-in-One" Radiometer is essential to every radio user. It tests everything, locates faults instantly, and helps to keep any set in 100 per cent condition. Ask your radio dealer about it, or write direct to PIFCO, LTD., High Street, MANCHESTER, or 150 Charing Cross Road, London, W.C.2.



PIFCO
ALL IN ONE
RADIOMETER

Standard Model "All-in-One" Radiometer, for Battery Sets only, as shown here

De Luxe Model, for Battery Sets, Electric Receivers and Mains Units.

Price **12/6**

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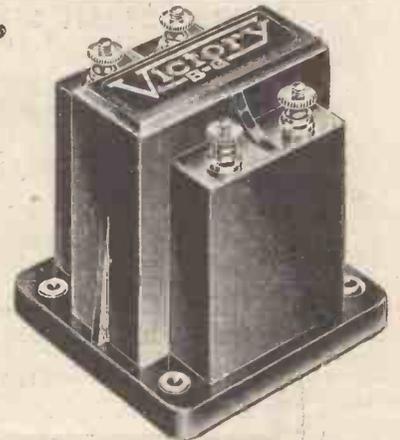
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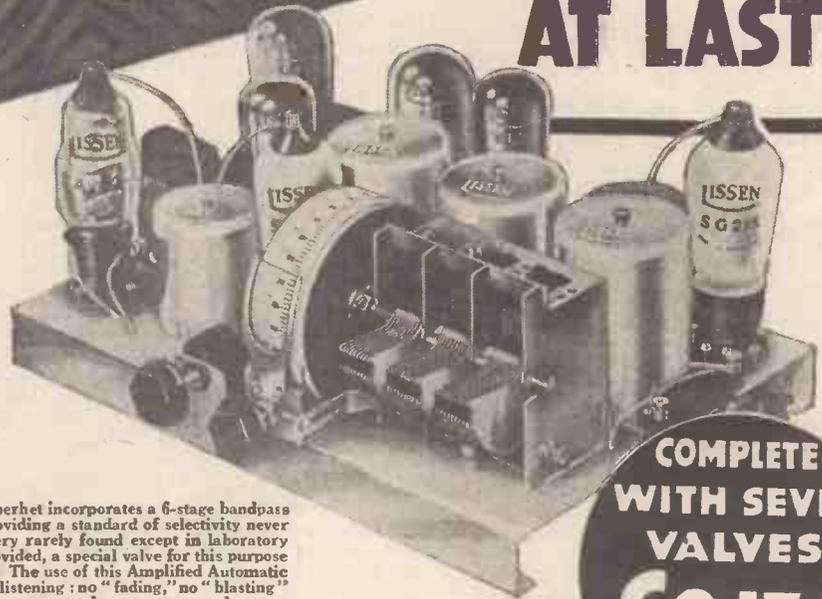
R38

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**HOME
CONSTRUCTORS
MOST AMBITIOUS
DREAM
REALISED
AT LAST!**

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.



**COMPLETE
WITH SEVEN
VALVES
£8.17.6**

The circuit of the Lissen "Skyscraper" Seven Valve Superhet 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 fit 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!



A SEVEN VALVE SUPERHET
8 STAGES IN ALL AND A 6 STAGE
BANDPASS FILTER EXACT 9K/c
TUNING CHANNELS WITH
AMPLIFIED AUTOMATIC VOLUME
CONTROL CLASS 'B' OUTPUT FULL
POWER MOVING COIL SPEAKER

**CHART FREE
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Please send me FREE CHART of the "Sky-
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Name

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**"SKYSCRAPER" 7
SEVEN VALVE SUPERHET 7**

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Britain's Leading Radio Weekly for Constructor, Listener and Experimenter

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Radio Gossip of the Week

Baird at Crystal Palace

ULTRA-SHORT-WAVE television experiments are to be carried out by the Baird concern, quite apart from B.B.C. transmissions. They have rented a part of Crystal Palace, from the tower of which the signals will be sent out. They should cover a wide area, including the whole of London.

Pirates, Beware!

IF you live in Newcastle, Gateshead, Sunderland, South Shields, or any district near those delectable towns, you should take note that the Post Office detection van is planning an intensive round-up tour beginning on October 2.

Not that the van will worry you, personally, dear reader, but you might know an erring listener who has so far fallen from the grace of good citizenship as to have omitted to take out a wireless licence. In a word, pirates beware!

First All-wave Set

DO you recall the Melody Ranger? It was described in AMATEUR WIRELESS dated January 28, 1933. It was, to the best of our knowledge, the first all-wave set offered to the home constructor by a wireless journal.

It tuned from 14 to 2,000 metres in three wavebands, all the switching being done by one knob actuating the mechanism underneath the bases of the Lissen coils.

Excuse the reminiscences, regular readers; we were put on to this line of thought by reading about the "first" all-wave set in a contemporary dated September 23. Comment seems quite superfluous.

Langenberg with a Vengeance!

NEW wooden aerial masts are being erected for the Langenberg station which, with its 100-kilowatt power, will soon prove a very ticklish customer for those wanting the station clear of North Regional—and what is equally important those wanting our northern station clear of the German.

Budapest Rivalling Eiffel Tower

WHILE on the subject of new aerial masts we ought to mention that Budapest broadcasting authorities are busily erecting two masts that will eventually be higher than the famous Eiffel Tower in Paris. These huge masts are to support the aerial of the forthcoming high-power Budapest station.

Morning Concerts from Normandie

IF you have a day off from the office, or are convalescing from your holidays, you might like to know that Radio Normandie, familiarly called Fécaimp, sends out quite an attractive programme every morning except Thursdays from 11 to 12 noon.

Many of the programmes are sponsored, and, if you like this sort of thing, you should apply for the programme schedule, 1½d. post paid, from the International Broadcasting Club, of Hallam Street, W.

Build a Radiogram!

OUR constructional pages this week—and the blueprint details on the front inside cover, please note—give you all the dope on



Biking to fame! This is the true story of Mr. Frederick Latham; a few weeks ago he was a cotton mill worker in Manchester, but he cycled to London to see Mr. Jack Jackson, with the result that twenty-four hours after arriving in London he was "on the air" as a new vocalist in the Dorchester Hotel dance band. Did you hear him?

THIS WEEK'S SPECIALS

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making efficient radio-gramophones. You have the choice of a two-valve all-electric set as a radiogram—the Consoelectric, or a four-valve battery set—the Ideal Four.

Radio Novice's Chance

IF you are just starting on this wireless business—and you could hardly find a more fascinating hobby—our special supplement for beginners will have a real appeal. On pages 555 and 558 we continue our tabloid radio course, wherein "live" components tell their stories, and on pages 556 and 557 there is also a very topical article for beginners explaining just what the new developments signify to the ordinary listener.

Two-in-one Valves

THOSE irrepressible contributors, "The Experimenters," excel themselves this week in recording their experiences with a new two-in-one valve of their own conception.

A detector and power valve in one bulb! How such a valve would help the amateur is breezily explained on pages 544 and 545.

Marconi's Micro-wave Experiments

SPECIAL equipment has been fitted up on the roof of the new Electra House on the embankment for carrying out experiments with micro waves. It is hoped that eventually the engineers of Marconi Co. may be able to communicate with Marconi in Italy with these waves.

News from Broadcasting House

By Our Special Commissioner

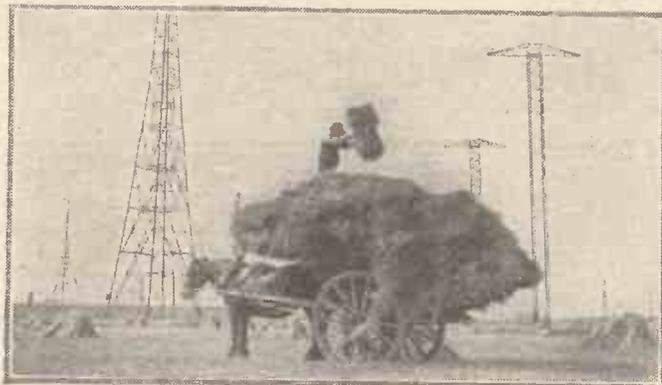
A Walters Sisters' Revue

IF you are a Walters Sisters fan—and who isn't, indeed?—you should make a date with your loud-speaker for either October 16 or 17. On those nights the Sisters will star in a new Ashley Sterne revue called "Bells of London."

John McDonnell is going to produce the show, so it ought to be good. You may remember McDonnell did those highly exciting Surprise Items in the days before the B.B.C. went all Civil Service.

Jack's the Boy!

ANYONE who doubts the microphone "pull" of Jack Payne should have seen the crowds around Broadcasting House during



Idyll at Ongar! Loading sheaves of wheat on a farm waggon under the shadow of the giant steel masts that radiate messages for Imperial Communications to all parts of the Empire

his recent studio engagements. Dozens of autograph hunters laid in wait every day of the week for their dance-band idol. And the letters that poured in acclaiming Jack must certainly have impressed the B.B.C.

I am very glad to find, on looking through some of these letters, that listeners are not praising Jack at the expense of Henry Hall, who, different though his technique may be, has definitely come into his own.

Mobbing the Microphone Stars

TALKING of microphone popularity, did you know that Sylvia Sydney, the American film star, was literally mobbed by admirers as she tried to get from the Langham Hotel to the B.B.C. opposite? You didn't? Well, she was; and it took her twenty minutes to cross the road. She got away after her broadcast by the goods entrance.

Which makes me wonder why the B.B.C. does not dig a private tunnel between Broadcasting House and the Langham opposite. Or, another bright idea, why not dig down to that tube railway below the foundations and erect a private station?

Watchman, What o' the Night?

THEY tell me that the night staff is being strengthened for the Empire programmes. About time, too, judging by some recent incidents.

One night, so skeleton was the programme staff, the night watchman had to deputise for a missing piano accompanist.

Another night the liftman had to do a job of programme work through a similar failure to appear, and Martyn Webster, the producer, had to work the lift.

Now those lifts want some handling; and

I am not surprised that Martyn, and the terrified artist he was attempting to escort to the appropriate studio, shot up and down seven times between the ground floor and the roof before he touched the right handle!

Baird Winning the Race?

MY latest news about the television race between Baird and H.M.V. is that Baird seems likely to pass the post first. He anticipates that his new ultra-short-wave system will be ready to take the air in a week's time.

The H.M.V. people have evolved a very complete ultra-short wave television installation, but for the Baird system I understand the transmitter on the roof will need some modification.

Better 30-line Pictures

FOR the moment there is more practical interest in the 30-line television transmissions on London National. Those of you with television sets, such as this journal has been describing recently, should take note that the images have been improved.

A new bank of photo-electric cells has been suspended from the gallery of the studio, to give better definition to long shots and extended views. Have you noticed?

Belfast Wants Mrs. Borrett

THERE is competition among provincial stations for the services of the London lady announcer. Belfast is particularly keen to secure Mrs. Borrett. Nothing is yet settled, but I should not be surprised to hear that Belfast's ambition is gratified within the next month or so.

If Mrs. Borrett stays on at Broadcasting House, I think they will add another lady announcer to the staff. It is obviously unfair to place the onus of representing the whole of one sex on one woman.

London's Loss is . . .

LONDON announcing is rather at sixes and sevens just now.

Mr. De Groot, who earned fame as the announcer who didn't go to school, and whose private tutoring saved him from the studied accent of our public schools, is to be chief announcer at Manchester.

Jack Cowper returns to Birmingham after some years as chief announcer for the Midland Regional station.

Humanising the Announcers!

CONSCIOUS of the cold-bloodedness of most of its announcements, the B.B.C. has at last decided to infuse a

little more life into the business. Henceforth announcers will report to the newly formed Presentation Department, which will instruct them in the correct manner.

There is the world of difference in the tone to be adopted in announcing a vaudeville and a religious service. The idea is to introduce the correct note of intimacy or deference the broadcast demands. Watch those announcers; listen for that human note—tra-la!

Hitch at Droitwich

JUST as the Droitwich masts were getting along nicely the B.B.C. contractors have had to cope with a labour dispute.

Apparently the men working on the ground demanded as much money as those up the masts. So out walked the gang and in came a new lot.

In case you have visions of sweated labour and all that I might remind you that all B.B.C. contracts include a fair-wages clause.

Personally, I would want more money than the B.B.C. would care to pay to shin up those masts and start riveting—or whatever it is one does up masts.

A Note for Footer Fans

PLEASE note that when the much-talked-of News Reel is broadcast every Saturday night from 9 to 9.35 the football results and other sports news will be interleaved at a fixed time.

The League Committee has refused to allow broadcasting of its matches, so all we shall hear this winter will be the Cup Final from Wembley, international games under the Football Association, and the chief rugby matches. Most people who are not footer fans will say that's quite enough, too.

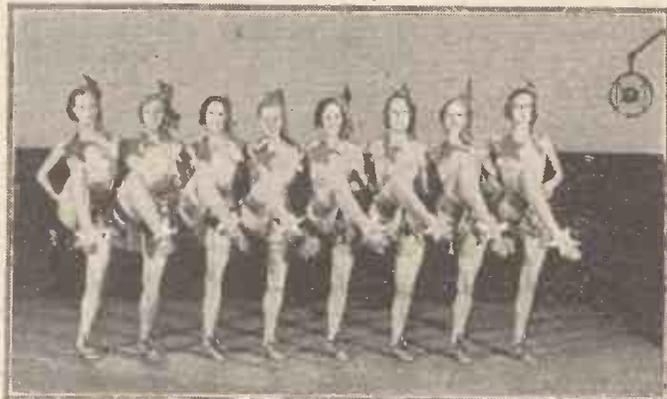
Crisis in Kids' Corner

UNCLES and aunts of the B.B.C. will soon lose their delightful personal touch with the "nephews and nieces," because at the end of the year all birthday greetings will be abandoned.

Instead, there is a suggestion that occasionally a selection of children's letters should be read before the microphone.

Who Am I?

"IS it true that you are really one of the B.B.C. announcers?" asks a reader with a sinister turn of mind. No, I have a Cockney accent



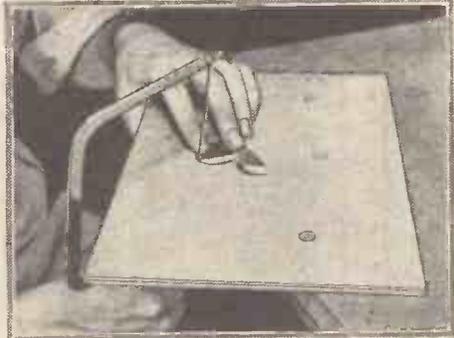
Meet the Eight Step Sisters! A dynamic picture of the eight little ladies who frequently "tread a measure" before the London microphone these days

Your Radio Tool Kit for 3/-

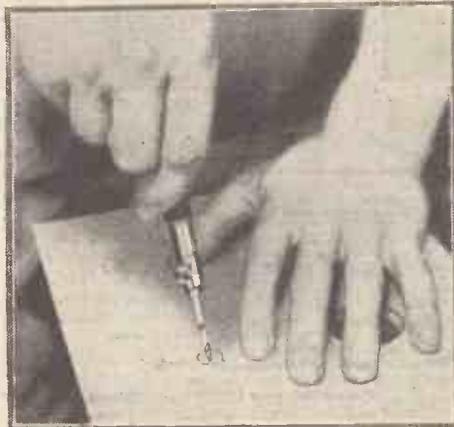
—and How You Can Save Trouble with a Full-size Blueprint!



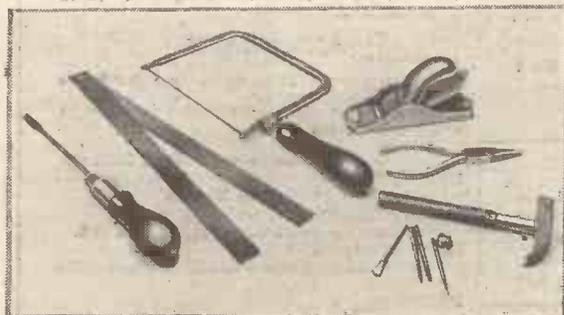
Using a ratchet screwdriver for fixing screws



Cutting a hole in a panel with a "coping" saw



Making hole to take "coping" saw blade



THERE are signs that thousands of readers of AMATEUR WIRELESS will take the line we recommended last week—to build a new set and lead the way in the new radio technique. That can easily be done by building one of the sets described in these pages. But many people are frightened at the thought of having to use tools, so in these notes it is our aim to show how simple set construction really is and how few tools are needed.

Value of Full-size Blueprint

By the use of an AMATEUR WIRELESS full-size blueprint for building, a great deal of time and trouble can be saved. There is no need to mark out the panel or the baseboard with a ruler and pencil, for the blueprints show the positions and sizes of all the holes that have to be drilled.

In the first place, the blueprint should be placed in turn over the back of the panel and the baseboard of the set; then the centres of all the holes to be drilled can be marked out with a scriber.

When this has been done the actual holes can be cut in the panel with a small "coping" saw and the holes for component-fixing screws can be made in the baseboard with the scriber. The coping saw is so arranged that the cutting blade can be arranged in four different positions with respect to the handle, so that it is possible to cut holes of almost any size in an ordinary panel.

Another tool that saves a great deal of time is a ratchet screwdriver, which will be needed when screwing the baseboard parts into position. A pair of round-nosed pliers will be necessary for shaping loops in the ends of connecting wires; and there will be no trouble about cutting off the right lengths if the pliers are provided with a wire cutter. The pliers can also be used for doing up small nuts and terminals.

Another tool that will be found of use by those who intend to do a fair amount of experimental work is a small wood-smoothing plane for truing up the edges of baseboards and panels.

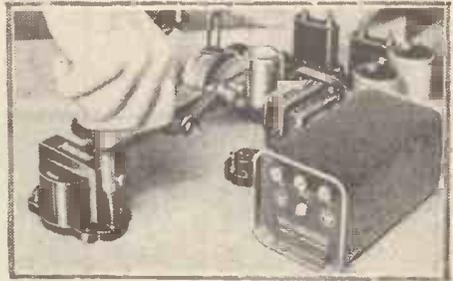
Cheap Tools are Good Enough

Now beginners, at any rate, do not want to lay out a lot of money on high-class tools when a few cheap ones will suit their purpose admirably. We, therefore, went along to the nearest Woolworth's to see just what value the radio beginner can get for about 3s. We found that for this small sum it is possible to buy the following tools:—

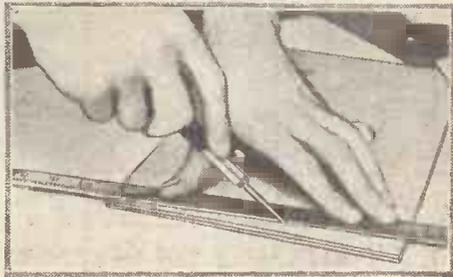
- (1) 2-ft. folding steel rule;
- (2) Combination hammer, scriber, screwdriver, gimlet, and countersinker;
- (3) "Coping" saw for cutting large and small holes;
- (4) Wood-smoothing plane;
- (5) Round-nosed pliers with wire cutter; and
- (6) Ratchet screwdriver with 5-in. blade.

While this kit of tools is fairly representative it can easily be varied to suit individual requirements. The point we wish to make is that radio construction can be undertaken with every success even with the cheapest and simplest of tools.

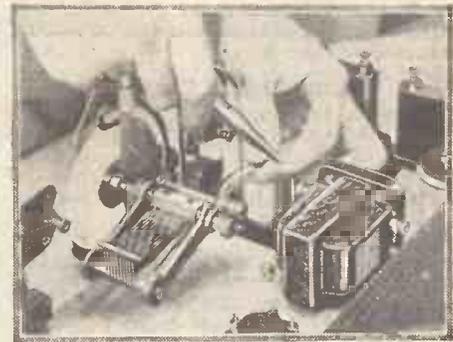
(Left) The group of tools that can be bought from a "sixpenny" stores for 3s. (Right) Inserting the scriber into the holder of the combination tool



Making a hole for a fixing screw



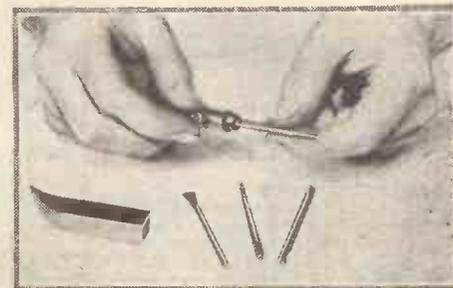
Marking out panel with a scriber



Using pliers to shape wiring



Planing the edge of a wooden panel



Two Radiograms for

The Ideal Four as a Radiogram and—



Operating the Ideal Four in its radio-gramophone cabinet—a handsome piece of work

WHEN you want a good radio-gramophone you must have for a nucleus a soundly designed radio set. Such a set is the Ideal Four, which, in addition to careful engineering at every point, has the unique advantage of automatic volume control that really works.

Converting Is Easy!

To make the original Ideal Four, which was designed as a table console, into a good radio-gramophone is, therefore, quite practicable, and indeed we have obtained extremely good results from the combined job illustrated this week.

You will remember that pick-up terminals were fitted to the end of the baseboard of the Ideal Four. (See the full-size blueprint on the inside cover of AMATEUR WIRELESS dated September 16.) We have to connect to these terminals, which come into the detector circuit of the receiver, a suitable pick-up and volume control and radiogram switch.

For convenience we have made use of the B.T.H. combined pick-up and volume control. As there is no switching in the set for the pick-up, we have to introduce a simple radio-gramophone switch between the grid of the valve and the pick-up terminals.

Another special requirement is a metal-sheathed lead for the grid connection, to avoid interaction and whistling noises.

First fit the motor on the top panel of the radio-gramophone cabinet, usually referred to as the motor board. The Garrard double-spring motor is quite easily fixed if you follow the makers' instructions. So is the pick-up, but be careful to arrange this so that it "tracks" properly across the record.

A useful refinement is the fitting in a convenient position near the

pick-up rest of a Bulgin needle cup. This gives the whole job quite a professional appearance.

The Peto-Scott cabinet will house the motor board at the top and the set and loud-speaker below, with room behind for the batteries.

In operation the Ideal Four radio-gramophone is just as easy as the table-cabinet model, but for further details you are referred back to the hints on page 483 of last week.

The only additional operation is the switching in of the pick-up when you want to play gramophone records. The Ideal Four gives very good quality on both radio and records, and is well worth while making up in radio-gramophone form, in the handsome Peto-Scott cabinet we show in our illustrations.



How the pick-up, turntable and needle cup are arranged on the motor board on the top of the radio-gramophone cabinet of the Ideal Four receiver



A handsome piece of work! The Ideal Four makes an ideal radio-gramophone for battery users

COMPONENTS YOU WILL NEED TO BUILD THE IDEAL FOUR (RADIOGRAM VERSION)

BASEBOARD

- 1—Peto-Scott Metaplex, 16 in. by 10 in.

CHOKES, HIGH-FREQUENCY

- 1—Telsen binocular (or Bulgin, Graham Farish type LMS).
- 1—Graham Farish, type LMS (or Bulgin, Telsen screened binocular).
- 1—British Radiogram, type 46 (or Lissen Disc, Telsen type W75).

COILS

- 3—Lissen dual-range iron-cored shielded.

CONDENSERS, FIXED

- 2—Lissen .0001-microfarad (or Dubilier, Telsen).
- 1—Lissen .001 microfarad (or Dubilier, Telsen).
- 1—T.C.C. .01-microfarad, type tubular (or Lissen, Dubilier)
- 4—T.C.C. 1-microfarad type tubular (or Dubilier, Telsen).

- 1—Lissen 1 microfarad (or Telsen, T.C.C.).
- 1—Lissen 1-microfarad (or Telsen, T.C.C.).
- 2—Lissen 2-microfarad (or Telsen, T.C.C.).

CONDENSERS, VARIABLE

- 1—British Radiophone midget three-gang .0005-microfarad, type 604, with full-vision scale type 711 (or J.B. Linatune, Utility).
- 1—Igranic pre-set .0005-microfarad, type No. 2 (or Sovereign).

HOLDERS, VALVE

- 3—Graham Farish four-pin (or Lissen, Telsen).
- 1—Graham Farish five-pin (or Lissen, Telsen).

PLUGS, TERMINALS, ETC.

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

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

- 6—Belling Lee terminals, type M, marked: Aerial, Earth, Pick-up (2), L.S.—, L.S.— (or Clix, Ealex).

RECTIFIER

- 1—Westector, type W4.

RESISTANCES, FIXED

- 1—Graham Farish 1,000-ohm (or Dubilier, Lissen).
- 2—Graham Farish 5,000-ohm (or Dubilier, Lissen).
- 1—Graham Farish 10,000-ohm (or Dubilier, Lissen).
- 2—Graham Farish 30,000-ohm (or Dubilier, Lissen).
- 1—Graham Farish 50,000-ohm (or Dubilier, Lissen).
- 3—Graham Farish 250,000-ohm (or Dubilier, Lissen).

RESISTANCE, VARIABLE

- 1—Bulgin 25,000-ohm, type VC34 (or Igranic, Watmet)

SUNDRIES

- 2 pairs Bulgin grid-bias battery clips, type No. 1 (or Gripso).

- 1—Bulgin grid-bias battery clip, type No. 2 (or Gripso).

- 1—Bulgin duplex needle cup, type NCI.
- 3—Belling-Lee terminal blocks.
- 1—British Radiogram 1-in. metal mounting bracket.
- 2—British Radiogram 2-in. metal mounting brackets.
- 1—Peto-Scott Metaplex strip, 7½ in. by 2 in. 5 yd. thin flex (Lewcoflex).
- Connecting wire and sleeving (Lewcos).

SWITCHES

- 1—Bulgin three-point type S39 (Lissen, Telsen).
- 1—Bulgin two-point type S38 (or Lissen, Telsen).
- 1—Bulgin rotary toggle, type No. S.92LB.

TRANSFORMER, LOW-FREQUENCY

- 1—Varley Nicora II (or Lissen Hyparnik, Telsen Radiogram).

ACCESSORIES

BATTERIES

- 1—Lissen 154-volt high-tension, type Q.P.P. (or Drydex, Ever-Ready).
- 2—Lissen 16-volt grid-bias (or Drydex, Ever-Ready).
- 1—Lissen 4½-volt grid-bias (or Drydex, Ever-Ready).
- 1—Lissen 2-volt accumulator (or Exide, Oldham).

CABINET

- 1—Peto-Scott Adaptagram Mod. I A.

GRAMOPHONE MOTOR

- 1—Garrard clockwork double spring type 11B.

LOUD-SPEAKER

- 1—W.B. Microtype PM4A (or Epoch, Amplion MC22).

PICK-UP

- 1—B.T.H. Minor with combined volume control.

SUITABLE VALVES

| Make | 1st H.F. | 2nd H.F. | Det. | Power |
|---------------|----------|----------|--------|----------|
| Mullard ... | PM12M* | PM12V* | PM2DX* | PM22 |
| Marconi ... | — | VS3 | HL210 | — |
| Osfam ... | — | VS2 | HL2 | — |
| Cossor ... | 220VS | 220VSG | 210Det | 230PT |
| Hivac ... | — | VS210 | D210 | Z220 |
| Mazda ... | — | S215VM | HL2 | Pen220A* |
| Six-Sixty ... | — | 215VSG | 210D | 230PP |
| Lissen ... | — | SG2V | HL2 | — |

*Valves used during "A.W." tests.

You to Build at Home!

—the Consolectric Two As a Radiogram As Well!

MANY readers with an electric-light supply must be interested in the constructional details we published last week on the Consolectric Two, one of the latest mains-set designs with several really outstanding features.

The use of a high-frequency pentode for the first stage will arouse great interest, as this valve provides very great amplification and enables considerable selectivity to be obtained from the aerial-tuning circuit.

Bias Resistance

As explained last week, the Consolectric Two was primarily designed with the idea of using it as a radio-gramophone if desired. To that end we incorporated a 500-ohm resistance with a parallel .1-microfarad fixed condenser in the cathode lead of the detector.

Although these components are not needed for the valve in its function of detector, for it is provided with a grid condenser and leak



Here you see what a really handsome radio-gramophone the Consolectric Two makes when fitted into the specified cabinet

and works with practically zero grid bias as a detector, they are essential for gramophone work, where this first valve has to act as a low-frequency amplifying stage.

The resistance provides a negative bias by tapping off a small part of the total high-tension voltage. Anode current flows through the cathode resistance and the voltage drop across this gives us the required bias for low-frequency amplification.

The circuit as designed for radio is therefore already suitable for amplification, but we cannot connect a pick-up directly across the



See the working diagrams on the front inside cover this week!

When built up as a radio-gramophone the Consolectric Two gives really fine reproduction of gramophone records, with first-class quality of reproduction and plenty of volume

PARTS FOR THE CONSOLELECTRIC RADIOGRAM

- BASEBOARD**
1—Peto-Scott Métaplex, 16 in. by 10 in.
- CHOKES, HIGH-FREQUENCY**
1—Telsen screened type W341 (or Wearitz, Goltanz).
- CHOKER, SMOOTHING**
1—Igranic, type CH1 (or Lissen, Telsen).
- COIL**
1—Telsen dual-range iron-cored, type W34D.
- CONDENSERS, FIXED**
1—Lissen .0001-microfarad (or Telsen, Dubilier).
1—Lissen .0005-microfarad (or Telsen, Dubilier).
1—Lissen .01-microfarad (or Telsen, Dubilier).
1—Lissen .1-microfarad (or Telsen, Dubilier).
1—Lissen 1-microfarad (or Telsen, Dubilier).
2—Dubilier 2-microfarad, type 9200 (or Telsen).
1—Dubilier 20-microfarad electrolytic, type 401 (or T.C.C.).
1—Dubilier 4-microfarad electrolytic, 500 V.D.C. peak (or Telsen, T.C.C.).
1—Dubilier 8-microfarad electrolytic, 500 V.D.C. peak (or Telsen, T.C.C.).
- CONDENSERS, VARIABLE**
1—Graham Farish .0005-microfarad, type Zelos (or Telsen, Lissen).
2—Lissen .0005-microfarad, type reaction (or Graham Farish, Utility).
- DIAL**
1—Ready-Radio slow-motion (or Utility, Telsen).
- HOLDERS, VALVE**
2—W.B. five-pin (or Telsen, Lissen).
- RECTIFIER**
1—Westinghouse H.T.12.
- RESISTANCES, FIXED**
1—Dubilier 400-ohm (or Lissen, Telsen).
1—Dubilier 500-ohm (or Lissen, Telsen).
1—Dubilier 1,000-ohm (or Lissen, Telsen).
1—Dubilier 30,000-ohm (or Lissen, Telsen).
1—Dubilier .5-megohm (or Lissen, Telsen).
1—Dubilier 1-megohm (or Lissen, Telsen).

SUITABLE VALVES

| Make | Detector | Power |
|-----------|----------|----------|
| Cosor | — | MPPen* |
| Mullard | SP4* | Pen4V |
| Marconi | — | MPT4 |
| Osram | — | MPT4 |
| Mazda | — | ACPen |
| Six Sixty | — | SS4PenAC |
| Lissen | — | ACPT |

*Valves used during "A.W." tests.

RESISTANCE, VARIABLE

- 1—Bulgin 50,000-ohm and combined switch, type V539 (or Watmel, Telsen).

SUNDRIES

- 3—Telsen terminal blocks (or Lissen).
1—Bulgin combined mains plug and fuses, type F15.
2—British Radiogram 4-in. metal mounting brackets.
1—British Radiogram metal bracket to specification.
Aluminium strip, 8 in. by 2 in. (Peto Scott).
Connecting wire and sleeving (Lewco).
1—6-in. length of screened sleeving.
2 yd. thin flex (Lewco).
2—Bulgin knobs, type K11.
1—Bulgin needle cup, type NCL.

SWITCHES

- 2—Bulgin on-off rotary toggle, type S02.

TRANSFORMER, LOW-FREQUENCY

- 1—Lissen Hypernik (or Telsen, Sovereign).

TRANSFORMER, MAINS

- 1—British Radiogram, type 56 (or Heayber, R.I.).

ACCESSORIES

CABINET

- 1—Osborn, type 256.

GRAMOPHONE MOTOR

- 1—B.T.H. for A.C. mains, type YL.

LOUD-SPEAKER

- 1—Epoch, model 20th Century (or W.B., K. & A.).

PICK-UP

- 1—Lissen needle-armature, type LN573 (or B.T.H.).

terminals indicated owing to the possibility of overloading.

The first thing to do when assembling the set as a radio-gramophone is, of course, to fit up the accessories on the motor-board, that is the pick-up and volume control and gramophone motor.

The motor is of the electrically driven type and this has to be connected by two leads to the electric-light point. The switching of the motor is so arranged that when the motor is stopped by the pick-up mechanism at the end of the record the mains are automatically switched off.

A complete diagram of connections for the

motor are supplied, but be careful to wire up the mains connections correctly.

The pick-up is entirely a separate component, mounted as shown by the layout on the inside cover this week. That leaves us with the volume control and gramophone switch.

We have used a combined component here. The potentiometer volume control and the simple on-off switch are combined as shown.

The need for the switching may not be obvious. If you look at the circuit diagram last week, though, you will see that the pick-up would be across the tuning circuit and it is essential when listening to the radio side to cut out the pick-up. This is very easily done with a simple switch such as is contained within the combination component.

Connecting the Potentiometer

The potentiometer volume control is also essential. The winding or resistance is across the pick-up and one end of the winding and the slider goes to the grid circuit of the valve.

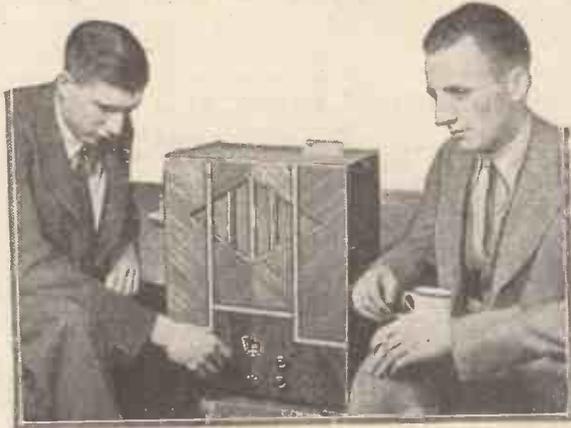
Now we have already explained that the pick-up is connected to the grid of the valve on one side and to earth on the other; this simplifies our external accessory connections appreciably.

We earth one side at any convenient point and use a shielded cable to take the remaining wire along to the grid circuit. We should have to use shielded wire in any case, otherwise there would be capacity effects set up, which would cause instability—most likely manifesting itself as whistling noises.

The idea is to use the centre wire as the connection from the potentiometer to the grid of the detector and the sheathing as the other connection. You must, of course, take a wire from the sheathing at the set end of the wire to an earthed point. The exact point does not matter; the important thing is to earth it.

The Log of the Consoelectric Two

At Home with "A.W."’s Most Modern A.C. Receiver



Members of the AMATEUR WIRELESS staff listen intently during a final test of the Consoelectric

I UNDERESTIMATED the possibilities of this two-valver when I took the set away from the "A.W." laboratories for its final test before publication. I rushed home and connected it up, thinking that even though the set was a "hotted-up" two-valver the results would be quite ordinary, and that an hour would be long enough for the test.

That I was wrong in my rash supposition can be seen by glancing at the rather large list of stations that appears on this page. The results were so unexpected and surprising that, in fairness to the set, I had to spend part of the next day finding out more about its station-getting capabilities.

Twenty Stations in an Hour

During that short hour in the evening I logged over twenty stations and out of that number at least a dozen provided an alternative attraction to the local programmes.

The output valve was fully loaded up to its 2 watts for the local signals and half-a-dozen of the foreigners. Believe me, that 2 watts on a good loud-speaker is more than sufficient to fill the average size dining room or lounge.

Rome was one of the stations that was heard at full output; I could hear its signals all over my house. Rome at full loud-speaker strength on a two-valver is something out of the ordinary, isn't it?

We can say the same thing about many other foreigners; Brussels No. 1, Leipzig, Huizen, Trieste, and Fécamp are just a few.

Ultra-selective If Carefully Handled

I found that selectivity on the medium waveband depends entirely on the skill of the operator. This set is ultra-selective if the aerial-input control and the reaction condenser are handled correctly.

You will see from the operating notes that the top control on the left is the reaction knob and the top knob on the right is the aerial input control. The whole secret of getting the greatest number of stations and the best selectivity with this set is to keep the reaction knob advanced until the set is almost on the verge of oscillation and to adjust volume with the other control.

On the other hand, if you do not work the set in this way, the selectivity will appear to be poor. With an outdoor aerial, 20 miles from Brookman's Park and the set tuned to get the best selectivity, London Regional spreads only four degrees on the dial, and the

signal was full loud-speaker strength.

The same remarks apply to the long waveband, although not to the same extent. I found that it was necessary to work the set with the aerial-input condenser in the half-way position to get a reasonable compromise between signal strength and selectivity.

With this arrangement I heard five stations on the long waves that passed the acid test of entertainment value. Luxembourg, Radio Paris, Daventry, and Hilversum, were the major music providers.

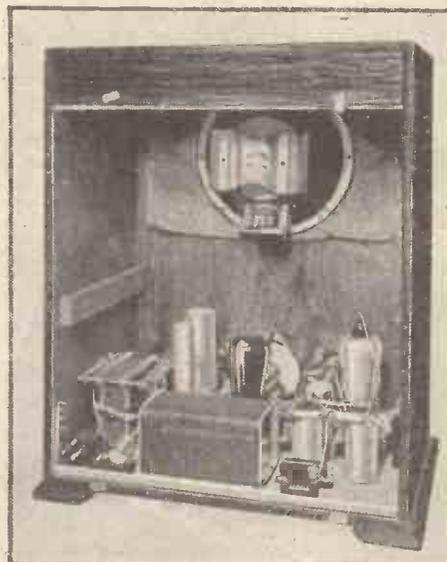
Indeed, it was nearly possible—not quite—to separate Berlin from Daventry and Paris; the actual background was very slight but I will not mislead you by saying that Berlin was at entertainment strength. Radio Paris and Luxembourg were heard at full strength; Sunday listeners please note.

After this really remarkable evening performance, I put the set on test again the next day between 2 and 3 p.m. and got Heston Airport and Croydon Aerodrome, as well as most of the other long-wave signals mentioned in the log. Lunchtime on the medium band brought in Brussels No. 1 and North Regional at reasonable strength—not full—besides the locals. Fécamp was at entertainment value during daylight.

Talking about Fécamp. You have noticed from the log that this station, which works on 226 metres, was heard at 27 degrees on the dial. You will see that there is plenty of room to bring in the British relay stations working on wavelengths near 200 metres.

Quality. This is really good, and is just what one would expect from a large pentode; crisp, with plenty of top and well-pronounced bass. There was hardly any mains hum; I had to put my ear to the loud-speaker to hear it.

I will sum up by saying that this is the best A.C. two-valver that has been on my test bench. Really remarkable results! T. F. HENN.



The Consoelectric Two (the construction of which was fully described last week) housed in its cabinet

Operating Hints

By the "A.W." Technical Staff

IN operation you will find this set delightfully flexible. Tuning is, of course, easy, just the one knob being turned to bring in the stations on either medium or long waves. The mains on-off and the wavelength ranges are equally easy to manipulate.

When we come to handle the reaction and the aerial-series condenser controls things are not so obvious, though there is absolutely nothing difficult about these controls once you realise what effect they have on the set's performance.

As you know, the reaction builds up the strength of the weaker stations, such as most of the foreigners that are within range. The aerial-series control does the opposite, in cutting down the strength as you decrease the capacity.

List of Stations Received

| LONG WAVEBAND | |
|-------------------------|------|
| Station | Dial |
| Heston Airport | 3 |
| Croydon | 15 |
| Oslo | 42 |
| Luxembourg | 53 |
| Eiffel Tower | 67 |
| Daventry National | 75 |
| Berlin | 79 |
| Radio Paris | 82 |
| Hilversum | 90 |
| MEDIUM WAVEBAND | |
| Fécamp | 27 |
| Trieste | 36 |
| London National | 40 |
| Heilsberg | 45 |
| Scottish National | 48 |
| Huizen | 51 |
| North National | 52 |
| Breslau | 57 |
| Poste Parisien | 58 |
| London Regional | 65 |
| Leipzig | 72 |
| Midland Regional | 73 |
| Athlone | 76 |
| Rome | 82 |
| Langenberg | 86 |
| North Regional | 88 |
| Florence | 91 |
| Brussels No. 1 | 92 |

You can use these two controls separately for these two definite and simple functions. But if you want to get the best out from the set in the way of selectivity you will work the reaction against the aerial coupling.

Supposing you want a foreigner, and it is not quite clear of interference. The first thing to do, assuming you are not already at the limit of reaction, is to decrease the aerial coupling a little, and that should clear the station, although it will reduce the strength.

Then you increase the reaction to make up for the loss of signal strength suffered by reducing the aerial-coupling control. Reaction has the property of increasing the strength only of the station to which the set is tuned, so that in increasing the reaction you will not increase the interference.

So, then, if you want good selectivity you must reduce the aerial coupling and increase the reaction.

THE VALVE



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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.D.P.

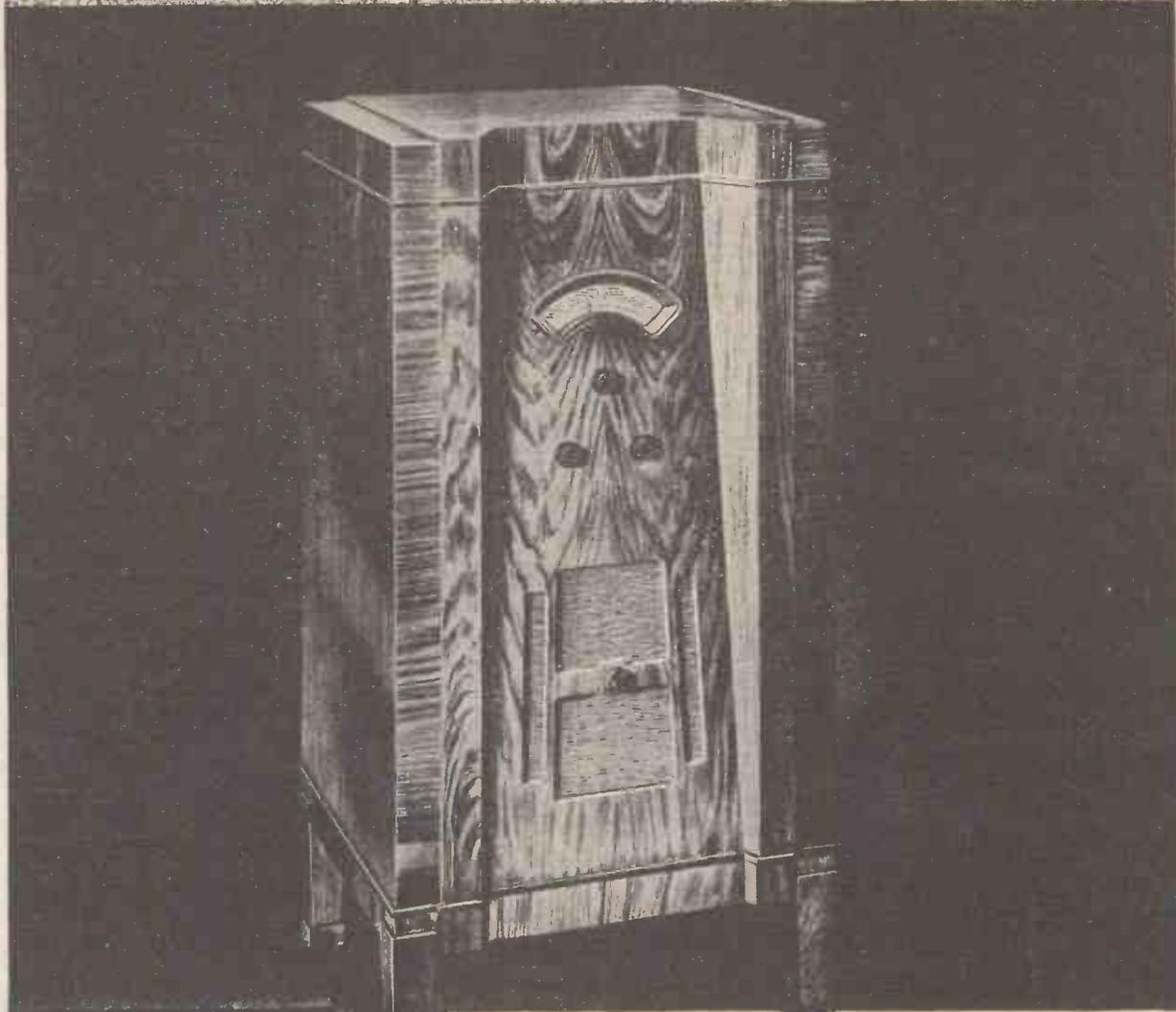
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Programme Criticisms by Whitaker-Wilson



The Fantastic Battle :: One Good Turn Deserves . . . ! :: Thrilling St. Leger Broadcast

NOBLE writing and high thinking were characteristics of Mr. Leslie Baily's play, *The Fantastic Battle*. The story was not too fantastic; much of it might have really happened.

There was pathos in the plight of the tiny buffer state oppressed by advancing hostile armies about to disregard its neutrality; sincerity in the passive resistance of the entire populace crowding the frontier roads; and something psychologically powerful about the refusal of the armies to violate neutral territory on finding themselves confronted by sad-looking people without as much as a pistol between them.

The author did his best to present soldier life as vividly as radio restrictions permit, but I thought he expended too much energy over his damns, blasts, and hells. Indeed, I was constrained to say tut-tut more than once.

The effects were spun out a little too much—a common fault in radio plays. Ten seconds must be regarded as a long period once we have guessed what the effect is supposed to be—longer still when we haven't.

When two or three people get round that gee-gee table in the effects room they seem to lose count of time altogether. They *did* have a game with it, didn't they?

Did you hear *Hurdy-Gurdy* from Cardiff, look you? Now you know what Cardiff does when time hangs heavily on its hands, or wherever (in the absence of hands) it hangs its time.

When are we to have a comedy show—a really good one? Funny all through. No holes in it. Must we wait until Ashly Sterne



Claude Hulbert, who distinguished himself in the show "One Good Turn," in which Bobbie Comber tried to sell him a shirt!

gives us his next? He is the only writer I can call to mind who keeps his comedy at a consistently high level.

One Good Turn contained so many weak spots that it can hardly be written down a success. Most of the scenes were feeble.

The music saved it. Ray Noble is to be congratulated on his melodious writing. At the Prom appealed to me enormously, particularly the lines "At the Prom, at the Prom, there's room to move to but not from."

Also the observation of the unmusical man who heard Beethoven Fifth Symphony and said: "How thankful I am I missed the first four." I know many of him.

The only real comedy scene was where Bobbie Comber sold a shirt to Claude Hulbert. Perhaps that gave the show its name—*One Good Turn*?

Afterthought: *Do we deserve another?*

I listened to Mr. R. C. Lyle's excellent and vivid running commentary on the St. Leger. As each horse came out he said it was a good-looking horse. In fact, I gathered there has never been such an array of equine beauty before.

When he said Hyperion had four white feet I was thrilled. Just like our cat. If only I had remembered the race was on, I should have rung up my bookmaker, if only I had one, and betted heavily on Hyperion, if only I had the money.

And then the wretched animal went and won after all, and I lost I don't know how much. I must give up racing and stick to Promenading.

Now for *Follies of the Air*. The air was full of follies that night. I was disappointed.

John Watt was successful in *Songs from the Shows* because he took everything into his own hands and gave interesting historical notes on the various shows.

If he is to be successful in the new series, and not plagiarise the title in the worst sense, he must be ruthless over the humour.

Someone said, after a song: "You ought to see your face now; you've no idea how funny it looks" Nor had I. Therefore I laughed not. The studio audience did. They saw the face.

Until someone proves I am wrong I shall stick to my opinion that lines (1) requiring vision for appreciation (2) which are merely back-chat, are valueless in broadcasting.

Lupino Lane in *How Deep is the Ocean?* failed for both those reasons.

The best effort was *To-morrow*. The negro rhythms were novel and attractive. The sketch about the babies was moderate, but all of it could have been re-written and made really funny.

Then again, the B.B.C. red-tape sketch missed fire because it was not convincing. So ordinary. The various departments gave such poor answers to Lupino Lane's enquiries. A satirical sketch lacking satire.

I should like to see John Watt and Harry Pepper wearing the crown of success, but their coronation depends on their powers as

coroners. They must hold *pre-mortem* examinations of all humorous matter to prevent the critics holding *post-mortem* examinations of the deadness afterwards.

In spite of all this I have heard things I wanted to hear from Queen's Hall.

The Bach Prom. gave me much pleasure. Strange, because being one of those dreadful highbrows, I find it difficult to come down to his level.

Arthur Cranmer's singing must be an



Ray Noble . . . "congratulated on his melodious music"



Myra Hess's . . . "pure pianism . . . never played better"

expression of himself and his composer at the same time. Just natural singing Complete in itself—and so delightful.

Jelly D'Aranyi and her sister, Adila Fachiri, played the double violin concerto so beautifully that I wanted them to do it all over again with Jelly as first and Adila as second—just to see if it made any difference.

How did I know Jelly (call her Yelly, if you must use her Christian name) was second? Because I heard her by herself earlier in the programme, and there are none so deaf as those who don't take the trouble to listen. Any complaints about that?

Another pleasure to me was Myra Hess playing the Schumann concerto. I do not know how many times I have heard her play it, but she never played the slow movement better in her life, I should imagine. Pure pianism.

Herbert Heyner sang Wolf in a way that confirmed my opinion that he was a very great songwriter. Fine music, finely phrased. How much phrasing matters!

I liked Honneger's *Pacific 231* the moment I heard it, because it was intended to imitate a train hurtling along at a mile a minute. Occasionally I can be attracted to the most ultra of ultra-modernisms when they have a definite programme in view.

When it comes to cacophony called symphony I am off it at once. I had heard rumours from high quarters and had learned what to expect. All the same I got more than I expected.

For the Up-to-date Experimenter

WE INVENT A NEW VALVE

—and Show How to Use a Class-B Valve for a Dual Purpose!

WE really think that before very long most simple three-electrode valves will have to take a back seat. Already we can read the signs of future valve progress in the development of such types as the class-B amplifier.

At the moment this is the only two-in-one valve for the battery user, but among mains valves there are numerous complications, examples being the double-diode pentode, the

EDITORIAL NOTE

We should like to emphasise the fact that the two-in-one valve discussed by "The Experimenters" this week actually does exist, two samples having been in the AMATEUR WIRELESS laboratories for some weeks. There seems to be everything in favour of producing such a combination valve, particularly as it could be done with very little alteration in most existing class-B valve characteristics. Readers are invited to send us their views on this matter.—ED.

diode triode and the diode tetrode—detectors with pentode, three-electrode or screen-grid valves combined in the same bulb.

For a long time to come it is the battery set that will need the most attention from designers. We are therefore surprised that more progress among two-in-one valves has not been made among battery types.

You might well ask why the two-in-one valve has been developed at all. In this country, where the number of valves has to

CHARACTERISTICS OF OUR SPECIAL VALVE

| Anode voltage | Grid voltage | Anode current in mA. |
|---------------|--------------|----------------------|
| 100 | 4.5 | 3 |
| 120 | 6 | 4 |
| 150 | 7.5 | 6.5 |

CHARACTERISTICS OF MARCONI AND OSRAM B21

| Anode voltage | Grid voltage | Anode current in mA. |
|---------------|--------------|----------------------|
| 100 | 1.5 | 1.8 |
| 120 | 1.5 | 2 |
| 150 | 3 | 4 |

be kept down, the tendency is easily explained.

Until recently the most popular set in this country has undoubtedly been the three-valver, usually quite a straight circuit, with one high-frequency stage, detector and power output. Now this type of circuit, though cheap to produce, is not good enough to cope with the ever-increasing chaos of the European ether.

Indeed, no one would try to argue that anything but the super-het circuit is really capable of coping with the present ether situation. Unfortunately, the super-het is not a very cheap set to produce, and even among mains models the usual minimum is three valves and a mains rectifier.

To achieve results with even this small number of valves the designers have to make use of the very latest "super-hot" multi-electrode types of valves, such as high-frequency pentodes. When we try to design an equivalent battery super-het we are up

By

The Experimenters

against the fact that we have no suitable valves available to make up a three-valver.

We have been thinking about this problem, and it has been impressed upon us that, while a four-valve battery super is quite feasible, and indeed this will be proved to you in no uncertain way before very long, a three-valve super seems out of the question—unless we are to abandon all efforts at real efficiency, or design a new type of valve.

Now we have come to the point of this week's article. For many weeks past we have been thinking about two-in-one valves, until we hardly dared look an honest-to-goodness triode in the face. We visualised our would-be three-valve super on the lines of an existing mains model, only with battery valves; thus we decided that the first valve would be a detector-oscillator, the second a highly efficient high-frequency pentode for the intermediate-frequency amplifier, and the third a high-slope triode detector coupled to a final valve—a power output. But that makes four valves.

Obviously two of these valves have to be combined. The first valve is already doing two jobs—detecting and oscillating. We could not possibly combine the intermediate-frequency stage and the detector stage. So that leaves us with no alternative but to combine the detector and the power valve.

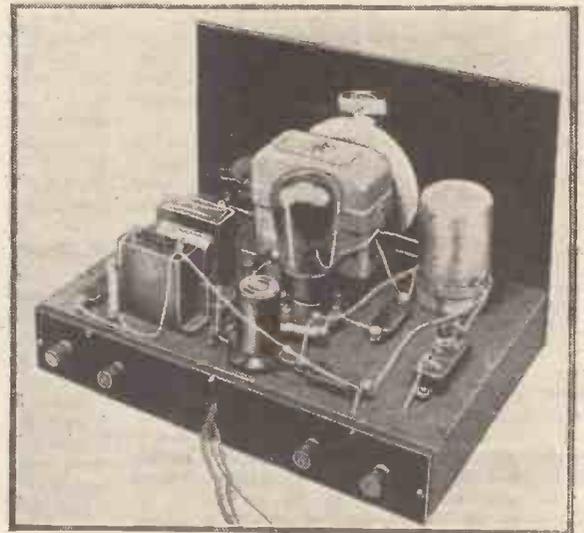
A revolutionary idea? Certainly, but is it so fantastic? Not when you think about it. After all, what about class-B valves? If you examine any typical class-B valve you will find that it consists of nothing more than two three-electrode valves mounted inside the same bulb with a common

filament but entirely separate grid and anode electrode assemblies.

This is the very two-in-one valve for our super-het job. If only we could make one of these three-electrode valves the detector, and the other the output valve, we have, in theory, anyway, the solution to the problem.

The construction of the desired two-in-one valve would not differ in any fundamental way from the normal class-B. We should still have, for example, a seven-pin valve-holder and the connections would be the same externally as for a class-B valve.

For our special job, though, we should want one-half of the valve to have a high-magnifica-



Our experimental set with the special two-in-one valve fitted in a seven-pin valve holder. With this valve the set is practically a two-valver, with detector and low-frequency amplifying stage.

tion factor, with a reasonably high impedance, say 20,000 ohms. The other half would have characteristics similar to any small power valve, say an impedance of 4,000 ohms and an amplification factor of 12 to 14.

Well, at this point we were, frankly, stuck. We had a good idea; how to put it into practice? The "ring" of valve manufacturers could not help us owing to regulations we need not go into here. Determined to get the idea tried out we approached a somewhat high-brow technical friend and, to our gratified surprise, he jumped at the chance of modifying an existing class-B valve to our specifications

Increased Detector Efficiency

Within a week he sent along two samples, and asked us to let him know what happened. He pointed out that as we were using a common filament of 2 ampere for the power valve and the detector the effect would be a great increase in the efficiency of the detector.

Imagine this valve with a .1 ampere filament, giving an amplification of, say, 20. Now with double the filament current up goes the amplification factor to well over 30—and without any overall increase in filament current, because we should, of course, need that 2 ampere anyhow. Actually you are getting a greatly increased detector efficiency without paying for it at all!

HEARING IS BELIEVING

To the Editor, "Amateur Wireless,"

SIR,—I dropped in on "The Experimenters" last evening for a chat. During our conversation I learned they had just finished testing a set which was at that moment reproducing.

I commented on the volume and clearness of tone, and was informed it was only a single-valve set; this I doubted, until I saw for myself and was allowed to manipulate.

I was able to tune-in with ease at least a dozen foreign stations; our English stations came through as well as on a three-valve set. In fact, I had to raise my voice to be heard while the set was working.

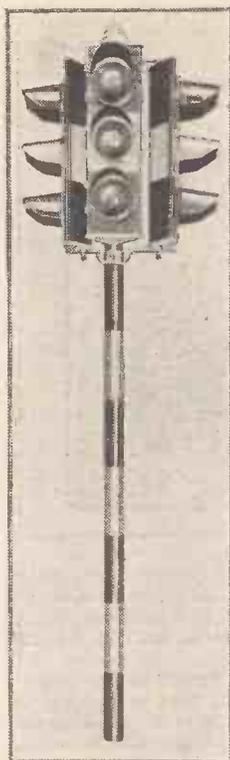
I was so impressed with the results of this set that I am taking this opportunity of writing to say that hearing is believing.

FRANK DAVENPORT

Letchworth.

Do Traffic Lights Cause Interference with Radio?

KENNETH ULLYETT deals with the vexed question of the interference which is thought to be caused by automatic traffic lights now being fitted at road crossings all over the country



A familiar sight at many street corners all over the country—but do these signs cause interference with radio?



One of the neon discharge tubes used in the timing circuit of a road traffic light of the Electromatic type

ated. A condenser is slowly charged up through a high resistance until the voltage reaches the critical striking point of a neon tube. The striking voltage causes the relay to operate, which controls the lights.

Unless precautions were taken, the condenser and neon-tube arrangement would constitute a powerful source of static and this would be aggravated by the contacts under each road strip, which causes the condenser to be temporarily "shorted" at the passage of each car, so lengthening the charging-up period.

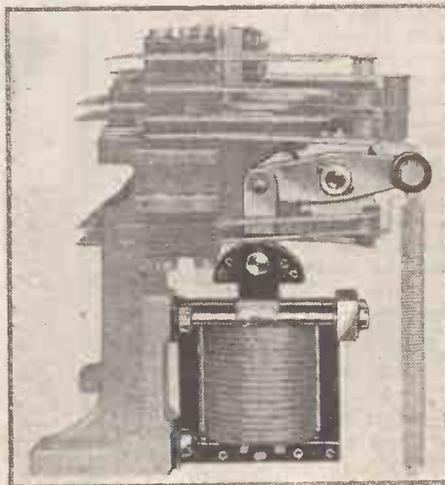
Only 12-volt Supply Used

As a precaution, only a 12-volt supply is switched by the road detector strips. Where local mains are A.C., the current is stepped down and then rectified, while with a D.C. supply the voltage is broken down by a resistance bank.

In either case the fact that only a 12-volt supply is switched by cars passing over the strips means that there can be no radio interference here; as a further precaution the leads under the road surface are shielded.

The condenser, resistance, and neon-tube apparatus, together with the mains rectifier for A.C., are fitted in a metal box, which acts as a radio screen.

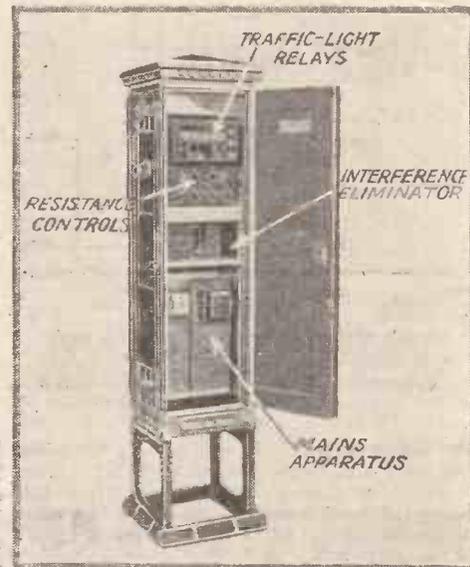
The solenoid circuit operates cam-controlled contacts, which switch the lighting supply for the traffic lights. This is of the ordinary local



A photograph of the end of the switch cam control shaft, showing the solenoid arrangement which opens and closes the switches. Arcing occurring at the switch contacts would cause radio interference unless eliminated

mains voltage and the total current switched for a traffic light change over is about 4 or 5 amperes. Another possibility of this switching causing radio interference is prevented by spark quenchers fitted in the controller box.

It has been found, after taking a number of tests, that the radio interference set up by traffic-light switches, even without special shielding, is not sufficient to upset average reception except, perhaps, in a congested area like Trafalgar Square, where, in any case, there is so much other traffic setting up radio



This lettered photograph of the control box of a traffic indicator shows where the interference eliminator kit is situated

MAN-MADE static is becoming so bad in crowded centres that every kind of flashing sign or intermittent electric contact comes under suspicion. The latest scare—after the Post Office engineers have found how to deal effectively with battery chargers and neon signs—is created by traffic light robots.

There are so many of these that there is a natural fear that the intermittent contacting for the red, amber, and green lights will be a source of wholesale radio interference.

Two Main Types of Light

Traffic lights in this country are of two main types: first, those which are operated on a fixed-time interval basis, generally by an electric clock-like movement; second, those of the Electromatic type, which are operated by an electric strip in the road.

The fixed-time lights are of the older type and one cannot be certain that they are all fitted even with a condenser bank across the contacts; moreover, as these are supplied by a number of manufacturers to traffic authorities in this country, there is no definite radio-interference standard.

The detector-operated type, however, are dealt with by only one organisation in this country and elaborate steps are taken to cut out any possible chance of man-made static.

The traffic-operated signs are mains oper-

interference that the occasional clicks caused by the traffic lights would pass unnoticed.

The shielding of the neon-tube discharge parts in the controller mechanism cuts out any direct radiation and the fact that the road switch leads and cables connecting up with the lanterns are shielded eliminates direct radio interference.

The real danger is that the switching impulses will be "reflected" back on the mains supply and so cause interference with mains-driven sets. Post Office engineers have found that more interference is caused by direct induction through the mains than any other way.

So spark-quencher circuits are fitted in the controller mechanism of the traffic lights, directly across the mains input supply.

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of the most readable features in radio journalism.

Then there is our guide to the chief broadcasting stations, brought up-to-date week by week; Jay Coote's notes on reception conditions and Continental developments; Kenneth Jowers' short-wave notes; and pointers about outstanding broadcasts.

But these are not all. We also give you a test of a commercial set; tests of new components; and the opportunity of getting the latest radio catalogues with the minimum of trouble.

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| 1,000 | 40 | 20,000 | 8 |
| 2,000 | 35 | 30,000 | 6.75 |
| 3,000 | 29 | 40,000 | 6 |
| 4,000 | 24 | 50,000 | 5.5 |
| 5,000 | 20.25 | 60,000 | 5 |
| 10,000 | 12 | 80,000 | 4.24 |
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| 100° F Temperature Rise | | | |
|-------------------------|------------|---------|------------|
| Ohms. | Milliamps. | Ohms. | Milliamps. |
| 1,000 | 80 | 20,000 | 16 |
| 2,000 | 70 | 30,000 | 13.5 |
| 3,000 | 58 | 40,000 | 12 |
| 4,000 | 48 | 50,000 | 11 |
| 5,000 | 40.5 | 60,000 | 10 |
| 10,000 | 24 | 80,000 | 8.48 |
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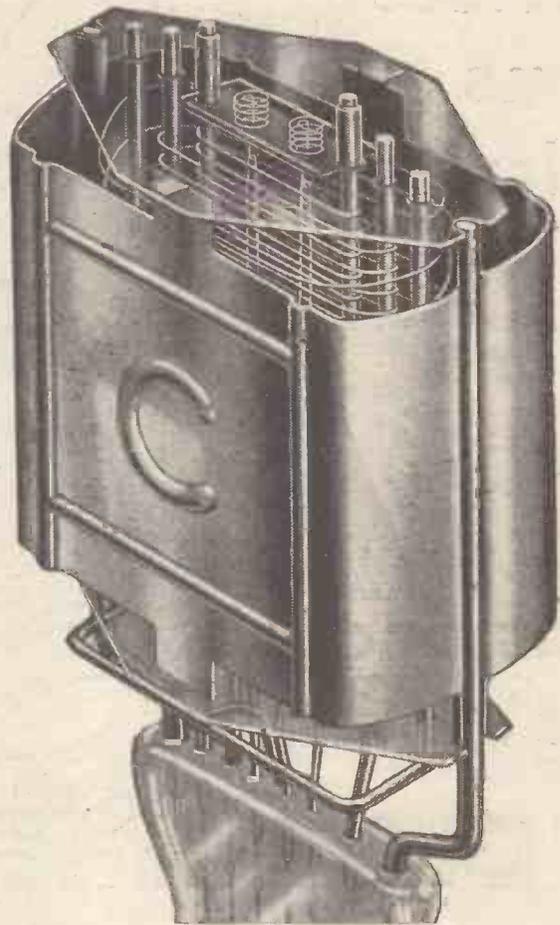
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On Your Wavelength!

Latest French Radio Scheme

M. EYNAC, Minister of Posts and Telegraphs, has just announced the latest details of the French broadcasting scheme. It's a big affair, the cost of which will run to the tidy little sum of about £10,000,000.

All this it is hoped to collect from licence fees, but if one may judge by the way in which the money has come in so far M. Eynac must be something of an optimist!

There are to be fifteen stations altogether with outputs between 60 and 120 kilowatts. This is a far more ambitious plan than that originally outlined by General Ferrie. It made provision for fourteen stations, a good many of which were to be rated at only 20 kilowatts.

Higher Power for Paris

ONLY one of the big stations is already at work. This is Radio Paris, which will be formally taken over by the Government very shortly. Radio Paris will be put up from 75 to 150 kilowatts.

Big PTT transmitters are building already at Nice, Toulouse and Marseilles and it is hoped to have several of them at work by this time next year.

Wasting Listeners' Money

WHAT strikes one about the scheme is that a good deal of money is apparently being wasted. In Paris there exist already two medium-wave high-powered stations, the Poste Parisien and Radio Vitus, the second of which has never yet lifted up its voice. Why not acquire one or both of these instead of building a complete new station?

The same kind of thing is going on at Toulouse, where our old friend the Midi transmitter, which is capable of the best part of 100 kilowatts, will have to come down to about 5 kilowatts, at Nice and in one or two other places.

In every instance the Government is building a new station and making no use of the existing one. A good many of the fine privately owned stations will have to reduce their power to something very small, for most of them must work upon common wavelengths.

Huizen Wheezin'

THOUGH, of course, we ought to pronounce it quite differently and probably do if we are afflicted with B.B.C. highbrowism, most of us are content to make Huizen rhyme with sneezin'. As no Britisher could probably pronounce the name quite correctly no matter how hard he tried, that's good enough for me, at any rate.

Poor Huizen has had a bad time lately owing to interference from a Russian station, which worked first of all about 3 or 4 kilocycles away from him and is now transmitting on exactly the same wavelength.

The result is a kind of ripply, wobbly background interference which you have probably noticed. Sometimes it is not bad enough to be offensive, but there are times when it is more than annoying. The best course is to go for Huizen when the Russian is not working.

A Test of Selectivity

A CORRESPONDENT goes for me because I said recently that Katowice was amongst the best of European transmissions.

"All rot," he says. "I haven't been able to

By Thermion

hear this station properly for months and months, for it is mixed up with the carriers of Söttens and Athlone."

Sorry, dear correspondent, but the reason why you cannot hear Katowice properly is that your set is not sufficiently selective. That's why you complain about Athlone and Söttens.

You are using a pretty old set, I notice, and one that never was renowned for its selectivity.

Selectivity and Quality

I HEAR a suggestion made in a well-informed quarter that some of this season's sets are rather sacrificing quality to selectivity. The need for selectivity is very great nowadays and it will become steadily more pronounced as the number of high-powered stations increases.

Not everyone realises that within a year from now every channel between 300 and 550 metres, with the exception of the few allotted to common-wave groups, will be occupied by a transmitter with a power of not less than 60 kilowatts. In most cases the output rating will be between 75 and 120 kilowatts.

Still, there is no reason why you shouldn't have both selectivity and good quality. The secret is *tone control*. Personally, I never build a set for my own use which does not incorporate tone control.

Tone Control is Worth While

WITH tone control of the right kind you can adjust the reproduction to suit your own ear exactly. The set can be made as selective as you like, but you can still have full brilliancy.

There is more in it than that. Certain foreign stations—notably the Dutch ones—rather emphasise the bass in the process of transmission. This is probably done to suit sets of the type commonly used by their listeners, but it does not go too well with receivers which are capable themselves of giving the bass its proper value.

With tone control you can effect an enormous improvement in your reception of the Dutch and several other European stations.

Then don't forget what happens in the "straight" set using reaction. As you tighten the coupling beyond a certain point you must

cause the bass frequencies to preponderate. Tone control helps you to set matters right.

Automatic Howler Control

TALKING about reaction, have you ever realised that class B may be described as something like automatic howler control?

Let us suppose that Ham-handed Henry and Oscillating Oswald tune by the squeal in order to get the last ounce out of their class-B sets. They may do; but they also get the last ounce out of their batteries.

When the class-B set is squealing the high-tension current runs up to giddy heights and stays there unless the reaction coupling is promptly loosened.

Hence the high-tension battery soon qualifies for the dustbin and Henry and Oswald are automatically fined the cost of a replacement!

Politics in Wireless

WE are, I observe, to have quite a number of political talks during the present season. I cannot say that the prospect fills me with excitement or that I am counting the minutes until the first one comes along.

Politics are all very well in their way, and that way, so far as broadcasting is concerned, should be in small doses. Let's hope that the B.B.C. will realise this and not go the way of the German stations, which have greatly detracted from the entertainment value of their programmes by cramming them stiff with political propaganda.

In any case, I suppose they will provide alternatives, and if they do I am pretty sure that no small proportion of listeners will flick over from National to Regional or vice-versa according to the circumstances.

Not Radio Cricket

WHAT I don't regard as playing the game is the broadcasting of political or other speeches from both National and Regional stations simultaneously. As I have previously pointed out, there is nobody able to receive the Nationals who cannot also tune in the Regionals and there is therefore simply no excuse for sending out the same item on both wavelengths from twin stations.

The B.B.C. attitude may be, "You have got to have it whether you like it or not." If this is so the authorities forget that most of us can turn to foreign stations as alternatives and those who cannot have at any rate an

HEAR THEM THIS WEEK Impressions by Slade



extraordinarily useful component in the on-and-off switch.

Tried America Lately?

THOUGH not everyone may believe it, American medium-wave stations have been coming in wonderfully well all through the past summer and at the present time half a dozen or so can be picked up at any time after midnight with a reasonably sensitive set.

The best stations are still those whose wavelengths lie between 200 and 300 metres, but those with longer wavelengths are improving rapidly. This is quite in accordance with the history of the last sunspot cycle, when the "optimum" wavelength for transatlantic reception moved steadily up from 200 to 250 and then to 300, 350 and 400 metres.

Your Thermion may prove to be a false prophet but he is rash enough to forecast that one of the best bands this winter for American reception will be that between about 320 and 450 metres.

Radio "Cops"

THE Brighton police are, I see, now provided with minute wireless receiving sets. As he makes his stately way over his beat Robert is constantly in touch with headquarters. If his chief has a message to send, the whine of a small buzzer warns the policeman that something of importance is coming through.

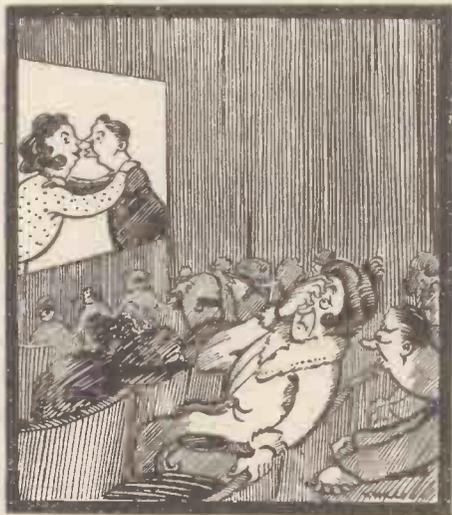
It is a magnificent idea, making for still greater efficiency in our splendid police force.

Wireless cannot do without copper and "coppers" cannot do without wireless.

The Children's Hour

IN the early days of wireless the Children's Hour was one of the most informal and delightful of broadcasts. I have been in the studio on several occasions when the original Uncles and Aunties were giving their show for the kiddies and I cannot imagine anything

Wireless Terms—



Slow-motion reaction

more spontaneous or more likely to appeal to their young listeners.

Do you remember the time when the youthful Thomas Jones of Swansea or Ian Mac-something-or-other of Auchtermuchtie was invited to look in the coal-scuttle for his birthday present?

This kind of thing came to an end owing to the growing numbers of "birthdays." Now the so newhat perfunctory greetings are restricted to members of the Radio Circles.

It is found, though, that Radio Circle

membership has grown to such huge proportions that the greetings occupy too much time. They are to go and we shall miss in future the musical honours of "Hullo, Twins," and the still more elaborate greetings to triplets. A pity, I think, but I suppose that it cannot be helped.

Crystals Again

WHEN I wrote recently that crystal sets were not being made nowadays I had forgotten for the moment one large body of listeners to whom they are amongst the greatest of boons.

Crystal sets are provided by the Wireless for the Blind Fund for blind people who live within short range of main broadcasting stations.

My good friends the Burne-Jones people write to tell me that in the last year or two they have manufactured over 8,000 of these receivers.

The crystal, then, is emphatically not dead, as a good many of us thought that it was. More power to its elbow, for it has been a good old friend.

A Queer Experiment

TALKING of crystals reminds me of a rather odd experiment that I carried out recently. My home is barely fifteen miles from Brookmans Park as the wave waggles and the field strength of the London Regional and National stations is something pretty big.

It seemed to me that reception might be possible even if most of the parts generally used in the simplest sets were left out. To try out the idea I connected a crystal detector direct to the down lead of an indoor aerial and a pair of telephones between the unoccupied detector terminal and earth.

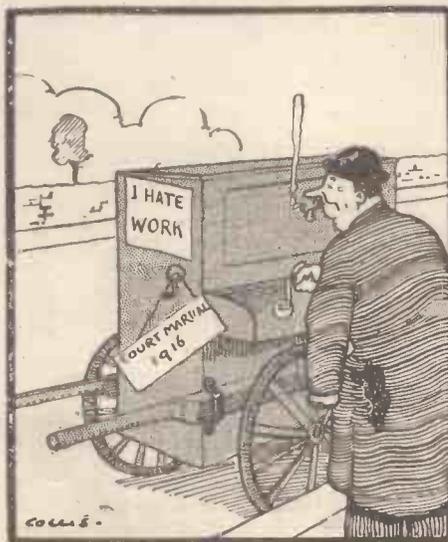
The result was quite good reception, provided that only one station was working at the time. If both were working you heard the two at once.

You might have thought that receiving apparatus could not be simplified beyond that point. I remember, though, that in the early days of 2LO a member of a firm whose offices were within a couple of hundred yards of the transmitting aerial found that he could hear the programmes by putting on a pair of headphones and touching one of the leads against an iron mantelpiece in his room.

A Licence Teaser

THE same thing could probably be done now in houses close to Ercokmans Park. What I want to know is whether the fellow who receives the London programmes with

—Travestied



Easy to tune

nothing more than a pair of 'phones and an iron mantelpiece (or a bedstead for that matter!) could be liable to take out a receiving licence. He is certainly hearing the programmes, but has he a receiving set "within the meaning of the Act"?

Experiments with Pentagrids

I HAVE been playing around with pentagrids quite a lot lately. The results have been quite interesting, but I have not been able to obtain more conversion gain out of a pentagrid than I can out of a really good fixed-bias (square law) detector and a separate oscillator.

The square law detector has been very much neglected because it only operates satisfactorily if the oscillator voltage is practically constant. Since most oscillators are by no means constant many people scrap the circuit as of no use. I have tried taking a little more trouble with the oscillator with considerable success.

A pentagrid actually works on quite a different principle since there is no rectification taking place. With the ordinary frequency-changer rectification is essential if the intermediate-frequency beats are to be obtained, but with the pentagrid the whole process is an actual modulation of the current.

I have never seen this stressed in the articles on the subject and it strikes me as rather an important difference.

"Humbucking" for Pick-ups

HUMBUCKING coils on loud-speaker have been in force for some time now and have distinctly cut down the amount of hum which is induced by the field winding into the speech coil.

It is rather interesting to note that this principle has now been applied to pick-ups. A friend of mine who is on D.C. mains has had the greatest difficulty in obtaining freedom from hum on his gramophone pick-up, particularly if the pick-up is at all of a high impedance.

The new Marconiphone pick-up is provided with a humbucking coil actually included inside. I am not quite clear as to the internal connections, but there are only the customary two connections from the pick-up itself.

Whatever the arrangement, it is very effective for my friend tells me that he can now have the pick-up full out without any damping resistance across it and the hum is quite negligible. Exit another bugbear!

Cathode Rays and Electrons

A CORRESPONDENT wants to know whether there is any real difference between a cathode ray and an electron stream. So far as I know, the term cathode ray was first used by Goldstein in 1876—long before the discovery of the thermionic valve and of the electron as we know it now. In these days, and, in fact, even with the later Crookes tube, the actual discharge passing through the tube was rather a mixed affair, owing to the presence of free gas molecules and secondary ionisation, but the modern cathode-ray tube, as used for television, produces what is practically a pure electron stream.

As a matter of fact, the so-called cathode-ray tube and the thermionic valve are gradually becoming as a like as two peas, so far as essentials are concerned. Both contain a cathode, one or more grids, and an anode, and both generate and control the passage of electrons. I don't suppose it really matters much whether we call the discharge a cathode ray or an electron stream, except that it is rather confusing to those who do not understand that they both mean one and the same thing.

The first is the older term, and may have some claim to priority on this ground, but the second is certainly the more correct in the light of our present knowledge.



The Receiver and Amplifier for Television

Successful reception of television signals is just as easy as broadcast reception, but for best results the set must have certain features which are explained in this article

THE first questions that anyone who contemplates going in for television reception asks is, "What sort of receiver shall I need and will it be costly?" In order to give a reply let us see what the actual requirements for the reception of television are. We can assume that everybody who intends taking up television is already in possession of a broadcast receiver, so we can leave the reception of the sound side of the programmes out of our calculations.

Separate Receiver and Amplifier

Our real requirements, then, are a receiver capable of picking up the vision signals and an amplifier of a sufficiently powerful type to provide an output which will be capable of modulating the light and operating the synchronising arrangements of the motor. We can regard this apparatus as a complete combination of receiver and amplifier, or we can regard it as two entirely separate units and it is in this latter way that it is proposed to deal with it here as it is thought that many readers will already have a receiver in their possession which although not ideal for the purpose will serve for the time.

The principal consideration, therefore, is the amplifier, though before dealing with this it will be as well to indicate what characteristics the receiver should possess if the best results are to be obtained. A

fair degree of selectivity is desirable, otherwise there will be distortion of the picture due to interference from foreigners. On the other hand, we require the higher frequencies as these constitute a large proportion of the television signals, so the selectivity must not be such that the high frequencies are cut. Care has to be taken that distortion is not introduced in any part of the receiver, so on this account it is not wise to use reaction. Band-pass tuning will be found suitable in that it will give

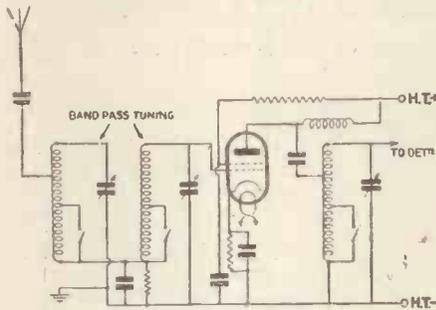


Fig. 1.—Band-pass tuning will give the right amount of selectivity for the reception of television signals. This diagram shows a successful aerial tuning circuit

Receiver Design

Two basic circuits are given by Figs. 1 and 2, the first showing the tuning arrangements and the H.F. stage, and the second the combined H.F. and detector stages with power anode-bend rectification.

At a later date it is proposed to give a suitable specification for a

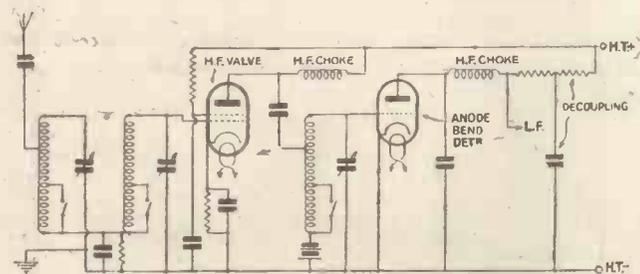


Fig. 2.—Power anode-bend rectification is the best type to employ in the detector stage and this diagram shows a suitable combination of high-frequency and detector stages

vision receiver which can be used in conjunction with the amplifier with which we are more particularly concerned at the present time.

An R.C. Amplifier

The basic circuit of the amplifier is given by Fig. 3 and it will be seen that three stages of resistance-capacity amplification are used to give the necessary modulation to the Kerr cell. Additionally, there is current to supply to the motor synchroniser,

but this comes from an extra valve which is not shown in the diagram.

The number of valves in the entire sequence must be such as to give positive modulation to the Kerr cell, otherwise our pictures would be reversed and we should be getting black in place of white and vice versa.

In a vision receiver we must have greater fidelity of reproduction than need be the case in a sound receiver, because the eye is not so accommodating as the ear in the matter of faults.

Distortion and over-accentuation of certain frequencies which would probably pass unnoticed even by the trained ear would be at once patent to the eye, so on this account we must strive for the greatest degree of purity attainable.

These considerations impose certain restrictions in the design of the amplifier and compel us to use some system of amplification which will be distortionless; also, we must be satisfied with a low stage gain. The obvious solution is resistance-capacity amplification, as it is easier to get a good frequency response characteristic with this system than with transformer coupling.

Compared with the voltages used in ordinary broadcast receivers, those in a

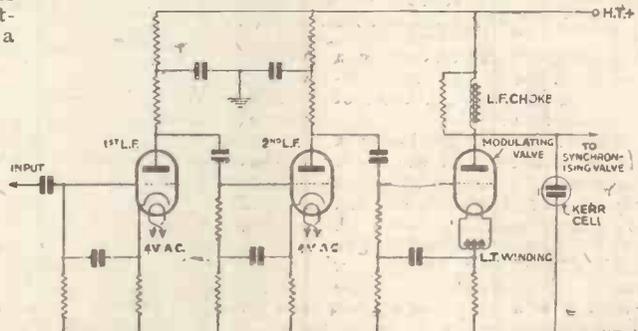
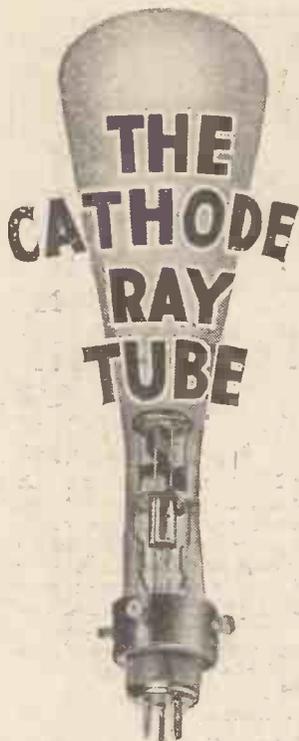


Fig. 3.—The amplifier is a simple resistance-capacity coupled type which will give an even frequency response so necessary in the handling of television signals

television set may appear somewhat high, as a desirable figure for the modulation of the Kerr cell is 500 volts, and it is best, therefore, to employ this voltage throughout the amplifier as this allows plenty of scope for decoupling and the use of high-voltage output valves which will deliver adequate modulation to the light cell without any danger of overloading.

In addition to the power for the Kerr cell, current must be provided for the

Continued on page 578



How the Beam Is Deflected

Last week an explanation was given of the various uses of the cathode-ray tube and it was shown that the principal feature in its operation was the deflection of the beam in order to form designs and pictures. This article describes the means adopted for controlling the beam and is preliminary to the practical construction of simple apparatus for cathode-ray television

switching on, the condenser is charged from the H.T. at a rate depending on the value of the series resistance and its own capacity. When, however, the voltage across the condenser has

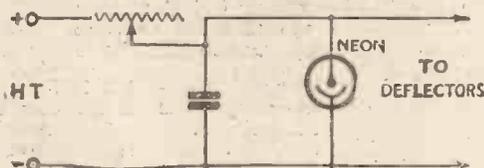


Fig. 1. Simple form of time base using neon lamp

rises to the "striking" voltage of the neon, the lamp will light and the condenser will immediately discharge through it. The condenser voltage will then fall until the "extinguishing" voltage of the neon is reached, when the lamp will go out and the condenser will re-charge. This cycle of charging and discharging will be repeated regularly at a rate which can be varied from 1 to about 500 per second by altering the series resistance. The curve of charging voltage of this arrangement is shown in Fig. 2, and it will be seen that between the limits of striking and extinguishing the voltage variation is approximately

has two drawbacks; the difference between the striking and extinguishing voltages of a neon lamp is very slight (20-30), and secondly, even over this short range the curve of condenser voltage is not absolutely straight. This means that the waves will appear bunched up at one end of the screen, apart from the fact that the beam will only travel a short distance before flying back. The non-

rate of movement of the beam, but we still have the handicap of limited travel, and this is

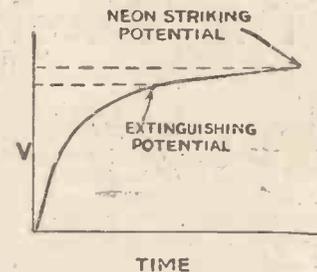


Fig. 2. Curve showing the striking and extinguishing potentials of the neon

WE saw last week that in order to observe a wave form on the screen of the tube, the beam must be made to traverse the screen in a horizontal plane at a uniform speed. The application of an A.C. voltage to the vertical

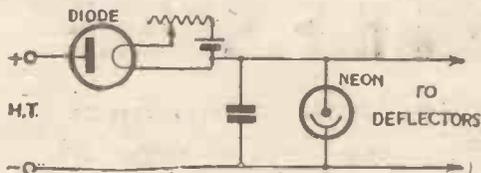


Fig. 3. In this circuit the resistance in Fig. 1 is replaced with a diode valve to make the voltage characteristic more uniform

deflectors will then result in a picture of the variation of voltage with time—i.e., a trace of the wave-form.

The circuit for producing a "time" deflection of the beam is shown in its simplest form in Fig. 1, and is usually referred to as the "blinking neon." A small condenser is connected to the H.T. supply through a variable high resistance, while across it is a neon lamp. On

variation is approximately

If, now, the horizontal pair of plates of the tube be connected across the neon lamp, the beam will be deflected across the screen uniformly as the charging voltage rises. When the lamp strikes, the beam will fly back almost instantaneously to its original position, and will then perform the journey again. The A.C. voltage on the vertical

linearity of the curve can easily be remedied by replacing the resistance with a diode (Fig. 3), which is saturated under normal conditions. The essential feature of a saturated diode is, of course, that the current remains constant over a wide range of anode voltage. This means that the charging current will not vary with alteration of condenser voltage, and that the condenser will charge at a perfectly uniform rate. The speed at which the condenser charges will depend on the internal impedance of the diode, and to vary this a resistance is inserted in the filament circuit.

where the thyatron is of use.

Before leaving the diode question, it might be noted that any valve of constant current characteristics may be successfully used as a series resistance—e.g., a screen-grid or a pentode. Speed control in this case would be effected by altering the grid bias.

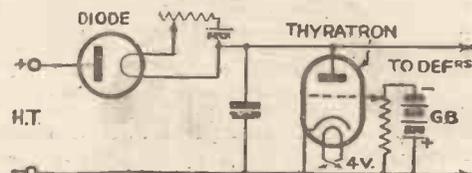


Fig. 4. A further improvement. The neon is replaced by a thyatron

The substitution of a diode for a plain variable resistance will thus give a more uniform

The properties of the thyatron have already been described Continued on page 578

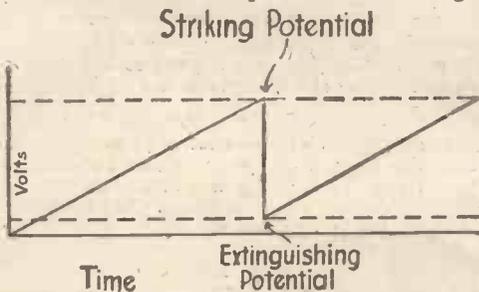


Fig. 5. Typical saw-tooth wave form produced by charging through a diode

deflectors will thus be "drawn out" on every horizontal swing of the beam, and if the speed of traverse is the same (or a multiple) as that of the supply under test the wave form will appear as a stationary line.

The simple circuit of Fig. 1

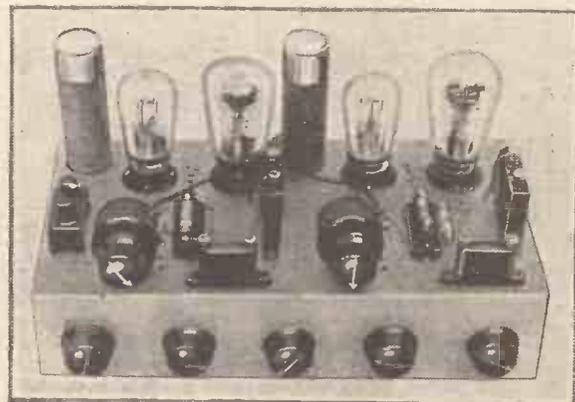
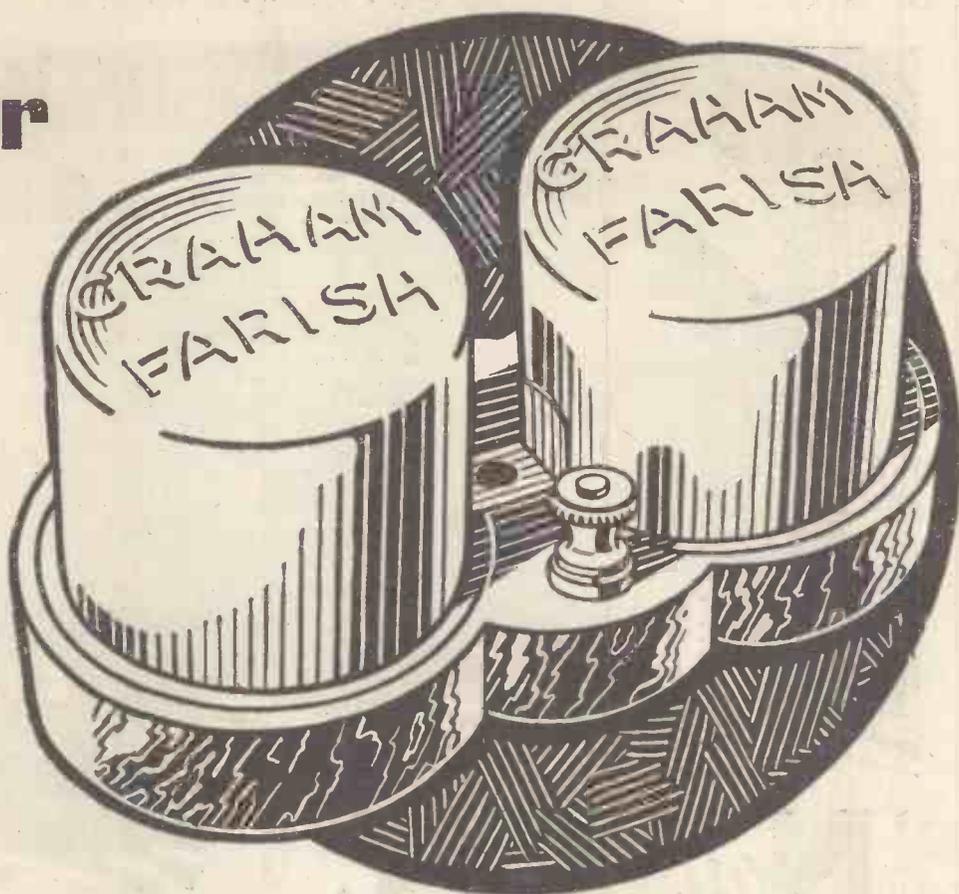


Fig. 6. The apparatus required for use in conjunction with a cathode ray tube is simple, as this photograph of a double time base for television scanning shows. It comprises two diode and thyatron combinations assembled on a metal chassis. The knobs control speed of beam in both vertical and horizontal planes and also the length of their travel

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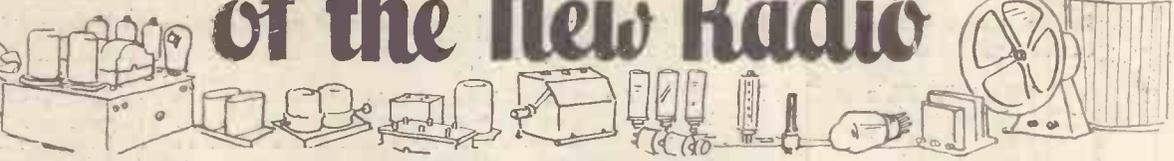
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The Beginners' How & Why of the New Radio



A Tabloid Radio Course IN 100 PARAGRAPHS

"I WONDER," mused Peter, "whether I can get any more information out of this old set?"

"Why not ask me and see?" came the reply. "Anyhow, I'm not old."

Peter apologised. "I did not know you were listening. Anyhow, how do you manage to speak to me?"

AIR WAVES

"I can produce air waves," answered the set, "just as easily as you can. What are air waves, did you say? Just expansions and contractions in the air. Imagine a boy with



"Imagine a boy with a pop-gun. He compresses the air until the pressure blows the cork out of the end"

a pop-gun. He compresses the air until the pressure blows the cork out of the end. The released air travels outwards in a wave, pushing all the other particles of air in the neighbourhood out of the way.

HEARING

"What does that do? If a wave like this reaches your ear it comes up against the eardrum and creates a pressure which is transmitted by nerves to your brain. This produces the sensation of sound in the shape of a sharp pop. The nearer we are to the pop-

gun the stronger will be the pressure of the air wave and the louder will be the sound.

MUSIC

"What about music? A musical note is made up of a regular succession of air waves, each of which produces a sort of small pop. If you spin a bicycle wheel and hold a card lightly against the spokes you will hear a musical hum, made by a succession of little clicks following one another very rapidly.

PITCH

"As the bicycle wheel slows down the pitch of the note drops. It becomes lower in tone until finally it ceases to become a note at all and breaks up into separate clicks. High notes are produced by rapid vibrations and low notes by slow ones. Music may consist of a succession of simple notes which gives us an air, or there may be a number of notes played together which will produce harmony if the frequencies or rates of vibration are suitably related to one another.

SPEECH

"Speech is very similar, except that the air waves are much less regular. If you sing a note you get the regular sequence, but consonants (such as p, t, d, and so on) produce small explosions which are not repeated. Every sound, however, gives a characteristic air wave, and speech is a mixture of all sorts and conditions of air waves, some regular, but most of them transient (that is, non repeating)."

MICROPHONES

"I want to know how you get the sound over the wireless?" said Peter.

"Let us start at the beginning," replied the set. "The first link in the chain is the microphone. Suppose you ask that telephone over there to tell you something about it."

At which the telephone took up the tale with a bow. "I contain a microphone," it wheezed, "which is rather like an electrical bellows. If you squeeze it the current inside it alters.

Here is the second instalment of something different and live in radio instruction, specially prepared by J. H. REYNER, B.Sc., A.M.I.E.E. This week he deals with sound and explains how it is captured at the transmitter and reproduced at the receiver. Mr. Reyner has hit on the happy idea of making the component parts of a typical radio set speak for themselves and explain their functions

"Air waves which reach my microphone produce tiny pressures sufficient to alter the current through me. The air waves which you produce when you speak to me are turned into exactly similar electric currents. A sudden explosion like a p or t sound will produce a large momentary electric current and, in fact, the current will be very nearly an exact copy of the air wave. Music, of course, is just the same.

AMPLIFIERS

"Oh, yes, the currents are quite small, but that does not worry us, because we can strengthen or amplify them until they are quite large. Yet they will still vary in just the same manner as the original speech waves, if sufficient care is taken in the process."

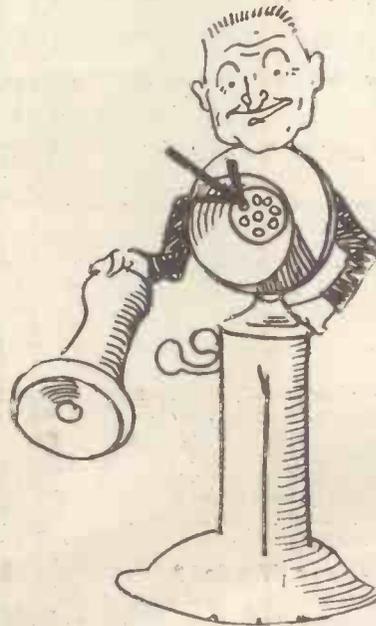
TELEPHONY

"Really," said Peter, "that is very interesting. What happens to these currents?"

"In my case," replied the telephone, "I send them through a wire to the exchange, whence they are directed to another telephone, where they pass through a receiver." The telephone held out its arm with the receiver on the end.

"This contains an electromagnet, which attracts a steel diaphragm and causes it to vibrate just in the same manner as the current itself. The vibrations of the diaphragm set up air waves; these travel into the ear and reproduce the speech which was originally picked up by the microphone."

Continued on page 558



The telephone held out its arm with the receiver on the end. "This contains an electromagnet, which attracts a steel diaphragm . . ."

WHAT'S NEW IN THE NEW

Radio time really begins when summer time | hundreds of people take an interest in radio for | the "Amat
comes to an end and at this period of the year | the first time. In these questions and answers | explains the

What Is This A.V.C.?

THE initials stand for "automatic volume control." That gives some idea of what the system is all about. What, you are going to ask, is *automatic* about the system?

detection with one anode, the other anode rectifying the current to provide the A.V.C. action, and the pentode part of the valve to amplify the output of the detector.

For really effective high-frequency amplification the high-frequency pentode was introduced.

What Is a High-frequency Pentode?

It is really a screen-grid valve, with an additional grid called the *suppressor* grid. This type of valve has a very high amplification factor and when used with highly efficient iron-cored coils you get a big increase in amplification.

These valves are supplied with five- and seven-pin bases. With a five-pin base you can easily replace a screen-grid valve with a high-frequency pentode, the only alteration needed being the value of the grid-bias resistance.

an existing set having a screen-grid valve you connect as follows: the filament, control grid and anode are connected as before but the additional suppressor grid goes to earth as a rule; sometimes an improvement is obtained by taking the grid to a small bias battery, of from 6 to 12 volts.

These valves give very great amplification but it is essential to use really efficient coils, such as iron-core coils.

What Are Iron-core Coils?

These coils are just the same as any other coils in their application. That is to say you can use an iron-core coil wherever an air-core coil is at present used. But there the similarity ends.

Iron-core coils, as their name denotes, have a central core of iron—but not just ordinary iron; it is a special compound of minute particles of iron, bonded together under pressure, the constituent particles being isolated



Matching coils is now a highly developed technique. Typical tests in the new Cossor works

Simply this: when the signal strength goes down the amplification goes up; and when the signal goes up the amplification goes down.

The output volume for a given setting of the manual or normal volume control therefore remains constant, or practically so. This, you will appreciate, is a great boon when listening to foreigners.

All stations, apart from the locals, tend to fade at night—tend to wax and wane in strength. Normally this means that the volume varies very considerably, and the programmes value is severely reduced.

How Does A.V.C. Work?

By controlling the high-frequency amplification. You know that the high-frequency current of the detector valve varies according to the strength of the signal? Very well, then. We feed back a portion of this current, which develops a voltage across a resistance.

This voltage is the bias voltage of the screen-grid valves. You also know that the amplification of a screen-grid valve depends on its bias. We arrange matters so that a strong signal biases the high-frequency valves for small amplification, and weak signals affect the bias so that the amplification is at a maximum.

Between these limits of strong and weak signals the bias is varied so that the amplification controls the volume in such a way that a perfectly level output volume is obtained from the loud-speaker.

Are Special Valves Needed?

Most systems of A.V.C. that really work depend on the use of special or highly efficient valves. For example the double-diode pentode valve is often used. This provides half-wave

Are These Valves for Mains Only?

Practically, but there is one exception, the Osram and Marconi VP21, which has a seven-pin base. The connections are quite simple, really. If you want to use such a valve in



WASHINGTON UP-TO-DATE

IRATE FATHER: What have you been doing with my unbreakable valve, George?

GEORGE: I cannot tell a lie—I used it as a hammer!



This X-ray photograph of a Catkin screen-grid type shows the construction of this unbreakable valve

V RADIO

our Wireless" Technical Staff latest trends in radio technique

from one another by the insulating material.

The effect of the iron is to increase the inductance, which means that for a given inductance less wire is needed, and so the high-frequency losses, which bear a relation to the number of turns, is decreased.

When the high-frequency losses are decreased the coil's efficiency goes up, and the

Sets to Build!

No beginner worth his salt will long be satisfied with purely theoretical explanations of how radio works—he will want to turn his hand to practical affairs.

Two recent AMATEUR WIRELESS sets, although they are up-to-the-minute in every respect, are well within the capabilities of the beginner and can be constructed at home without difficulty. Full details will be found in the two preceding issues.

result is that an iron-core coil is more selective and often gives better sensitivity than an ordinary coil.

You can obtain these coils in single units, or assembled in packs for three circuit tuning.

How Else Can the Set be Improved?

In many ways! For example, there is the low-frequency side of the set. Many improvements have been made. Parallel-fed transformers and special alloy transformers have been followed by Q.P.P. and class B.

What is the Advantage of Class B?

That whatever volume you may be taking from the set, the anode current adjusts itself accordingly. During intervals in the programme, or during reception of weak signals, there is only a very small anode current in the output stage.

The strong signal takes much more anode current with class B than a weak signal, but this peaking of current is quite reasonable, as the overall current, taking into account the low current value with weak signals, is surprisingly moderate.

Class-B valves are available in all well-known makes, but only for 2-volt accumulators. Most of them work with zero grid bias and need a step-down transformer preceding them.

Two exceptions are the Marconi and Osram in one type and the Mazda in another type.

The Marconi type takes a bias of about 3 to 6 volts, and needs a step-up transformer. The Mazda valve retains the step-down transformer, but takes a negative bias of .5 volt.

Any Other High-tension Economisers?

Yes, the Westector unit enables the average high-tension current from the battery to be reduced very considerably when using ordinary valves. Thus it is now possible to conserve the anode current of an ordinary power valve without going to the use of a class-B valve output stage.

This system really is worth attention. It is a system that will come into great favour among good designs of the future.

The idea is quite simple. As you know, the more negative bias you put on a power valve the less is the anode current. With weak signals only a small anode current variation is needed to avoid distortion, and so the standing current can be small.

We thus arrange to overbias the power valve so that for weak signals the anode current is really small. Then, when a strong signal comes in, and we want a much bigger standing current in order to produce distortionless amplification with large current variations, the bias is automatically decreased by the use of a Westector unit.



A central feature of the design of this H.M.V. Concert Seven super-het is an electric clock, which is ingeniously fitted into the loud-speaker fret

How Does This Unit Work?

For a start, remember that the unit concerned is a half-wave rectifier. It is placed in the anode circuit, and part of the output current is rectified across it. The direct current obtained is passed through a resistance, and across this resistance develops a voltage.

This voltage is in opposition to the bias voltage. The more current that is passed through the more is the opposition voltage, and so the less is the actual bias on the valve. Thus for big signals the bias is reduced and the current is increased, which gives the required condition for distortionless reproduction.

At all other-times, though, the bias is con-



S. Wilding Cole, managing director of Kolster Brandes, initiates Miss Gertrude Lawrence, the famous actress, into the mysteries and joys of the latest K.B. super-het, fitted with the Rejectostatic device to cut out the crackles

siderable and so the current is conserved. The average effect is an appreciable reduction of the anode current.

It is not essential to use a Westector, as a valve would do, but it certainly seems easiest to make use of the Westector, which takes no anode or filament current of its own.

Have Westectors Other Uses?

Oh, certainly. There are, in fact, four distinct types of Westector, two half-wave and two full-wave. The half-wave types are for simple half-wave rectification and automatic volume control, as well as for the battery economy already mentioned.

The full-wave type is for full-wave detection, in super-hets especially, and for automatic volume control of the more advanced systems.

A full-wave Westector is the last word for large super-hets, as it will, in the second-detector position, handle a very large input without any distortion, and, of course, there is no sign of microphonic noises.

These Westector units are valves in the true sense of the word. They do not in any way amplify, and must be used with valves for effective work. By the way, Westectors are by no means the only unbreakable valves. There are the well-known Catkin group to remember.

What Are Catkins?

A specially developed type of robust valve brought out recently by Marconi and Osram. They are nearly unbreakable, because there is no glass bulb.

The vacuum is made inside the metal shell forming the anode. The electrode system is mounted on a glass foot or base, but apart from that there is nothing likely to be damaged, even by deliberate rough handling.

Continued on page 581

A Tabloid Radio Course—Continued from page 555

CARRIER WAVE

"What happens in broadcasting?" persisted Peter.

"Perhaps I had better tell you," resumed the set. "The process is similar, but we have no wire. Instead, we use a very rapid oscillation—a current rushing backwards and forwards so rapidly that it is quite unable to make any impression on our ordinary senses. Its principal use is to produce wireless waves, as we told you last week.



"Hello," came a muffled voice from inside the set. "I am the detector valve . . . I record all the variations in the strength"

"To transmit the telephony we vary the strength of this oscillating current to correspond with the current picked up by the microphone. We call the very high-frequency current the *carrier*, and the wireless wave radiated by the transmitter is the *carrier wave*, for obvious reasons.

MODULATION

"Consequently, the strength of the ordinary wireless wave varies from instant to instant. A musical note corresponding to middle C on the piano is produced by 256 vibrations per second. To transmit such a note by wireless we should make the carrier wave vary in strength from a maximum to a minimum 256 times every second. If the note was a strong one, the change in the value of the carrier wave would be large, whereas if it were a weak one the variation in strength would be small. With no modulation the carrier wave is constant and produces no effect because we cannot hear it.

DETECTION

"At the receiver we pick up these wireless waves, tune them in, and then extract the modulation. I think I shall let the detector tell you about this."

"Hello," came a muffled voice from inside the set. "I am the detector valve. High-frequency carrier currents pass straight through me, but I record all the variations in the strength. I pass these on to my friend, the output valve, who uses them for the loud-speaker. So, you see, if I receive a wave modulated in strength 256 times a second I pass on to the output valve a vibration of 256 cycles and I pour the high-frequency carrier wave down the drain.

CYCLES

"What do I mean by cycles? Vibrations per second, my dear sir. A 1,000-cycle note is one having 1,000 vibrations per second. We call this the frequency of the note. What frequency do I deal with? Well, it varies. In ordinary speech the frequencies run from about 100 to 2,000 cycles per second. In music they run from 50 to 5,000 or more. Vibrations within this range are usually called *audio frequencies*, because they correspond to vibrations which are audible.

AUDIO FREQUENCIES

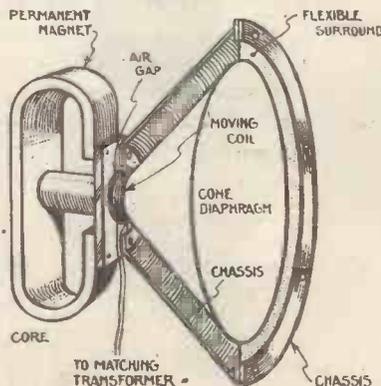
"What is the highest audible frequency? That depends on the hearer. Many people can hear up to 12,000 or 15,000 cycles. Others cannot hear 8,000. The squeak of a bat is about 10,000 cycles and is bordering on the limit. Young people can usually hear higher frequencies than old ones, while there are many people who can understand speech quite easily and are deaf to all frequencies above a few thousand vibrations per second.

"Pardon? What about the other end of the scale? Well, the 16-ft. pipe of an organ, which is the really boomy note which makes you all quaky, gives out 32 vibrations per second. The B.B.C. tuning note has a frequency of 1,000 cycles. Good-bye; good-bye! See you again."

REPRODUCTION

"Well," said Peter, "as I see it you generate electric currents corresponding to the speech at the transmitter, send them on the back of a wireless wave to the receiver, and unsaddle them at the detector. Where do we go now?"

"To the reproducer," replied the set. "It can be an ordinary pair of telephones, as used for ordinary telephony. The audio-frequency currents go through the telephone earpiece and cause the diaphragm to vibrate. This produces air waves, which affect your ear drum in the ordinary way.



Typical moving-coil loud-speaker assembly, showing principle of operation

LOUD-SPEAKERS

"Usually to-day we use a loud-speaker, and I shall let Mr. Loud-speaker tell you all about it."

"Ha!" said a gruff voice, "so I'm going to get a look in, am I? Well, I am built like a telephone receiver. I have a diaphragm which is made to vibrate by the electric

current. My diaphragm, however, is large, and I can produce quite a considerable air wave, which you can hear a good many feet away. If I receive currents vibrating at 1,000 cycles I shall wobble my diaphragm 1,000 times a second, and you will hear a musical note when the air waves reach your ears.

CONES

"What is my diaphragm like? It is made in the form of a cone and is constructed of special paper. The paper must be stiff, so that it can vibrate strongly without flopping all over the place. On the other hand, it must not be crackly or if it has to move suddenly it will produce crackling noises which ought not to be there. You would not hear these as crackling noises, but the music would sound shrill.

"It is most important that my diaphragm should be constructed of exactly the right kind of paper and that the cone should be of the correct shape. This makes quite a big difference to the quality.

QUALITY

"Quality? That is a term we use to denote the relative naturalness of the reproduction. If the air waves which I produce are to sound just like those in the original studio, I must be able to vibrate in exactly the right manner at all times. If I can do this you say that the quality is good and that the reproduction is true and faithful. Unfortunately, I am often not given a chance. I am fed with too much current or the wrong sort of current so that I have to produce all sorts of air waves which were not in the original music at all."

CUT-OFF

"But," asked Peter, "can you really vibrate at any frequency you like?"

"Alas, no," said the loud-speaker. "I am not as quick as I should like to be. I can vibrate several thousand times a second, but I find it very difficult to get up to 4,000 and 5,000 cycles. Some of my friends can do it, and more, but I am afraid that I can't. You might say that I cut off at 4,000 cycles.

"Just the same in the bass. My diaphragm ought to allow me $\frac{1}{4}$ in. or more to shift the air necessary to produce very slow air waves. I can't, unfortunately, so that I cut off in the bass as well.

BASS AND TREBLE

"Bass? No, kind sir, not a drink! Bass (pronounced *base*) means the lower notes in the musical scale. The upper notes are called treble. What's that: how does one reproduce bass? By using a special type of cone.

MOVING-COIL LOUD-SPEAKERS

"This cone is not fixed in the middle, but is free to vibrate. It carries a small coil, which moves in between two magnets. When speech currents are passed round the coil, it vibrates and makes the cone vibrate as well. Since the cone is quite free, it can move quite a distance and produces low-frequency air waves more easily. This form of loud-speaker, called the moving-coil type, is used in many sets to-day."

Peter looked at his watch. "Well, he said, "I must think it all over. Thanks very much."

"You're welcome," said the set, "a river-derci, auf wiedersehen, hasta la . . ."

But Peter had switched off. [To be continued

IDEAL SELECTIVITY *meant*

LISSEN IRON CORE COILS



TO THE DESIGNERS OF THE 'IDEAL' FOUR

"Amateur Wireless" set out to obtain "ideal" selectivity in this new circuit, and "after weeks of careful experiment," to use their own words, they decided upon Lissen Iron-cored Coils as the ideal medium for building up the three-tuned circuit filter of the set.

These new Lissen Iron-cored Coils have lower losses than any previously produced coils. They are particularly efficient in triple-gang, being matched to dead accuracy. Shielding is complete, with metal can and metal base supplied. Even the terminals are within the screens. Complete with wave-change and filament switches inbuilt.

Triple Gang of Lissen Iron-cored Coils as specified for the "Ideal 4." PRICE

12⁶/₁₀₀ EACH COIL

LISSEN IRON-CORE COILS
CAN BE USED TO REPLACE
ALMOST ANY ORDINARY
COIL ASSEMBLY AND GIVE
INCREASED SELECTIVITY

LISSEN

IRON CORE COILS

Please Mention "A.W." When Corresponding with Advertisers

WHAT TO SEE AT THE MANCHESTER SHOW

About the Tenth Northern National Radio Exhibition :: Sept. 27 to Oct. 7

We have had the pleasure of meeting thousands of our South of England and Scots readers at the London and Glasgow radio shows. Now every Northern reader is assured of a warm welcome at our stand (No. 76 in the Main Hall) at the Manchester Radio Show, which is held at City Hall, Deansgate, from Wednesday, September 27, to Saturday, October 7

MANY of our northern readers will be visiting the Tenth Northern National Radio Exhibition, which will be more or less a repeat performance of the recent Radiolympia and Scottish National exhibitions; that is to say most of the prominent radio firms of the country will be showing all their latest developments.

Well, it has been a wonderful year in radio, and everyone who visits the show can be certain of a highly illuminating experience.

All we can hope to do in this brief space is to give you some of the "high lights" that must not be missed. Go to the show yourself and see all the things we have not the space to mention, much as we should like to.

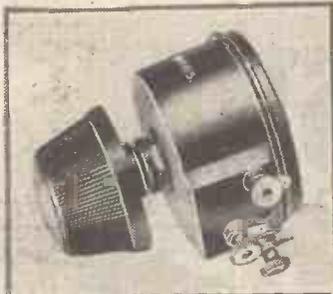
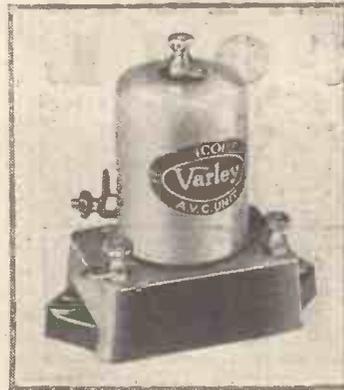
Automatic Volume Control

Automatic volume control is one of the most discussed aspects of the modern set. It can be utilised by the home set-builder, as we can see from the units now available. One good unit for A.V.C. is the Wearite Autotrol.

With this unit, which consists of a network of resistances and a Westector, with associated condensers, you can materially reduce fading even with a straight set, always providing that there is ample high-frequency amplification available.

To obtain what is known as delayed automatic volume control, only one wire in the existing set need be altered, but a 1.5-volt grid-bias battery must be added. An additional manual volume control can be added easily.

This firm, always to the fore with home-constructor's components, has produced a chassis-mounting valve holder of exceptional interest. The contact is wonderfully sure,



Left: Varley A.V.C. unit connected in anode circuit of detector. Above: Igranic potentiometer with very silent and smooth control

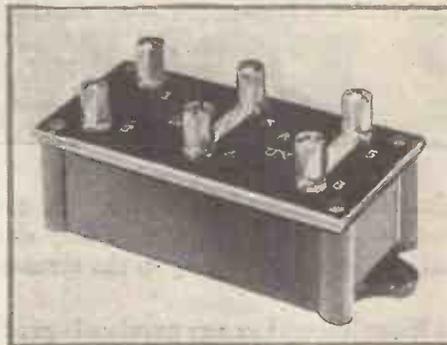
each socket being made of a very strong, springy metal. Just the thing for the modern all-metal set. See their stand!

Varley are also keen on A.V.C., as we can see from their new unit. The Nicore A.V.C. unit is connected in place of the usual high-frequency choke in the anode circuit of the detector valve—the second detector if the set is a super-het. Very simple to insert, only four wires having to be connected.

Switching is always a bit of a trial—not only for set-makers, but for home-constructors. Bulgin's have thought out something quite original—a rotary switch having any number of contacts, within reason, the whole job being mounted in a bakelite moulding.

Each separate switch section is insulated from its neighbours. It makes a positive contact, and you can hear a distinct click when the change is made. One of the best switches at the show this year.

Talking of switching, Igranic tell us that they had so many requests for



Wearite A.V.C. unit designed to be fitted after the second detector of a super-het

switches on the end of their volume control that they decided to produce a combined control.

This new switch and volume control will meet a long-felt want among constructors. In addition to the volume control, this new device includes, on a common spindle, a three-point change-over switch. It will be very useful for

battery sets, to switch off high-tension, low-tension, and grid-bias. Don't miss it!

Ease of control is not only confined to combination switching. Dials have also progressed vastly. Particularly notable is the new Polar device, which has a novel design likely to appeal to the constructor.

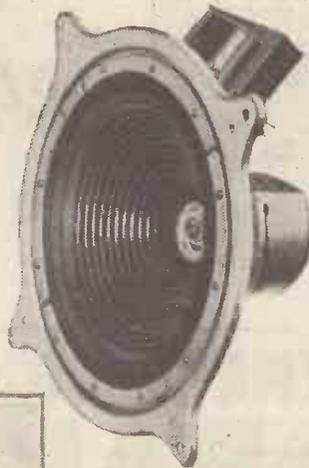
It has a pointer with a very wide angle of travel. The knob turns the pointer over 270 degrees and the

condenser behind it travels the usual 180 degrees. This provides a wide spacing for each degree, and so makes calibration easy.

Quite a lot of short-wave gear this year. We note British Radiophone are showing a double-gang condenser for short waves, .00015 microfarad for each half. The whole

job is mounted on a porcelain base, so that the minimum capacity is very low indeed, making the condenser good not only for receiving but even for transmitting.

Transmitters will also be interested in the development of quartz crystals by Hivac. These crystals have several claims to attention. They are ground to an extraordinary degree of accuracy—1 in 10,000. Another point is that the crystal is mounted in a vacuum, actually on a valve base, so that temperature changes will not affect the frequency.



A typical energised moving-coil loud-speaker, the R.K. Major model for D.C. mains

In the modern set coils can play a great part. To-day few coils are designed without some form of screening. The Micron, the new R.I. coil, bristles with good ideas. In addition to full-screening, its iron core is slightly movable, so that in effect a restricted permeability tuning facility is obtained.

Constructors will find plenty of new gadgets to play with at Manchester. The Graham Farish range, for example, is enlarged. Tubular condensers and the new flexible type condensers should certainly be seen. So should the new class-B driver transformer.

By the way, the Zelos condenser has now been developed as a twin, triple and quadruple gang, and the single-unit condenser has been arranged so that it is screened or unscreened.

No amateur is complete without some sort of measuring instrument, and that is why we suggest you make a point of seeing the range of Pifco meters. Special attention is drawn to the Pifco Rotameter, an ingenious multi-purpose meter that should appeal alike to the keen amateur and the dealer.

All-in-one Meter

The All-in-one Radiometer made by the same people should interest many amateurs.

Batteries are still as important as ever they were, and among the makes you should inspect are the Hellesen Hi-Life range. A big factory at Wimbledon, near London, is now working at full pressure on these batteries.

Especially long life at popular prices is the claim for these batteries. See for yourself.

Turn to page 562 for plans

VOLT-DROP IS FATAL! IN MODERN TRANSIENT LOAD CIRCUITS!



High tension batteries for Class "B" Quiescent & Push Pull Sets *must have low internal resistance and rapid recuperative powers!*

BIG OXYGEN CONTENTS OF LISSEN CELLS ENABLES THE BATTERY TO STAND SUDDEN DRAINS

In a modern Transient Load—Q.P.P., Push-Pull, or class B—Receiver, the amount of high-tension current called for by the receiver depends upon the "noise value" of the programme. That saves a lot of high-tension current because the average programme is relatively quiet. But it reveals also a danger of severe distortion, because **VERY FEW BATTERIES** can stand up to the load imposed upon them by these new output stages when, for example, a heavy orchestral item is being played or when the drums predominate. A Queen's Hall concert, for instance, might well call for 30 milliamps current output from your battery on certain passages. An ordinary high-tension battery simply cannot do it—the voltage immediately drops off alarmingly and the quality of reproduction is ruined.

HOW MANY BATTERIES CAN STAND UP TO 30 MILLIAMP DRAIN WITHOUT VOLT DROP?

The Lissen Battery contains a catalytic agent of great potency which liberates oxygen in abundance in the cells and keeps the internal resistance of the battery very low. The new circuits reveal the great advantage of this low internal resistance very strikingly, because a Lissen Battery, when called upon, can deliver 30 milliamps or more of current instantaneously without volt drop.

You have paid a big price and waited a long time for a battery set capable of giving you all the volume you want on an economical basis; it is penny wise and pound foolish to sacrifice this new beauty and power of radio by using inferior batteries. Ask very firmly for a Lissen High-Tension Battery this year—you will HEAR A DECIDED IMPROVEMENT IN LOUD-SPEAKER TONE and enjoy LONGER BATTERY LIFE for LESS MONEY.

LISSEN

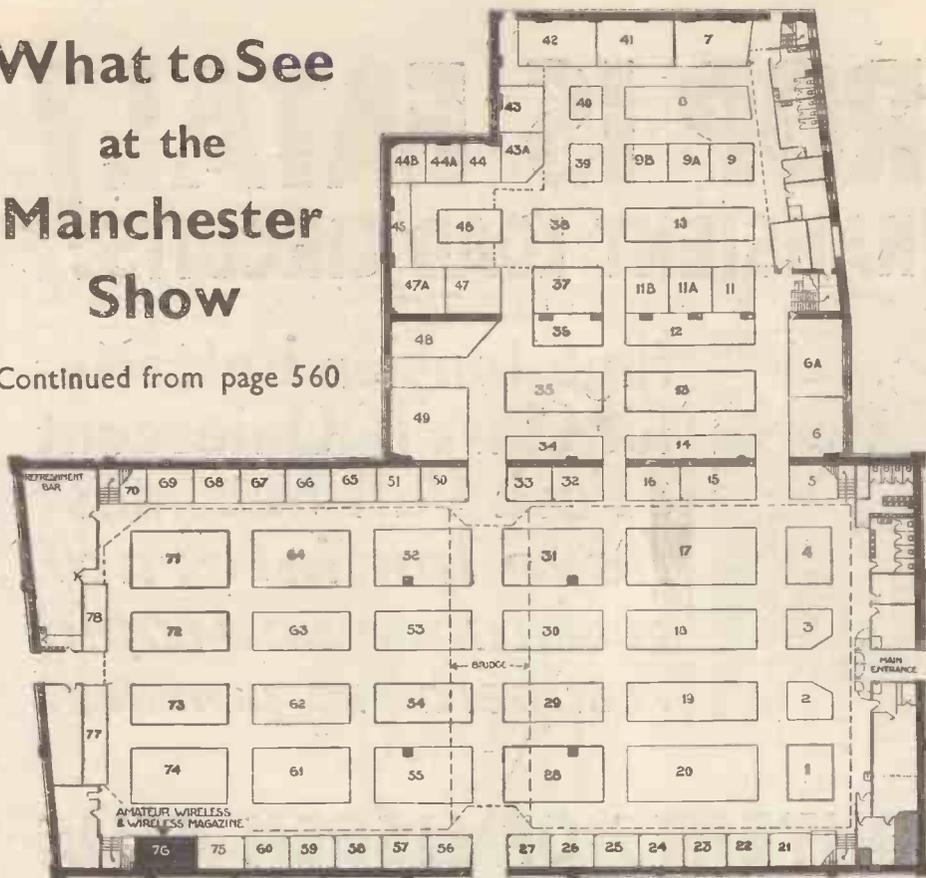
H.T. BATTERIES STUBBORNLY RESIST VOLT-DROP



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

What to See at the Manchester Show

Continued from page 560



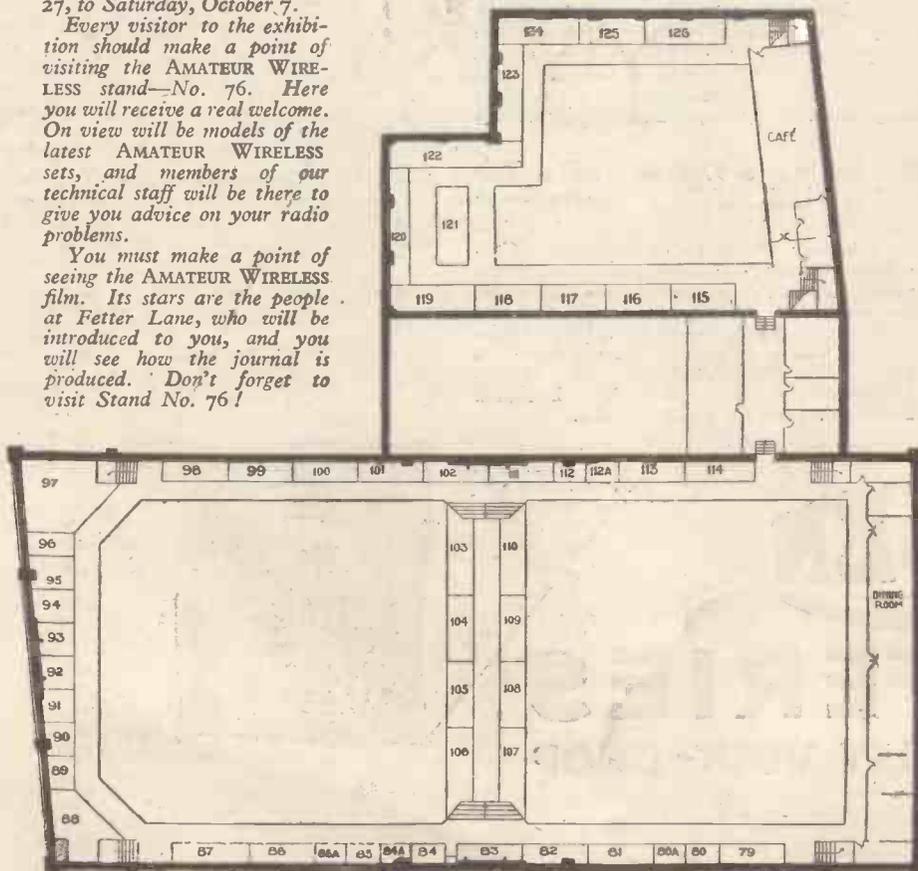
THE Tenth Northern National Radio Exhibition will be held in the City Hall, Deansgate, Manchester, from Wednesday, September 27, to Saturday, October 7.

Every visitor to the exhibition should make a point of visiting the AMATEUR WIRELESS stand—No. 76. Here you will receive a real welcome.

You must make a point of seeing the AMATEUR WIRELESS film. Its stars are the people at Fetter Lane, who will be introduced to you, and you will see how the journal is produced.

Above: Ground Floor Plan of New, Tonman and Main Halls

Below: Gallery Plan



List of Exhibitors

Table listing exhibitors with columns for Name, MAIN HALL, Stand No., and TONMAN HALL. Includes names like Allied Newspaper, Ltd., General Electric Co., Ltd., and various radio-related companies.

ALL-WORLD RADIO RECEPTION ON ULTRA-SHORT-SHORT-MEDIUM & LONG WAVES

ON SHORT WAVES

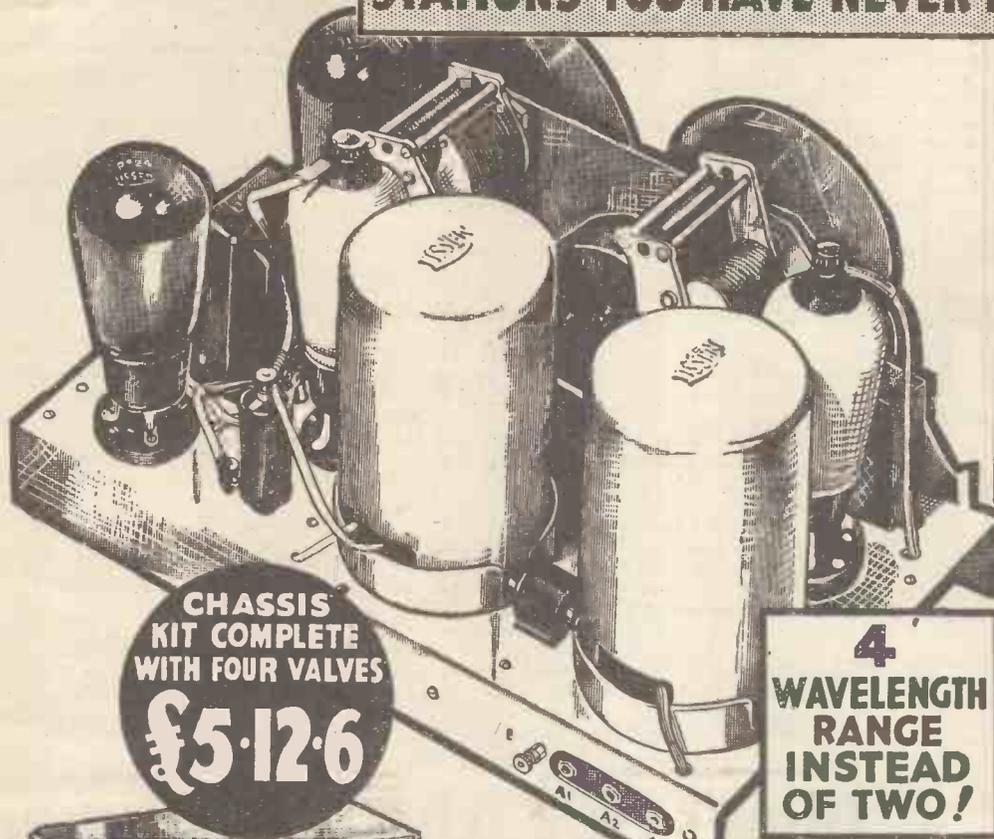
Bandoeng, Java (68 metres); Vatican City, Rome (50.26); Moscow (50); Zeesen, Berlin, DJC (49.83); Miami Beach, Florida (49.67); Cincinnati, U.S.A.

STATIONS YOU HAVE NEVER HEARD BEFORE

(49.5); Nairobi, Kenya (49.5); Boundbrook, New Jersey (49.18); Chicago, U.S.A. (49.18); Johannesburg, South Africa (49); Pittsburg, U.S.A., W8XK (48.86); Casablanca, Morocco (48); Rabat, Morocco (32.26); Daventry, G.S.B. (31.55); Melbourne, Australia (31.55); Schenectady, New York (31.48); Zeesen, Berlin, D.J.A. (31.38); Springfield, Massachusetts (31.39); Daventry, G.S.C. (31.3); Sydney, Australia (31.28).

ON ULTRA-SHORT WAVES

Madrid, Spain (30 metres); Paris, Radio Colonial (25.03); Winnipeg, Canada (25.6); Eindhoven, Holland (25.57); Daventry, G.S.D. (25.53); Zeesen, D.J.D. (25.51); Rome, 2RO (25.4); Daventry, G.S.E. (25.28); Pittsburg, W8XK (25.27); Rabat, Morocco (23.39); Vatican City, Rome (19.48); Daventry, G.S.F. (19.82); Zeesen, D.J.E. (19.73); Pittsburg, W8XK (19.72); Schenectady, W2XAD (19.56); Zeesen, D.J.E. (16.89); Daventry, G.S.G. (16.88); Boundbrook, N.J., W3XAL (16.87); Pittsburg, U.S.A., W8XK (13.93).



**CHASSIS
KIT COMPLETE
WITH FOUR VALVES
£5.12.6**

**4
WAVELENGTH
RANGE
INSTEAD
OF TWO!**

**WITH
DOUBLE
BALANCED
PENTODE
OUTPUT
AND
MOVING
COIL
SPEAKER**



**WITH
WALNUT CABINET
& MOVING COIL
LOUDSPEAKER
£8.2.6**

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-Balanced Pentode Output, giving brilliant reproduction on a Moving-coil Speaker—as much power as a Mains Set from ordinary high-tension batteries.

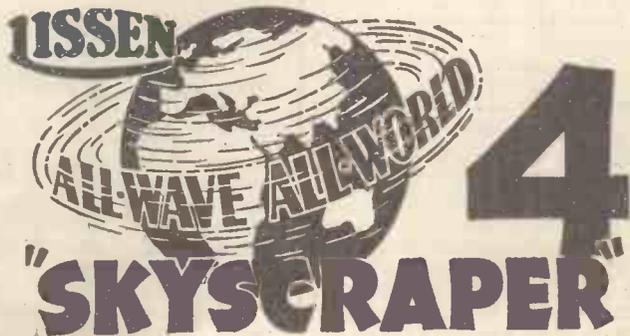
Lissen have made this All-Wave All-World Radio available to Home Constructors first, because it brings back the thrill of conquest to hear America and Australia direct on a set you have built yourself; it makes you an enthusiast to realise what a wonderful thing you have created.

When you see the Great Free Chart of the All-Wave All-World "Skyscraper 4," which tells you how to build it and how to work it and why it gives such marvellous results, you will agree at once that it will be wise of you to build for yourself rather than buy a factory-assembled receiver which cannot give you these new and intriguing short-wave stations. The FREE CHART simplifies everything; there are pictures of every part, with every wire numbered, every hole lettered, every terminal identified. YOU CAN'T GO WRONG! But get the Chart and see for yourself—then build the Lissen All-Wave All-World "Skyscraper 4," the SET THAT SPANS THE WORLD!

To LISSEN Ltd.,
Publicity Dept.,
ISLEWORTH.
Please send me FREE
copy of All-Wave All-World
"Skyscraper" Chart.

Name.....
Address.....
A.W. 834.

**CHART
FREE
POST COUPON**



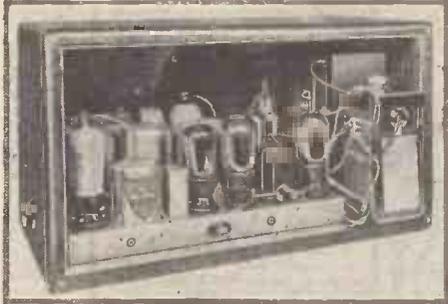
To Ensure Speedy Delivery, Mention "A.W." to Advertisers

Sets of the Season Tested

Lissen Skyscraper Seven

YOUR first experience with the Lissen Skyscraper Seven is an education in listening. It is one of the opening remarks in the huge constructional chart Lissen's have prepared for this set. Now that we have thoroughly tested this new Skyscraper we can endorse every word of that sentence and add that, besides educating the user in listening, it will teach him all there is to know about station-getting.

This set, as our tests in South London have proved, is really an amazing station-getter. Graz and Mühlacker come in clear of London Regional and at full strength; weak stations



A back view showing all the "works" of the Lissen Skyscraper Seven. It is quite easy to build

like Rabat, Madrid, Copenhagen and all the little Frenchmen come in like giants; there is remarkably little background noise.

Technically the Lissen kit under review is of special interest. One glance at the many modern ideas in the specification makes the observer wonder how they can all be incorporated in a kit set. In the first place there is a wavelength calibrated scale—found to be very accurate. Then there is the incorporation of a form of amplified automatic volume control, particularly effective in levelling up the strength of all stations received.

Now let us run briefly over the circuit

BRIEF SPECIFICATION

Makers: Lissen, Ltd.

Model: Skyscraper Super-het Seven.

Price: £11 10s. (including console cabinet and moving-coil loud-speaker);

£9 15s. (complete kit in table cabinet);

£8 17s. 6d. (complete kit and valves.)

Valve Combination: Seven valves in super-het sequence. Screen-grid first detector (Lissen SG215), oscillator (Lissen HL2), L.F. amplifier (Lissen SG215), second detector (Lissen AVC2), driver valve (Lissen L2) and class-B output (two Lissen B2).

Power Supply: Self-contained batteries.

Type: Constructor's kit set.

Remarks: One of the best kit sets we have tested. An amazing station-getter.

arrangement. There is a band-pass aerial-input stage to the first detector, a screen-grid valve, then a separate oscillator, one stage of intermediate-frequency amplification, and after this the special diode-pentode second detector preceding the low-frequency amplifier consisting of a driver valve feeding a class-B output stage.

"An entirely new valve never before used in any set" is Lissen's description of the diode-pentode, the Lissen AVC2. This is a new "bottle" that does three distinct jobs in the circuit. The diode section rectifies the input energy from the intermediate-frequency stage;

then it amplifies this current and passes it on to the driver valve. It also provides the automatic volume control.

The class-B output stage is unusual. Instead of having two three-electrode assemblies in one bulb, Lissen prefer to use two single valves.

We received the Skyscraper Seven in completed form, but from the maker's detailed instructions we fail to see anybody experiencing difficulty in building the set.

The makers carefully explain the construction through four easy steps, starting from a boxful of components to the assembled chassis with its coils, variable condensers, class-B transformer and the valves on the top and all the small parts, like fixed condensers and grid leaks, underneath. All the wires are numbered in numerical order so that you can't make mistakes.

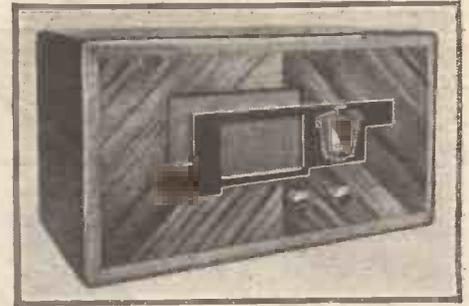
The chassis is then ready to be fixed in the horizontal cabinet. Lissen have excelled themselves with their modern cabinet for this worthy member of the Skyscraper family. It is in walnut and, although it is supplied in pieces, the job of assembling only takes two or three minutes.

When you have finished it you will not tell the difference between it and a cabinet-maker's product, so well has the idea been thought out.

Working the set is really simple. There are only two knobs on the front: on the right is the tuning knob and the other is the manual volume control, which we found needs little attention once the volume on a weak station has been adjusted. On the side there is a rotary switch, which changes the wavelength ranges and turns the set on and off.

Inside the cabinet is plenty of room for the batteries and the moving-coil loud-speaker.

Our tests amply justified the maker's claims for "clean" separation of stations providing



Doesn't the set look easy to work? On the left is the volume control and on the right the tuning knob

they keep to their 9-kilocycle channel—and all the good ones do. We found no trouble in getting stations or in separating them. During a run round the medium waveband at night we logged over forty signals in a short time. Stations rolled in one after another, all at about the same strength thanks to the fine A.V.C. action.

Foreigners As Good As Locals

There was hardly any need to adjust the manual control except on the two locals and then it was not really necessary. It was very uncanny to turn the dial upwards from London Regional. Mühlacker, closely followed by Algiers and Hamburg, came in as easily as the local.

Fifteen stations, nine of which gave real live entertainment, was the result of our long-wave test. Moscow was as loud as the local and even Kaunas, a difficult signal to log, came in quite well.

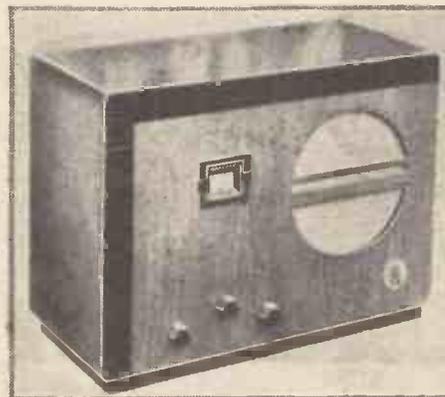
Quality was what one would expect from a good loud-speaker fed by a class-B output stage. Plenty of crisp volume, in which both top and bass notes were well balanced.

In all a kit set that can be thoroughly recommended.

News for the Set Buyer

FOR the connoisseur the R.G.D. 1201 receiver must not be overlooked. It is the most modern receiver that could possibly be imagined—twelve valves, automatic record changer, automatic volume control, automatic tone control and a marvellous walnut and macassar cabinet are some of the features of this extraordinary set. Naturally the price is a trifle high, being £105 5s.

The Page Car Radio two-valve set has many applications besides being used in a motor car. It is the cheapest set to run that we have



The new K.B. 444 is remarkably good value for money. A short-wave converter is made by K.B. specially for this set

ever seen, as high tension and grid bias can both be obtained from a 12-volt dry battery and, what is more, it only costs £3 18s. 6d.

Manufacturers are going ahead bringing out specially designed outfits for car use. Supplies are now available of an Atwater Kent equipment, which is marketed by the Portland Radio Co., Ltd., of 222 Great Portland Street, W.1.

The set is a six-valve super-het with moving-coil loud-speaker and has three controls—an on-off switch, volume control and tuning control—mounted on the steering column of the car. The price is £25 4s. for 6- and 12-volt systems.

Brief details only are available of the new car set that will be shortly released by the Majestic Electric Co., Ltd., of Tariff Works, Tottenham, N.17. The set will be known as the Majestic Twin 6 Auto-radio Super-het, and will have simple controls. It is claimed that the Majestic set is capable of getting forty stations on the loud-speaker.

We are wondering what action will be taken by the set makers next January to alter the thousands of station dials rendered obsolete by the introduction of the Lucerne Plan. Philips Lamps, Ltd., have tackled the problem early by not marking their tuning scales in stations but by sending out a chart fixed to the set with dial readings for some ninety to a hundred stations. When next January arrives all their customers will receive by post a copy of the new chart.

PETO-SCOTT

EVERYTHING RADIO—CASH C.O.D. or EASY TERMS

Peto-Scott are pioneers in Radio and Television. Our service to the British public was introduced in 1919, and during fourteen years of Solid Service and Satisfaction we have established a reputation for fair dealing that defies competition. Customers in all parts of the globe come to us regularly for all their radio requirements—Sets, Kits of all descriptions, Part Kits, Miscellaneous Components,

Speakers, Eliminators, and Accessories. Purchases can be made for CASH, C.O.D., or on Easy Payments. WE DEAL WITH YOU DIRECT. Peto-Scott's Easy Way System, with its strict privacy and no third-party collections, will bring radio to your home by convenient monthly payments. Send list for quotation; no obligation. Easy Terms on orders value over £2.



MOVING-COIL SPEAKERS

BLUE SPOT 99P.M. PERMANENT MAGNET MOVING-COIL SPEAKER. Complete with tapped input Transformer. Cash or C.O.D. Carriage paid, £2/19/6. Balance in 10 monthly payments of 6/-.

NEW BLUE SPOT PERMANENT MAGNET MOVING-COIL SPEAKER 45 P.M. With input transformer. Cash or C.O.D. Carriage Paid, £2/5/0. Balance in 7 monthly payments of 6/-.



NEW W.B. P.M. 4A. MICROLODE PERMANENT MAGNET SPEAKER

complete with switch-controlled multi-ratio input transformer. Cash or C.O.D. Carriage paid, only £2/2/0. Balance in 7 monthly payments of 5/9.

NEW LISSEN P.M. MOVING-COIL SPEAKER with input Transformer. Cash or C.O.D. Carriage Paid, £1/5/0. Balance in 4 monthly payments of 5/6.

NEW LISSEN WALNUT CABINET MOVING-COIL SPEAKER, with input transformer. Cash or C.O.D. Carriage Paid, £2/10/0. Balance in 9 monthly payments of 6/-.



PETO-SCOTT PERMANENT MAGNET MOVING-COIL SPEAKER

with tapped input transformer for power or pentode. Cash or C.O.D. Carriage Paid, 15/-.

Balance in 2 monthly payments of 5/6.

Class "B" Type, 22/6. Cash or C.O.D., or 4 monthly payments of 6/3.

EPOCH MODEL 20C, 20CB, and 20CQ PERMANENT MAGNET MOVING-COIL SPEAKER for ordinary power, Class B and Q.P.P. respectively, complete with input Transformers. Cash or C.O.D. Carriage Paid, £1/15/0. Balance in 6 monthly payments of 5/6.

EPOCH MOVING-COIL SPEAKER AND CLASS "B" UNIT, with Valve. Cash or C.O.D. Carriage Paid, £3/3/0. Balance in 11 monthly payments of 5/9.

NEW FERRANTI MOVING-COIL SPEAKER, M.5.T. with input transformer, suitable for power, pentode, or Class "B" output. Cash or C.O.D. Carriage Paid, £1/17/6. Or 7 monthly payments of 5/-.

NEW FERRANTI CLASS "B" SUPER-POWER CONVERTER. Instantly converts your set to Class "B." Complete with Valves. Ready assembled. Cash or C.O.D. Carriage Paid, £3/3/0. Balance in 11 monthly payments of 5/9.

NEW ROLA "CLASS B" PERMANENT MAGNET MOVING COIL SPEAKER AND AMPLIFIER

Complete with Valve and Input Transformer. Two models: A for PM2B, PD220 and 220B; B for 240B and HP2 (state which when ordering). Cash or C.O.D. Carriage Paid, £3/11/0. Balance in 11 monthly payments of 6/6.

6P.M. PERMANENT MAGNET MOVING-COIL SPEAKER, with input transformer. Cash or C.O.D. Carriage Paid, £2/9/6. Balance in 8 monthly payments of 6/-.

ATLAS C.A.25, for A.C. mains, Class-B and Q.P.P., four tapplings: 00/80, 50/90, 120, 150 volt, 25-m.a. Cash or C.O.D. Carriage Paid, £2/19/6. Balance in 10 monthly payments of 6/-.

NEW REGENTONE A.C. ELIMINATOR, Type W.I.F. Seven voltage tapplings, 120/150 volts at 12 m/A. Cash or C.O.D. Carriage Paid, £2/15/0. Balance in 9 monthly payments of 6/-.

AVOMINOR TEST METER. Cash or C.O.D. Carriage Paid, £2/0/0. Balance in 7 monthly payments of 5/6.

PILOT AUTHOR KITS CONSOLELECTRIC TWO

KIT 'A,' Author's Kit of FIRST SPECIFIED Parts, including Peto-Scott METAPLEX Baseboard, 16 in. by 10 in., but less valves, cabinet and speaker. Cash or C.O.D. Carriage Paid, £6/16/0. Yours for 12/6. Balance in 11 monthly payments of 12/6.

KIT-BITS You pay the postman. We pay post charges on all orders over 10/-.

| | |
|---|--------|
| BRITISH RADIOGRAM mains transformer, type 5G | £ 2 6 |
| PETO-SCOTT A.O. Two walnut consolette cabinet | 1 5 0 |
| EPOCH 20th Century loud-speaker | 1 15 0 |
| WESTINGHOUSE rectifier, type H.T.12 | 17 6 |
| IGRAMIC, type CHA, smoothing choke | 9 0 |
| TELSEN dual-range iron-cored coil, type W349 | 8 6 |
| Set of 2 specified valves | 1 16 0 |

IDEAL FOUR

KIT 'A' Author's Kit of FIRST SPECIFIED Parts, including Peto-Scott METAPLEX Baseboard, but less valves, Westector, cabinet and speaker. Cash or C.O.D., Carriage Paid, £7/2/6. Yours for 14/-.

Balance in 11 monthly payments of 14/-.

KIT "B," As Kit "A" but with valves and Westector only. Cash or C.O.D., Carriage Paid, £10/4/6. SEND ONLY 18/9. Balance in 11 monthly payments of 18/9.

KIT "C," As Kit "A" but including valves and Westector and PETO-SCOTT cabinet with baseboard and battle assembly, but less speaker. Cash or C.O.D., Carriage Paid, £11/16/6. SEND ONLY 21/9. Balance in 11 monthly payments of 21/9.

KIT-BITS You pay the postman. We pay post charges on all orders over 10/-.

| | |
|---|-------|
| 1 PETO-SCOTT Metaplex baseboard, 16 in. by 10 in. | £ 2 0 |
| 1 BRITISH RADIOPHONE 3-gang condenser, type 904, with 711 full-vision scale | 1 8 0 |
| 1 VABLEY Nicore II transformer | 11 6 |
| 1 BRITISH RADIOGRAM, type 46, H.F. shoko | 2 0 |
| 3 LISSEN dual-range iron-cored shielded coils | 17 6 |
| 1 PETO-SCOTT Metaplex strip, 7 1/2 in. by 2 in. | 3 2 6 |
| Set of specified valves | 1 5 0 |
| Peto-Scott specified cabinet | 1 5 0 |

IDEAL FOUR RADIOGRAM Additional Parts Required

| | |
|--|---------|
| 1 PETO-SCOTT model "A" Adaptagram | £ 3 3 0 |
| 1 B.T.H. Minor pick-up with volume control | 1 1 0 |
| 1 GARRARD double-spring motor, 11B | 1 15 0 |
| 1 BULGIN Duplex Needle Cup | 2 3 |
| 1 BULGIN rotary grammo switch, S.86 | 1 9 |

Cash or C.O.D. £6/7/0. Carriage 2/6 extra if Adaptagram is included. Or 12 monthly payments of 11/9.

- Exact to Specification

EXCLUSIVELY SPECIFIED FOR IDEAL FOUR RADIOGRAM

38 in. high, 22 in. wide, 15 1/2 in. deep. Speaker compartment; 17 in. by 19 in. by 14 in. Yours for 8/3.

WALNUT ADAPTARAM Direct from Factory. NO MIDDLEMAN'S PROFITS. Built by master-craftsmen of the piano trade. Real inlaid walnut, mortised, tenoned, French polished. With motor-board ready to take your set, speaker and power equipment. Plain front or vignette panels, 14 in. by 7 in., 16 in. by 7 in., 18 in. by 8 in. Battle-board, 3/6 extra. As illustrated. Cash or C.O.D. Carriage 2/6 extra. Or 8/3 Deposit and 11 monthly payments of 5/9. (Carriage Paid.) IN OAK OR MAHOGANY NO EXTRA. SEND FOR NEW CABINET CATALOGUE.



MANUFACTURERS' KITS IN SEALED CARTONS

NEW LISSEN SKYSCRAPER FOUR ALL-WAVE CHASSIS MODEL, complete kit comprising all components, including set of Lissen Valves. Cash or C.O.D. Carriage Paid, £5/12/6. Balance in 11 monthly payments of 10/3.

NEW LISSEN 7-VALVE SUPER-HET CONSOLETTA MODEL, complete with Valves and Permanent Magnet Moving Coil Speaker. Cash or C.O.D. Carriage Paid, £11/10/0. Balance in 11 monthly payments of 21/-.

NEW LISSEN 7-VALVE SUPER-HET, CHASSIS MODEL, complete with Lissen Valves in Sealed Carton. Cash or C.O.D. Carriage Paid, £8/17/6. Balance in 11 monthly payments of 16/6.

NEW LISSEN SKYSCRAPER FOUR ALL-WAVE CONSOLETTA CABINET MODEL, complete kit, comprising all components, including set of Lissen Valves, Cabinet and Moving Coil Speaker. Cash or C.O.D. Carriage Paid, £8/2/6. Balance in 11 monthly payments of 15/-.

TELSEN CLASS B 4 CHASSIS KIT, in Sealed Carton, less Valves, Cabinet and Speaker. Cash or C.O.D. Carriage Paid, £3/17/6. Balance in 11 monthly payments of 7/-.

TELSEN CLASS B 4 CONSOLETTA KIT, including Telsen Class B Moving-coil Speaker and Consolette Cabinet, less Valves. Cash or C.O.D. Carriage Paid, £5/17/6. Balance in 11 monthly payments of 10/9.

NEW COSSOR, MODEL 341. S.G., Detector and Pentode, and Balanced Armature Speaker, complete with Cabinet. Cash or C.O.D. Carriage Paid, £6/7/6. Balance in 11 monthly payments of 11/9.

BARGAIN KIT GUARDIAN O.P.P. 4-VALVE RECEIVER, formerly £3/19/6. KIT "A." Complete Kit of Parts in sealed carton with full instructions, less valves and cabinet. Cash or C.O.D. Carriage Paid, 59/6. Balance in 11 monthly payments of 5/6.

GRAMMO MOTORS AND PICK-UPS

NEW GARRARD MODEL 202A. 12-in. Turntable. Electric Motor for A.C. mains. Cash or C.O.D. Carriage Paid, £2/10/0. Balance in 8 monthly payments of 6/-.

GARRARD ELECTRIC MOTOR A.C.A. with 12-in. Turntable. Cash or C.O.D. Carriage Paid, £2/2/6. Balance in 7 monthly payments of 5/9.

B.T.H. SENIOR PICK-UP AND TONE-ARM. Cash or C.O.D. Carriage Paid, £1/17/6. Balance in 7 monthly payments of 5/-.

B.T.H. MINOR PICK-UP AND TONE ARM. Cash or C.O.D. Carriage Paid, £1/1/0. Balance in 4 monthly payments of 4/6.

IMPORTANT—Parts, Kits, Miscellaneous Receivers or Accessories for Cash, C.O.D. or H.P. on our own System of Easy Payments. Send us a list of your wants. We will quote you by return. C.O.D. orders value over 10/- sent Carriage and Post Charges Paid.

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NAME.....
ADDRESS.....
A.W. 30/9/33.

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Broadcasting Stations

Wavelengths are brought up to date week by week. For the purpose of better comparison, the power indicated is that of the carrier wave.

| Metres | Kilo-cycles | Station and Call Sign | Country | Power (Kw.) | Metres | Kilo-cycles | Station and Call Sign | Country | Power (Kw.) |
|--------|-------------|-----------------------|------------------|-------------|---------|-------------|-----------------------|------------------|-------------|
| 16.86 | 17,790 | Daventry (GSG)... | Great Britain... | 20.0 | 318.8 | 941 | Sofia (Rodno Radio) | Bulgaria | .5 |
| 16.88 | 17,775 | Eindhoven (PHI)... | Holland | 20.0 | 318.8 | 941 | Dresden | Germany | .25 |
| 19.56 | 15,330 | Schenectady (W2XAD) | United States | 20.0 | 319.7 | 936 | Naples | Italy | 1.5 |
| 19.73 | 15,200 | Zeesen (DJB)... | Germany | 8.0 | 321.9 | 932 | Goteborg | Sweden | 10.0 |
| 25.25 | 11,880 | Paris (Coloniale) | France | 15.0 | 325 | 923 | Breslau | Germany | 60.0 |
| 25.4 | 11,810 | Rome (2RO) | Italy | 15.0 | 328.2 | 914 | Poste Parisien | France | 60.0 |
| 25.51 | 11,760 | Zeesen (DJD)... | Germany | 8.0 | 331.5 | 905 | Milan (Siziano) | Italy | 50.0 |
| 25.53 | 11,750 | Daventry (GSD)... | Great Britain... | 20.0 | 335 | 896 | Poznan | Poland | 2.0 |
| 25.63 | 11,705 | Paris (Coloniale) | France | 15.0 | 338.2 | 887 | Brussels (No. 2) | Belgium | 15.0 |
| 30.0 | 10,000 | Madrid (EAO)... | Spain | 20.0 | 342.1 | 877 | Brunn (Brno) | Czechoslovakia | 32.0 |
| 31.25 | 9,598 | Lisbon (CTIAA)... | Portugal | 2.0 | 345.2 | 869 | Srasbourg (PTT) | France | 11.5 |
| 31.3 | 9,585 | Daventry (GSA)... | Great Britain... | 20.0 | 350 | 857 | Barcelona (EAIJ) | Spain | 8.0 |
| 31.38 | 9,560 | Zeesen (DJA)... | Germany | 8.0 | 352.1 | 852 | Graz | Austria | 7.0 |
| 31.55 | 9,510 | Daventry (GSB)... | Great Britain... | 20.0 | 355.9 | 843 | London Regional | Great Britain... | 50.0 |
| 37.33 | 8,036 | Rabat (CNR) | Morocco | 6.0 | 360.6 | 832 | Muhlacker | Germany | 60.0 |
| 45.38 | 6,611 | Moscow | U.S.S.R. | 10.0 | 363.6 | 825 | Algiers (PTT) | North Africa... | 13.0 |
| 46.69 | 6,425 | Boundbrook (W3XL) | United States | 1.0 | 364.1 | 824 | Bergen | Norway | 1.0 |
| 48.86 | 6,140 | Pittsburgh (W8XK) | United States | 40.0 | 368.1 | 815 | Bolzano | Italy | 1.0 |
| 49.02 | 6,120 | Wayne (W2XE)... | United States | 1.0 | 368.1 | 815 | Heilsnkl | Finland | 13.2 |
| 49.18 | 6,110 | Chicago (W9XF) | United States | 5.0 | 368.1 | 815 | Seville (EAI5) | Spain | 1.5 |
| 49.26 | 6,090 | Skamlebaek (OXY) | Denmark | .5 | 368.1 | 815 | Santiago (EAI4) | Spain | .2 |
| 49.34 | 6,080 | Chicago (W9XAA) | United States | 5.0 | 369.5 | 812 | Radio LL (Paris) | France | .8 |
| 49.5 | 6,060 | Nairobi (VQ7LO) | Kenya Colony | .5 | 372.2 | 806 | Hamburg | Germany | 1.5 |
| 49.59 | 6,050 | Daventry (GSA)... | Great Britain... | 20.0 | 376.4 | 797 | Scottish Regional | Great Britain... | 50.0 |
| 49.83 | 6,020 | Zeesen (DJC)... | Germany | 10.0 | 381.7 | 788 | Lwow | Poland | 16.0 |
| 50.0 | 6,000 | Moscow (RNE) | U.S.S.R. | 20.0 | 385.1 | 779 | Radio Toulouse | France | 8.0 |
| 50.26 | 5,969 | Vatican (HVJ)... | Italy | 10.0 | 389.6 | 770 | Leipzig | Germany | 150.0 |
| 202.3 | 1,483 | Liege (Exp.) | Belgium | .15 | 394.2 | 761 | Bucharest | Roumania | 12.0 |
| 202.4 | 1,481.3 | Kristinehamn | Sweden | .25 | 398.9 | 752 | Midland Regional | Great Britain... | 25.0 |
| 209.8 | 1,429 | Miskolcz | Hungary | 1.25 | 403 | 743 | Sottens | Switzerland | 25.0 |
| 209.8 | 1,429 | Magyarovar | Hungary | 1.25 | 408.7 | 734 | Katowice | Poland | 12.0 |
| 209.8 | 1,429 | Pecs | Hungary | 1.2 | 413 | 725 | Athlone | Irish Free State | 80.0 |
| 211.3 | 1,420 | Antwerp | Belgium | .4 | 416 | 721 | Rabat | Morocco | 6.0 |
| 211.3 | 1,420 | Newcastle | Great Britain... | 1.0 | 419.9 | 716 | Berlin | Germany | 1.5 |
| 214.3 | 1,400 | Aberdeen | Great Britain... | 1.0 | 424.3 | 707 | Madrid (EAI7) | Spain | 3.0 |
| 215.6 | 1,391 | Chatelineau (EL) | Belgium | .25 | 424.3 | 707 | Madrid (España) | Spain | 2.0 |
| 217.1 | 1,382 | Konigsberg | Germany | .5 | 424.3 | 707 | Moscow (ROZ) | U.S.S.R. | 100.0 |
| 217.1 | 1,382 | Dublin | Irish Free State | .2 | 430.4 | 697 | Belgrade | Yugoslavia | 2.8 |
| 218.5 | 1,373 | Salzburg | Austria | 1.5 | 441.2 | 680 | Rome (Roma) | Italy | 60.0 |
| 218.5 | 1,373 | Plymouth | Great Britain... | 2 | 447.1 | 671 | Paris (PTT) | France | 7.0 |
| 220 | 1,363.3 | Beziere | France | .5 | 447.1 | 671 | Agen | France | .25 |
| 220.3 | 1,362 | Binche | Belgium | .2 | 447.1 | 671 | Danzig | Dantzig | .5 |
| 224.4 | 1,337 | Cork (6CK) | Irish Free State | 1.2 | 451 | 665 | Milan (Vigentino) | Italy | 7.0 |
| 225.9 | 1,327.3 | Fecamp | France | 10.0 | 452 | 664 | Madona | Latvia | 25.0 |
| 227.4 | 1,319 | Flensburg | Germany | .5 | 453.2 | 662 | Odessa (RDH) | U.S.S.R. | 15.0 |
| 227.4 | 1,319 | Hanover | Germany | 1.5 | 453.2 | 662 | Klagenfurt | Austria | .5 |
| 231 | 1,301 | Malmö | Sweden | 1.2 | 456.6 | 657 | San Sebastian | Spain | 5.0 |
| 231.7 | 1,294.2 | Kiel | Germany | .25 | 459.4 | 653 | Beromuenster | Switzerland | 60.0 |
| 233 | 1,287 | Walleria | Belgium | .3 | 465.8 | 644 | Lyons (PTT) | France | 15.0 |
| 235 | 1,283 | Lodz | Poland | 2.2 | 465.8 | 644 | Tartu | Estonia | .5 |
| 235.5 | 1,274 | Kristiansand | Norway | .5 | 472.4 | 635 | Langenberg | Germany | 60.0 |
| 236 | 1,271 | Bordeaux (S.O.) | France | 3.0 | 476.9 | 629 | Lisbon (tests) | Portugal | 20.0 |
| 238.2 | 1,259.5 | Nimes | France | 1.0 | 480 | 625 | North Regional | Great Britain... | 50.0 |
| 238.9 | 1,256 | Nurnberg | Germany | 2.0 | 488.6 | 614 | Prague | Czechoslovakia | 120.0 |
| 240.6 | 1,247 | Stavanger | Norway | .5 | 495.8 | 605 | Trondheim | Norway | 1.0 |
| 242.3 | 1,238 | Belfast | North Ireland | 1.0 | 500.8 | 599 | Florence | Italy | 20.0 |
| 242.7 | 1,236 | Liege | Belgium | .3 | 509.3 | 589 | Brussels (No. 1) | Belgium | 15.0 |
| 244.1 | 1,229 | Basle | Switzerland | .5 | 517 | 581 | Vienna | Austria | 100.0 |
| 245.9 | 1,220 | Berne | Switzerland | .5 | 525 | 572 | Riga | Latvia | 15.0 |
| 245.9 | 1,220 | Cassel | Germany | .25 | 532.9 | 563 | Punich | Germany | 60.0 |
| 245.9 | 1,220 | Linz | Austria | .5 | 539.8 | 557.7 | Melmo | Italy | 3.5 |
| 245.9 | 1,220 | Schaerbeek | Belgium | .15 | 550.5 | 545 | Budapest (I) | Hungary | 18.5 |
| 247.7 | 1,211 | Trieste | Italy | 10.0 | 559.7 | 536 | Tampere | Finland | 1.0 |
| 249.9 | 1,200.4 | Juan-les-Pins | France | 1.0 | 559.7 | 536 | Kaiserslautern | Germany | 1.5 |
| 251.8 | 1,191.6 | Barcelona (EAI15) | Spain | 6.0 | 559.7 | 536 | Augsburg | Germany | .25 |
| 253 | 1,185 | Gleiwitz | Germany | 5.0 | 563.3 | 532.5 | Freiburg | Germany | .25 |
| 254.7 | 1,177.6 | Toulouse (PTT) | France | .7 | 565 | 531 | Wilno | Poland | 22.0 |
| 257 | 1,167 | Monte Ceneri (Tests) | Switzerland | 25.0 | 570.6 | 525.8 | Grenoble (PTT) | France | 15.0 |
| 257.3 | 1,166 | Horby | Sweden | 10.0 | 577.3 | 519.5 | Ljubljana | Yugoslavia | 7.5 |
| 259.3 | 1,157 | Trèves (Triër) | Germany | 2.3 | 690 | 434.7 | Oulu | Finland | 1.2 |
| 259.3 | 1,157 | Frankfurt A/M | Germany | 17.0 | 720 | 416.7 | Moscow (RMO) | U.S.S.R. | 20.0 |
| 261.6 | 1,147 | London National | Great Britain... | 50.0 | 743 | 404 | Ostersund | Norway | 0.6 |
| 261.6 | 1,147 | West National | Great Britain... | 50.0 | 750 | 400 | Geneva | Switzerland | 1.25 |
| 263.8 | 1,137 | Moravsko-Ostrava | Czechoslovakia | 11.0 | 833 | 360.1 | Heston Airport | Great Britain... | 5.0 |
| 265.4 | 1,130 | Lille (PTT) | France | 1.3 | 845.1 | 355 | Budapest (2) | Hungary | 3.0 |
| 267.4 | 1,121 | Nyiregyhaza | Hungary | 6.3 | 848.7 | 353.5 | Rostov (RAD) | U.S.S.R. | 4.0 |
| 267.6 | 1,121 | Valencia | Spain | 6.0 | 857.1 | 350 | Lenin-grad (RHP) | U.S.S.R. | 100.0 |
| 268.5 | 1,117 | Bremen | Germany | .25 | 937.3 | 320 | Kiar'ov (RMD) | U.S.S.R. | 20.0 |
| 269.8 | 1,112 | Bari | Italy | 20.0 | 1,000 | 300 | Moscow (ROZ) | U.S.S.R. | 100.0 |
| 271.5 | 1,105 | Rennes (PTT) | France | 1.3 | 1,034.5 | 290 | Kiev (RR) | U.S.S.R. | 100.0 |
| 273.7 | 1,096 | Turin (Torino) | Italy | 7.0 | 1,071.4 | 280 | Tiflis (RDK) | U.S.S.R. | 35.0 |
| 276.5 | 1,085 | Heilsberg | Germany | 75.0 | 1,083 | 277 | Oslo | Norway | 60.0 |
| 279.7 | 1,072.6 | Bratislava | Czechoslovakia | 14.0 | 1,105 | 271.5 | Minsk (RMG) | U.S.S.R. | 35.0 |
| 281.2 | 1,067 | Copenhagen | Denmark | .75 | 1,143 | 262.5 | Monte Ceneri | Switzerland | 25.0 |
| 282.2 | 1,063 | Lisbon (CTIAA) | Portugal | 2.0 | 1,153.8 | 260 | Kalundborg | Denmark | 7.5 |
| 283.6 | 1,058 | Innsbruck | Austria | .5 | 1,170 | 256.4 | Tashkend (RAU) | U.S.S.R. | 35.0 |
| 283.6 | 1,058 | Berlin (E) | Germany | .5 | 1,190.5 | 252 | Luxembourg | Gd. Duchy of | 200.0 |
| 283.6 | 1,058 | Magdeburg | Germany | .5 | 1,200 | 250 | Istanbul | Turkey | 5.0 |
| 283.6 | 1,058 | Stettin | Germany | .5 | 1,200 | 250 | Reykjavik | Iceland | 21.0 |
| 284.7 | 1,053.6 | Radio Lyons | France | 1.0 | 1,229.5 | 244 | Boderi | Sweden | .6 |
| 286 | 1,049 | Montpellier | France | .9 | 1,239.7 | 242 | Kiev (RAG) | U.S.S.R. | 10.0 |
| 288.5 | 1,040 | Bournemouth | Great Britain... | 1.0 | 1,247 | 240.5 | Vienna (Exp.) | Austria | 3.0 |
| 288.5 | 1,040 | Scottish National | Great Britain... | 50.0 | 1,304 | 230 | Moscow (RCY) | U.S.S.R. | 100.0 |
| 291 | 1,031 | Vilpuri | Finland | 13.2 | 1,354.4 | 221.5 | Motala | Sweden | 30.0 |
| 293 | 1,022 | Kosice | Czechoslovakia | 2.5 | 1,411.8 | 212.5 | Warsaw | Poland | 120.0 |
| 294.2 | 1,019.6 | Limoges (PTT) | France | .7 | 1,445.8 | 207.5 | Eiffel Tower | France | 13.5 |
| 296.1 | 1,013 | Hulzen | Holland | 20.0 | 1,481 | 202.6 | Moscow (RTC) | U.S.S.R. | 500.0 |
| 298.8 | 1,004 | Tallinn | Estonia | 11.0 | 1,538 | 195 | Ankara | Turkey | 7.0 |
| 301.5 | 995 | North National | Great Britain... | 50.0 | 1,554.4 | 193 | Daventry National | Great Britain... | 30.0 |
| 304.3 | 986 | Bordeaux (PTT) | France | 13.0 | 1,620 | 185 | Norddeich (KVA) | Germany | 10.0 |
| 307 | 977 | Falun | Sweden | .5 | 1,634.9 | 183.5 | Zeesen | Germany | 60.0 |
| 307.7 | 974.9 | Vitus (Paris) | France | 1.0 | 1,725 | 174 | Radio Paris | France | 75.0 |
| 309.9 | 968 | West Regional | Great Britain... | 50.0 | 1,760 | 170.45 | Moscow (RAX) | U.S.S.R. | 30.0 |
| 312.5 | 960 | Genoa | Italy | 10.0 | 1,796 | 167 | Lahti | Finland | 40.0 |
| 312.8 | 959 | Cracow | Poland | 2.0 | 1,875 | 160 | Kootwijk | Holland | 50.0 |
| 315 | 952.5 | Marseilles | France | 1.6 | 1,875 | 160 | Moscow (RCZ) | U.S.S.R. | 100.0 |
| | | | | | 1,910.8 | 157 | Sverdl'ovsk (RHX) | U.S.S.R. | 40.0 |
| | | | | | 1,935 | 155 | Kaunas | Lithuania | 7.0 |

European Radio Activities

By Jay Cooté

IF during the last few days you have heard the familiar call Roma-Napoli from the Rome station, you may have noticed that Bari has been added to the announcements. The fact is that this station has been hooked up by special cable to the Southern network, which very shortly will also include Palermo. Of all the Italian transmitters, Bolzano is now the only one which remains on its own.

Stand by for tests by the new Lisbon 20-kilowatt transmitter, which, it is hoped, will be ready to go on the air with a regular programme at the beginning of next month. The tests will be carried out on the wavelength allotted to this station by Lucerne, 476.9 metres (629 kilocycles), but from October until January 15, or until the Lucerne Plan is brought into operation, Lisbon will work on the channel hitherto used by CTIAA, of that city, 282.2 metres (1,063 kilocycles).

Re-building Muhlacker Masts

Although broadcasts from Langenberg are already very well heard in the British Isles, we may expect shortly to receive them at much greater volume, as its aerial system is to be improved. The masts are to be scrapped and in their place a wooden tower, 165 metres in height (544 feet), will be erected. Muhlacker, however, will hold the altitude record when it is rebuilt this autumn with a tower 190 metres, or 627 feet high.

Another station which will doubtless appear frequently on our logs next year will be Algiers, as steps are to be taken immediately to replace the existing plant by something approaching 75 kilowatts or even more. The broadcasting authorities at a recent meeting glibly spoke of 120 kilowatts.

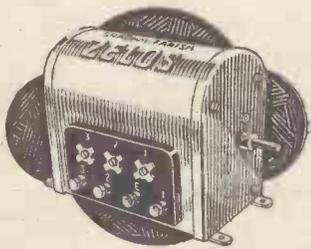
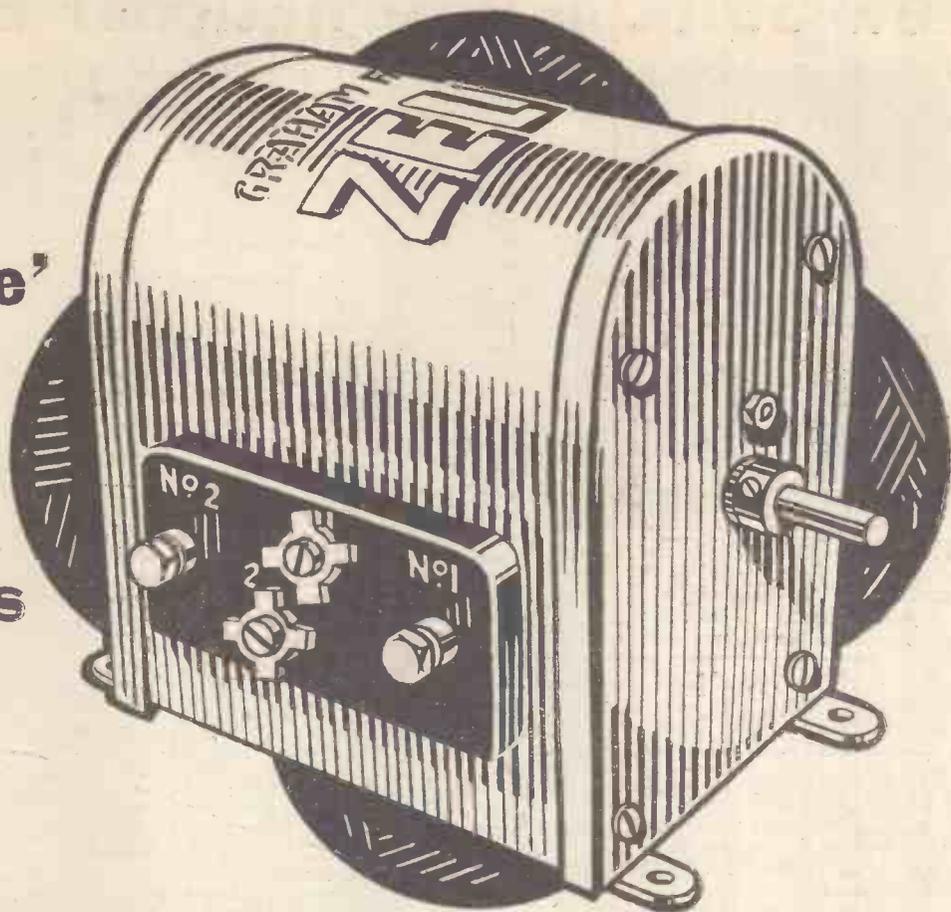
Although for many months much vague information has been published in regard to the French plans for the reorganisation of the State broadcasting system, concrete plans have now been passed. Actually orders were placed last year for the following new stations: Paris P.T.T. (120 kilowatts), Nice-Monaco-Corse (60 kilowatts), Lyons P.T.T. (100 kilowatts), Toulouse P.T.T. (120 kilowatts), to be completed in the early part of next year.

In addition, contracts have now been made with French works for Marseilles, Reator (60 kilowatts), Rennes (100 kilowatts), and Lille (60 kilowatts) to be completed by the second half of 1934. Such a transformation in the network will make France one of the most powerful broadcasters in Europe.

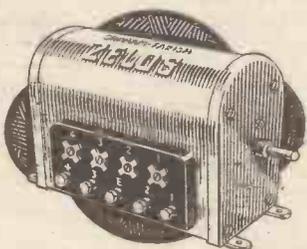
From Belgium comes the news that, with a view to assisting in balancing the budget, the Government will make a cut in the revenue to be paid to the I.N.R., with the direct result that the Brussels stations are compelled to curtail their activities. In future, therefore, broadcasts will only be made between midday and 2 p.m., and from 5 p.m. to 10 p.m. B.S.T. Hitherto, on Saturdays and Sundays the stations were on the air to a much later hour. "It's an ill wind," according to the proverb; what we lose from Brussels we may gain after 10 p.m. from Florence, Vienna, and from Brno, as this early close down will do much to clear their channels.

It is hardly likely that we shall hear much from the new 10-kilowatt station which Norway is putting up at Vadso, but it is useful to make a note of the wavelength to be used in case signals are picked up and found difficult to identify—845 metres (355 cycles).

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 Condensers



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 CONDENSER - - 19/6**



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 CONDENSER - - 27/6**

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The Condenser supreme for the modern Receiver, giving precise and simultaneous tuning for two circuits. Accurately spaced, carefully matched and efficiently screened. Fitted with low-loss trimming Condenser and star-wheel adjustment. Each set of fixed vanes attached to its own terminal, moving vanes connected to terminal on case. Rigid frame. Beautifully finished in frosted aluminium.

14'6
 2-GANGED

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

New Start in International Broadcasting



Dr. Nicholas Murray Butler, the President of Columbia University, is the chairman of a committee formed to foster international broadcasting

These are first details of a new international broadcasting scheme which is being planned by the American Columbia organisation

TRANSATLANTIC relays have often been carried out in the past between this country and America and between American stations and a number of European stations, chiefly connected with the German Reichsrundfunk chain.

Broadcasts have been exchanged from time to time between prominent speakers on both sides of the Herring Pond, both by National Broadcasting Company and Columbia enterprise. In some cases the speakers on this side have addressed the microphone in the B.B.C. studios, but the Post Office short-wave communication has been used so that the speeches have not been heard by B.B.C. listeners, but only by the American listeners to whom they were addressed.

Bernard Shaw, the late Arnold Bennett, and other personalities in connection with whom there are a number of copyright difficulties when broadcasting in this country is contemplated have consented to broadcast on the Transatlantic link provided they were not generally heard in this country.

The same conditions have applied in the dance-band world and Jack Hylton, for example, used a B.B.C. studio for his American relay, although the programme was not broadcast by the B.B.C.

New Attempt to Settle All the Problems

In the past, these difficulties and many others have hindered the start of international broadcasting; but now a new attempt is being made by the Columbia organisation to settle all the problems and within a few weeks, start a series of international broadcasts between Europe, America and Asia.

The Public Affairs Institute in New York is responsible for setting up a committee under the chairmanship of Dr. Nicholas Murray Butler, the President of Columbia University.

Active steps have already been taken, and when he investigated the progress on this side of the Atlantic he found that the Marquis of Lothian and Sir Evelyn Wrench had already joined forces with the scheme.

On the American side the radio problems will be dealt with by the Columbia-broadcasting system, which operates a vast chain of ninety-two stations throughout the United States.

The Executive Secretary for Europe, who is working hard on this big scheme, is a man who in the past has done a great deal of useful work in arranging Transatlantic relays. Many of these have been carried out in Post Office studios, and it is highly probable that the Post Office will take an active part in the technical side of the international broadcasting, at least so far as the European transmissions are concerned.

An international committee has been appointed, and already a large number of prominent speakers has been asked to take part in the international broadcasts. This must not be confused with the standing committee of the N.B.C.

Talks, Debates and Discussions

Broadcast talks, debates and round-table discussions will be given in each of the countries co-operating. Leading American personalities will broadcast to us, and European and Asiatic affairs will be discussed by prominent local speakers, these broadcasts being relayed via the Transatlantic link and through the Columbia broadcasting system.

Arrangements have been made for the collaboration of broadcasting companies in all three continents, and no time is being lost.

In view of the importance of this scheme it is interesting to note that the European committee includes (beside the Marquis of Lothian and Sir Evelyn Wrench), Mr. Bonnet, Director of the International Institute for Intellectual Co-operation, for France; Prof. Emilio Bodrero, Vice-President of the Italian Chamber of Deputies, for Italy; Dr. Paul Dengler, for Austria; Prof. Jan Koxak, for Czechoslovakia; Prof. Aage Friis, for Denmark; Mr. B. G. J. Loder, ex-President of the International Court of Justice, for Holland; Count Paul Teleki, for Hungary; Dr. Christian L. Lange, for Norway; Don Rafael Altamira, for Spain; Prof. Gustav Cassel, for Sweden; and Prof. W. Rappard, for Switzerland.

Viscount Ishii has consented to act for Japan and Dr. Loy Chang for China. The American members include Hon. Henry P. Fletcher, former American Ambassador in Rome, Mr. Thomas W. Lamont, the banker,

and Mr. Frank L. Polk, former Undersecretary of State.

Columbia have already a wide experience of short-wave Transatlantic relaying, but the assistance of leading technical men of European broadcasting organisations is being called into play.

The date of the first international broadcast is expected to be announced within the next two or three weeks.

For some time past the National Broadcasting Company has had an internationally



The Marquis of Lothian, who will represent British interests in the new international broadcasting scheme

represented committee which has enabled listeners to the N.B.C. chain of stations in America to share in the best European broadcasts. Columbia are trying to go even beyond this end and to create a really representative exchange of radio talent between the Continents.

Now that both the two huge station chains in the United States have international committees it is possible that many of the previous obstacles in the way of transatlantic relays will be overcome.

A Wireless Licence for 2s. 6d.!

What the World Pays to Listen

IN the United States of America, in Holland, and in Portugal you can listen to radio programmes free of all licence dues and official interference. There are few other countries where that is possible without incurring the risk of a fine or imprisonment. France, one of the last strongholds of this freedom, has now gone over to the licence system. French listeners must pay a tax which corresponds roughly to the amount paid by the British listeners, but in addition there is a tax on valves.

It is not generally known that of the ros. paid annually by the British listener only 4s. 7d. reaches the coffers of the B.B.C.

The licence fees in other countries vary considerably. In Hungary, Spain, and Morocco the private listener has to pay only about 2s. 6d. These are the cheapest countries for radio reception. The Moroccan fee applies only to crystal receivers, however; for a valve set the tax is 12s. 6d. In Belgium the crystal user pays 3s. 6d. and the valve user 10s. 6d. Italian listeners pay 1s. a year to the State and 2s. to the broadcasting company.

One of the most expensive countries is Yugoslavia, where the annual fee varies from £1 6s. 8d. for fixed apparatus to £3 11s. for portable sets and £5 6s. 8d. for sets fixed on any vehicle.

Lithuanians also have to pay through the nose—for a valve receiver £1 19s., or for a crystal set 15s., plus a charge for "registration and supervision." Latvian listeners pay £1 7s.

Other High-Fee Countries

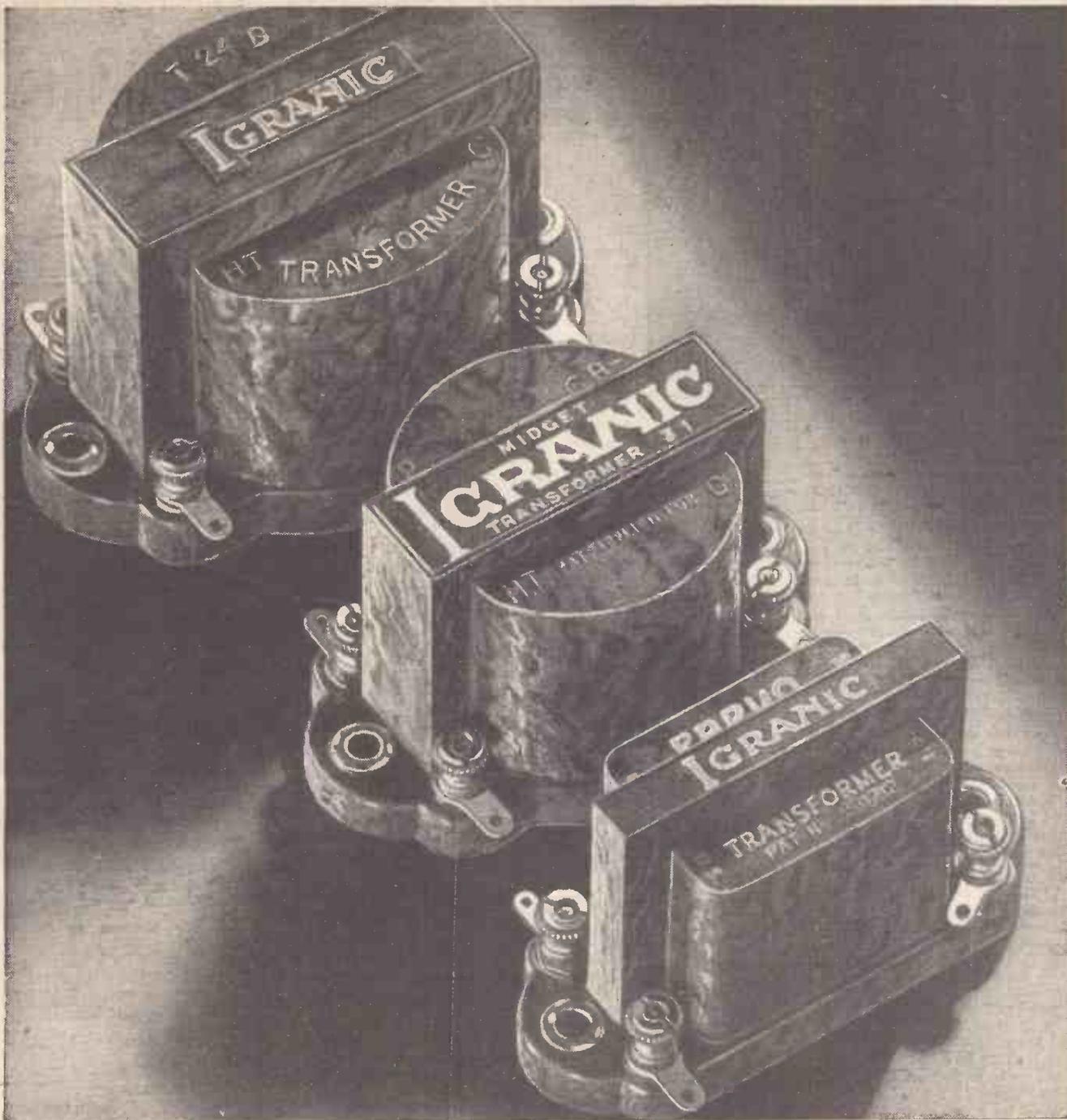
Poland and Germany are other high-fee countries—£1 5s. 9d. in the former and £1 16s. in Germany, although there the Post Office has power to remit the fee to blind persons, seriously disabled ex-servicemen, hospitals, nursing homes, and infirm persons.

Here are some other licence fees:—

| | s. | d. |
|-----------------------|----|----|
| Tunis | 4 | 11 |
| Russia | 6 | 4 |
| Denmark | 8 | 0 |
| Finland | 9 | 0 |
| Sweden | 10 | 4 |
| Egypt | 16 | 5 |
| Austria | 17 | 2 |
| Switzerland | 18 | 4 |
| Czechoslovakia | 21 | 0 |

Several countries give special concessions to crystal-set users. In Lithuania valve users pay £1 19s. and crystal users only 15s. In Rumania the charges are £1 2s. and 11s. 8d. respectively.

L. B.



The time has come—not to talk of many things, nor even to sing the praises of any specific “Igranic” component—but simply announce that Igranic are first, as always, with those ultimate refinements in radio design which you very properly demand. We do not hope to convey to you any idea of the Igranic range within the sixty-nine square inches of this advertisement. We are content to recommend the new fifty-page Igranic catalogue, which meets the needs of every radio constructor with understanding and due economy. A copy will be sent you free, and by return of post. The prices of the Igranic Transformers illustrated above are :

T.24B 5/6 Parvo 6/9 Midget 8/6

Write for fully illustrated Catalogue No. D.196 of Igranic Quality Components.

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If you cannot obtain Igranic components, write to us direct and include the name of your local dealer.

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The Young Idea! Getting busy with "The Four-meter" three-valver—needless to say this is not an AMATEUR WIRELESS receiver! When you have recovered from seeing the picture a second time, note specially the "efficient" earth—in a window box!

SNAGS IN CAR RADIO

To the Editor, AMATEUR WIRELESS:

SIR,—To bring up the subject of car radio once more, there are one or two points that still want clearing up.

(1) The use of portables in cars. This sounds all very well in theory but in practice will be found more difficult than one might imagine.

In a proper installation the low-tension negative is earthed and the chassis of the set earthed at every possible point to reduce interference to as low a level as possible.

This is difficult to carry out in a portable, but, unless it is done, the interference is very bad indeed.

Furthermore, the directional effect of a portable (even with A.V.C., which does help a bit) spoils any enjoyment one may have expected to derive.

(2) Has anyone realised the consumption of a car set with, say, four valves (Catkins, as ordinary battery valves are not robust enough)? Poor high-tension battery!

Boreham Street, Sussex.

G5YA

AMERICA ON SHORT WAVES

SIR,—I have constructed a three-valve set from diagrams in AMATEUR WIRELESS, and now I can get America (U.S.A.) nearly every night at 7 p.m., and Australia has been received twice, all on the loud-speaker.

For instance, I received last Friday evening, at 9 p.m., on 19.56 metres, a talk by Governor Healy on "Safety First" on a loud-speaker which could be heard all over the house—this on three valves!

Hanwell, W.7.

J. W. C.

THAT CRYSTAL SET

SIR,—May I offer my sympathetic support to Mr Skerrin's defence of head-phone, crystal testing?

I have in the house a 3-valve set with a moving-coil speaker; but always use reed-type phones (no longer, alas, obtainable) when listening to a broadcast concert. With these phones the instruments in an orchestra are immediately distinguishable, whereas with the best of loud-speakers it is at times impossible to distinguish between clarinet and flute; oboe, cor anglais, and horn. With phones even the vibrant lower notes of the piano can be followed till they "fade out".

Is there any loud-speaker which reproduces the tones of this instrument as faithfully?

Moreover, the "atmosphere" of a concert hall becomes really vivid and intimate. I would, however, suggest to your correspon-

Listeners' Letters

Our Readers Express

Their Views on This and That

dent that he substitutes for his crystal a one-valver, having two tuned circuits; capacity coupled by a .0001 variable condenser. He would then receive not only all the British broadcasts, but 10 to 15 Continental stations.

The former belief that crystal detection gives purer reproduction than a high-class valve has, of course, long been exploded. About cost of upkeep; I renew my 99-volt high tension battery after a year and six months use, while a 15 amp-hour low-tension battery needs recharging about once in six months. Total upkeep less than a penny a week! L. L. London, W.1.

SHORT-WAVE ENTHUSIASM

SIR,—Having read your short-wave article in the September 9 issue of AMATEUR WIRELESS, I derived immense satisfaction from the fact that some enterprising editor had at last made an effort to meet the requirements of a select yet enthusiastic band of radio fans.

Surely a good straight three or super-hot could be designed for short-wave reception only, whereby the public could all participate in the thrilling experience of listening to a station at the remote corners of the world.

Instead of this it is left to a limited number of short-wave amateurs to carry on the good work.

Wishing your paper every success,

York.

R. E. F.

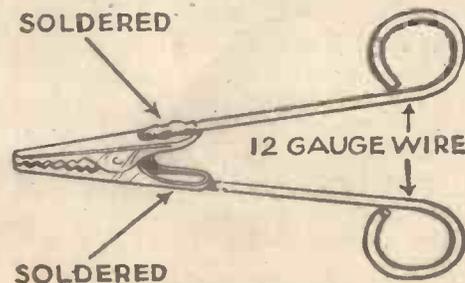
OUR WIZARD THREE

SIR,—I am writing this just to tell you about one of your sets that I have built—the "Wizard Three." I built the set from parts contained in a five-valve portable which, by the way, was useless here as far as the London stations were concerned, it being continually jammed by the North Foreland light-house and lightships.

Handy Radio Scissors

MOST constructors have had the experience, when making adjustments to their set, of dropping terminal heads or screws into the "works" where they always roll or fall into the most inaccessible place. Here is a simple little gadget that will enable you to retrieve the missing parts with little or no trouble.

Take a crocodile clip and two pieces of



How the "radio scissors" are made

Well, on the "Wizard," using a picture-frame aerial and having the earth attached to the gas pipe, I have received over thirty stations, all heard at full loud-speaker strength on a moving-coil speaker, including both London stations and Midland Regional, without any trace of morse.

The set is built to specification, with the exception of pentode output, which I employed because I had the valve. By the way, I find the loudest station at any time of day is undoubtedly Fécamp.

Thanking you for the excellent paper that comes out every Wednesday.

Broadstairs.

J. S.

[ED. NOTE.—The "Wizard Three" was described in AMATEUR WIRELESS dated September 17, 1932.]

SHORT WAVES AGAIN!

SIR,—From the recent controversy in your readers' letters over short waves, you will gather that a good number of your readers are short-wave listeners.

I should estimate this number at 5 per cent. at the least. Since "A.W." usually contains about forty pages, at the least two should be devoted to short-wave items. (One would satisfy most of us.) Instead of this there is sometimes a small column tucked away in some remote corner, and sometimes none at all.

Beginners are sometimes allotted one or two pages, but that is as far as it gets. In the near future I hope to see short-wave items on a par with the other good articles which you give us regularly. Hoping I have not asked too much,

R. S.

Coventry.

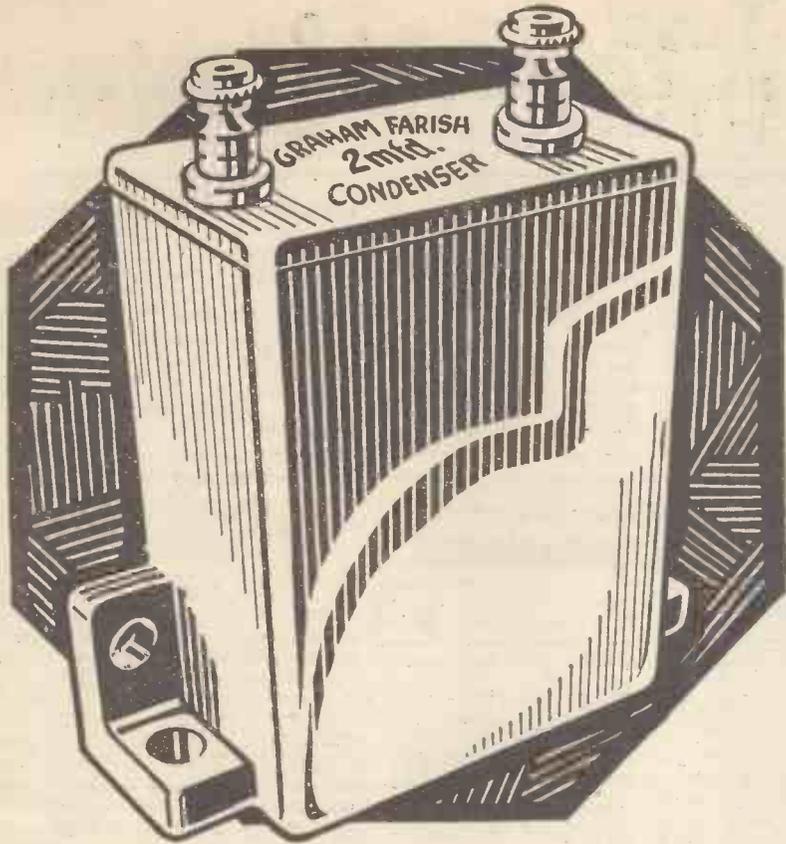
[ED.—Note: We propose to devote as much space to short waves as developments warrant, and not to publish a special feature irrespective of whether there is anything new or not worth recording. Next week we shall give full details of a special ultra-short-wave receiver.]

bronze wire (No. 12 gauge), make two convenient size loops at one end of each wire and solder. The other ends should be soldered to each side of the crocodile clip respectively. This little gadget will serve many useful purposes. D.Q.

Use for Old Gramophone Records

THERE must be hundreds of keen radio amateurs who have some very old gramophone records which probably will never be put on the turntable again. A handy way of getting rid of the records and, at the same time, making use of them is to break up two or three records in small pieces and put them in a jar containing methylated spirits. In time the records will dissolve in the liquid. If a piece of three-ply wood is painted with the mixture from the jar and allowed to dry, and then polished with a soft cloth, the wood will have a fine ebonite finish. This idea is particularly useful to those who prefer black panels and yet either cannot afford ebonite or haven't the necessary tools to drill ebonite.

J. R.



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·005 mfd. to ·01 mfd. . . . 1/6

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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.

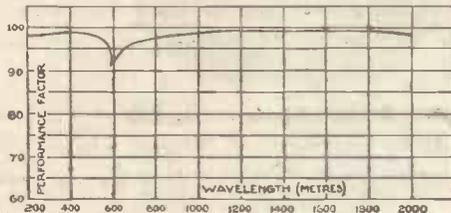


The two new Kinva high-frequency chokes are both fully screened and have given good results on test

KINVA HIGH-FREQUENCY CHOKES

THE high-frequency choke is a very important component in radio receiving apparatus and may be largely responsible for the successful operation or otherwise of the receiver. The design of a successful choke, especially if it is of the canned variety, is a much more difficult problem than appears at first sight.

Postlethwaite Bros. have recently placed on the market two new types of screened high-



A curve showing the performance of the Kinva high-frequency choke, model I.D.C.

frequency chokes. The first of these is known as type I.D.C. and is fitted with a special dust-iron core. This allows a high value of inductance to be obtained, with a relatively low number of turns, and thus tends to reduce the effective self-capacity of the winding.

The second choke, also dust-cored and screened, is known as the Major type and has been specially designed for use with super-het second-detector circuits and generally where a high value of inductance is required.

Both high-frequency chokes were tested over the complete working range and the results for the I.D.C. choke can be seen from the curve reproduced above.

A small absorption occurs at about 600 metres with the I.D.C. model, but as this is outside the normal working range no trouble should occur. Over the remainder of the range the performance is excellent.

Excellent Performance Down To 100 Kilocycles

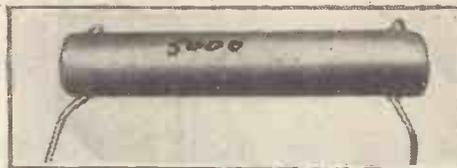
In the case of the Major choke practically the same remarks may be made; a small absorption occurs at about 700 metres, but the performance both above and below this is excellent and the choke is quite satisfactory down to 100 kilocycles, which covers all normal super-het intermediate-frequency stages.

The retail prices are 4s. 6d. for type I.D.C. and 5s. 6d. for the Major type, and they can be recommended

WATMEL RESISTANCE

ONE of the most important, and at the same time most neglected, components in radio apparatus is the fixed resistance. Unless this is absolutely reliable, satisfactory operation of the apparatus is impossible.

Watmel Wireless Co., Ltd., has just placed on the market a new series of fixed resistances which in appearance are very similar to the familiar composition type. These are rated at 3 watts and may be obtained in all values up to 50,000 ohms. They are wire wound on



One of the new Watmel fixed resistances

ceramic porcelain formers and the wire is spot welded to the connecting leads, the whole being coated with Vita enamel, thus giving high insulation between turns and a protection, to the winding. It is claimed that the resistances are constant in operation.

The sample submitted for test was found to be entirely satisfactory and withstood a 3 or 4 times wattage overload with no obvious signs of serious distress.

The resistances are colour-coded to the R.M.A. specification and there is a tolerance of + or - 5 per cent. on the rated resistance values. If required, however, a tolerance of + or - 1 per cent. can be given. These resistances, which retail at 1s., should give very good service.

BRITISH RADIOGRAM CLASS-B TRANSFORMER

THE class-B driver transformer is unlike other intervalve transformers in that it has to deal with power. Hence, the ratio is usually a step-down from primary to secondary, as in the case of an output transformer, this ratio being anything from 2 to 5:1. It is also necessary that the transformer should be matched to the class-B valve with which it is to be used in similar fashion to the matching of an output transformer to a loud-speaker.

Readers will recall that we have recently reviewed various British Radiogram components in these columns and this week we have their Universal class-B driver transformer. This is housed in a brown bakelite case and has a tapped primary winding to make it suitable for

use with the various class-B valves available.

On test the transformer was up to standard. The inductance of the primary winding was approximately 20 henries with no D.C. in the winding, this dropping to 17 henries with 4 milliamperes D.C. The resistance of the secondary winding was 120 + 120 ohms, which will keep the copper loss small. The iron loss was also low, being approximately 15 milliwatts at 500 cycles. The transformer was quite satisfactory in operation.

AMPLION LOUD-SPEAKER

THE design of a permanent magnet for a miniature loud-speaker is one which needs careful consideration. When permanent-magnet loud-speakers were first introduced the magnet was of considerable size and weight, but research has now made it possible to produce a small, light magnet still considerably more efficient than the original types.

This improvement is demonstrated in the Amplion Midget loud-speaker, which is a real midget; the diameter of the diaphragm being only 4½ in., while the overall depth of the speaker is 3½ in. A universal input transformer is provided, enabling all types of output valve, including class B and pentodes in quiescent push-pull, to be used.

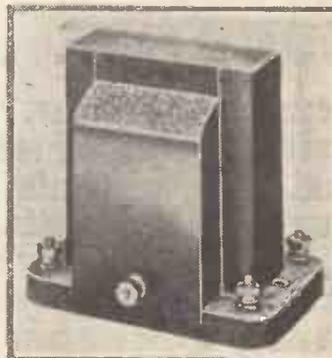
Contrary to expectations, the sensitivity of the loud-speaker was only slightly below that of our standard, and the overall performance was generally very satisfactory when the small size is considered.

RONNIE EARTH TUBE

AN interesting earthing device is a copper earth tube made by the Ronnie Engineering Co. The tube is quite conventional in size, being 14½ in. long, and is fitted with a brass terminal on the flange at the top.

The tube is perforated in ten places to allow the mineral compound contained in the hollow of the tube to come in contact with the ground. This mineral compound can be bought separately in cartons, costing 1s. 3d. The tube is strongly made and should prove satisfactory in use. The price is 5s.

A simple test of the hygroscopic action of the mineral compound is that when some of the dry Ronnie mineral compound is left exposed in the open air for a short time, it will be found that the crystals have attracted a deal of moisture from the atmosphere.



The British Radiogram class-B driver transformer is particularly interesting for battery users



Good results were given by the new Amplion midget loud-speaker—which is a real midget

See page 560 for Notes on other new components

Better 'CLASS B' WITH . . .

MARCONI



PRICE **14/-**

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MARCONIPHONE CO. LTD.,
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for your copy of an interesting folder
describing all the new Marconi Valves

Marconi B21 brings better class B performance to all battery sets.

B21 differs from previous valves in several respects, the most important being that it operates with grid bias. This feature gives these important advantages :

- ① Better quality, because the anode current cut-off is less sharp and the currents in the two halves overlap. This reduces spurious oscillation and gives less distortion at low output levels.
- ② Greater sensitivity, because the input impedance is higher and less power is needed from the driver valve.
- ③ Greater overall magnification, because it is possible to use driver transformers having higher ratio than those allowable with the zero bias type of valve.

In addition, Marconi B21 is built on exceptionally robust lines, the bulb being shaped to give a firm support to the top of the electrode system. Greater uniformity and stability are assured.

MARCONI DRIVER VALVES FOR USE WITH B21

Marconi L21. A new high-efficiency Class B driver incorporating mica bonded construction. And gives ample output to load B21 up to good home volume - **7/-**

Marconi LP2 used when maximum output is required - **8/9**

MARCONI 2-VOLT VALVES

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|------|-----------------|-----|-----|-----|------|
| S23 | Screen Grid | ... | ... | ... | 15/6 |
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| VP21 | V. Mu H.F. Pen. | ... | ... | ... | 15/6 |
| HL2 | Triode | ... | ... | ... | 7/- |
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| PT2 | Pentode | ... | ... | ... | 16/6 |

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::

By J. H. Reyner, B.Sc., A.M.I.E.E.

ARE we becoming too easily satisfied to-day as regards quality? The majority of modern sets employ a pentode output valve. The pentode is certainly sensitive. It will give good signal strength on quite weak stations, but there are many people who believe that really good quality can only be obtained with the old form of triode output valve, and that the pentode is at the best a compromise.

Great Efficiency of Pentodes

One big argument in favour of the pentode is its greater efficiency. It draws a certain anode current from the battery or power supply and it converts from 30 to 40 per cent. of this current into useful speech current which will operate our loud-speaker.

The average power valve of the triode type will utilise only 15 or 20 per cent. Recent valve developments, however, are beginning to show ways in which this defect can be overcome.

Ordinarily we can only use a valve in a somewhat limited manner. We connect our high-tension supply to the anode, which produces current, and by varying the voltage on the grid of the valve we cause this current to alter. The voltage delivered by the detector valve is therefore applied to the grid of the output valve, and it produces a fluctuating current in the anode circuit which operates the loud-speaker.

We can only vary the voltage of the grid within certain limits. One limit is obviously the point where the anode current is reduced practically to nothing. The other is where the grid becomes positive relative to the filament, at which point the grid acts just like another anode and current will flow from the filament.

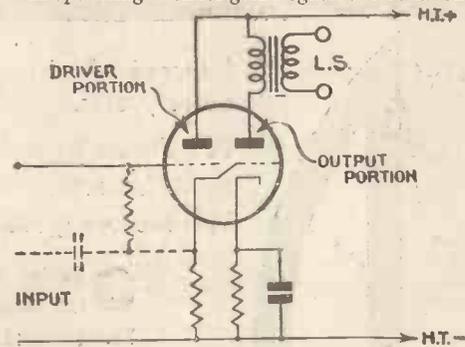
As soon as this happens the amplification from the preceding valve falls right off and the quality becomes distorted.

Were it not for these limits we could go on using the valve over a much more extended range and we could get more power output. Valve makers, therefore, have been studying the operation of valves in the region where the grid is positive. The class-B valve of

to-day is a typical example, for this runs practically all the time with the grid positive and it has to have a small power valve, known as a driver, in front to supply the necessary grid current needed for its operation.

An alternative valve was suggested in America some time ago, known as the "triple twin." This was made in two sections, one of which was a power valve capable of delivering considerable output and the other was in the nature of a driver valve.

This driver valve was made with peculiar characteristics. As long as the output portion was operating with its grid negative it behaved



Typical circuit for the new American type 2B6 valve

like an ordinary valve. As soon as the output portion started to take grid current, the amplification from the driver portion increased to compensate for the extra load thrown on to it.

The result was that the output from the power tube was still proportional to the input and distortionless amplification was obtained.

This tube has made its appearance in a new guise just recently. It is known as the 2B6 tube and a circuit diagram is shown above.

The valve will be seen to have two cathodes independently heated by a common heater. Associated with each cathode is a grid and an anode, so that there are virtually two valves in the one tube.

The first valve is cathode-coupled to the second. The cathode is directly connected to the grid of the second portion, but in the cathode return lead is a resistance, while the anode of the first portion is connected direct to high-tension positive. This valve therefore works just like an ordinary resistance-coupled valve except that the resistance is in the cathode lead instead of the anode lead.

As a result of this connection the cathode varies in voltage just as the anode of an ordinary valve would do. These voltage variations are transferred direct to the grid of the output portion, which amplifies the signals and delivers the power output to the loud-speaker.

The cathode of the output section has a small bias resistor shunted by a condenser. This is so adjusted that the negative voltage produced by the bias resistor more or less offsets the positive voltage due to the direct connection between grid and the cathode of the preceding tube.

Actually the valve works with about 2.5 volts positive on its grid in the normal position and the grid voltage varies from about 37 volts positive to 32 volts negative.

As already explained, whenever the grid of the output section runs positive the amplification from the driver section increases and maintains a truly proportional amplification.

It has one advantage for which great things are claimed. This is that the power output is not greatly dependent on the anode load.

Output of 4 Watts

As shown in the diagram, the valve gives 4 watts output for 25 volts input (r.m.s.). This is not a good sensitivity, being much less than our ordinary triodes such as the Mazda PP5/400 or the PP3/250.

By connecting the input between grid and cathode (as shown dotted) the output may be obtained with only 10 volts input, which corresponds to a sensitivity of 20 milliwatts per volt squared, which is still only average. It would seem desirable to withhold further comment until samples of the valve are available for practical tests.

Programme Items to Hear

JOHN MASEFIELD, the Poet Laureate, is appealing on behalf of the Royal Alfred Aged Seamen's Institution on September 24. This institution has homes in Kent for old sea dogs when they retire from the "briny."

Binnie Hale, the musical comedy star, is making her microphone debut on September 28 and 29, when a broadcast version of *No, No, Nanette* will be given. Binnie Hale, you will remember, took the name part in the original show at the Palace Theatre in 1925. It will be quite a treat to hear those two old tunes, "Tea for Two" and "I Want to be Happy."

The show will be produced by John Watt and Harry Pepper; and the cast will include Patrick Waddington, Wyn Richmond, Floy Penrhyn and Reginald Purdell.

Sir William Bragg is giving the introductory talk in the new series on scientific research on September 29.

An organ recital by Dr. J. H. Reginald Dixon is promised for North Regional listeners

on October 4. Dr. Dixon, founder of the Lancaster Music Festival, is organist of Lancaster Cathedral. He will play at the Town Hall, Manchester, for this broadcast.

Melville Dinwiddie, the new Scottish Regional director, is introducing himself to Scottish listeners in a talk on October 10. It is believed that the Scottish director has several new ideas for programmes up his sleeve.

The Aberdeen station celebrates its tenth birthday on October 10. Several favourite Aberdeen artists will be taking part in a special celebration concert.

Aylmer Buesst, who recently joined the B.B.C.'s musical staff as second-in-command to Adrian Boult, is conducting the B.B.C. orchestra on October 11. The soloist of the concert will be Anatole Melzak, who will play Victor Buesst's *Violin Concerto*. A work by the late Percy Pitt, former Music Director of the B.B.C., will be one of the strong points in this show.

The opening of the new harbour at Haifa, Palestine, will be the subject of a relay on October 13. Listeners will hear a descriptive commentary on the scene at Haifa followed by talks by Sir Philip Cunliffe-Lister, Secretary of State for the Colonies, and the High Commissioner for Palestine, Lieut.-General Sir Arthur G. Wauchoppe.

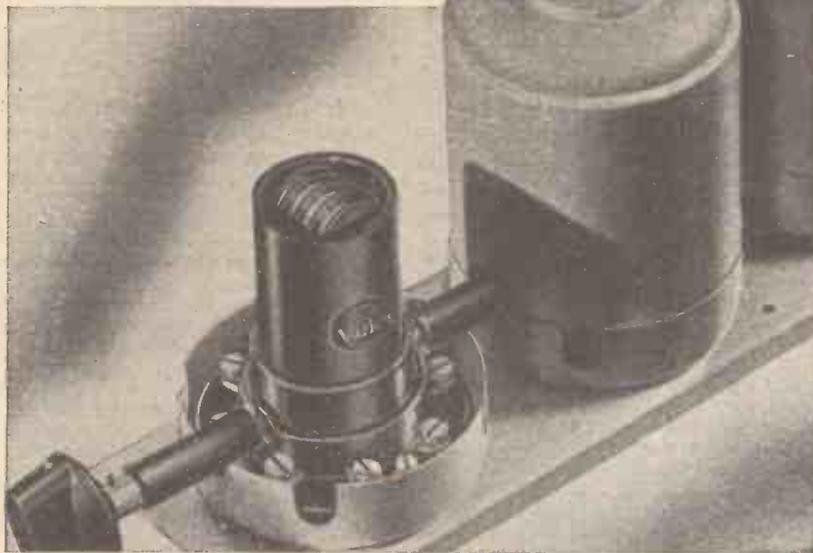
At a concert in aid of the National Union of Railwaymen's Widows and Orphans Fund, the Roosters Concert Party will give several of their old army sketches. The concert will be broadcast on October 13.

Midland Regional listeners will hear a relay from the Prince of Wales Theatre, Birmingham, on October 14, when the first act of *Lohengrin* will be played by the Metropolitan Opera Co.

Sir Edward Elgar, the famous English composer, is making a special journey to Belfast to conduct a concert of his works which will be played by the Belfast Wireless Symphony Orchestra on October 14.

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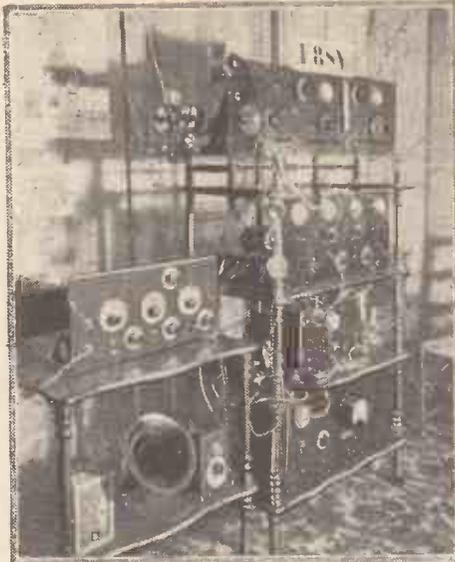
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Short-wave Notes By Kenneth Jowers



An interesting photograph of the French amateur station F8SY, situated at Lyons. This station comes in well on the 40-metre waveband

I HAVE had a very nice letter from LU6CY in Buenos Aires, giving me some interesting information on his transmitter. He would welcome any reports from this country, particularly on the 40-metre band. LU6CY is using about 100 watts on 20, 40 and 160 metres, and has had consistently good D.X. reports.

VE3HE, who was so consistent last winter, is now coming in fairly well; in fact, the Canadian stations as a whole have shown a distinct improvement during the last few weeks. I have picked up quite a number of experimental transmissions from VE0JR on 25.6 metres, late on Saturday evenings when they should be off the air.

W8XK on 25.27 metres has been the only really reliable American station this week. Conditions have been rather poor, except on the 25-metre band, but the better conditions on this band are rather counteracted by the fact that it is so crammed. There are at least a dozen stations within one metre, so that unless you have a fairly selective set long-distance reception is quite out of the question.

I had lunch during the week with a few 5-metre friends who consider that unless something interesting turns up, such as commercial transmissions or television, 5-metre working except for the enthusiast will tend to die out. So it seems that until the B.B.C. ultra-short wave television comes along there will not be much interest in 5-metre receivers.

There is, by the way, quite a large number of amateur transmitters on 5 metres in the London area, so you should have little difficulty in testing on this band. For example, there is 5QF of Whetstone; 6BO at Harrow; 2OW at Ealing; 6XN at Ealing, who is working with 2OW; 6CJ at Hillingdon; 2GG at Newbury; 5NR at Hammersmith; and so on.

This will just give you an idea that there are transmissions to be picked up, particularly over the weekend. There are also stations in the provinces, such as 5UK, Southend; 2KT in Rayleigh; and, farther north, there is 6FK in Abbots Langley.

When one keeps a log of the commercial telephony stations, it is surprising how many familiar stations have dropped out since last year. W2XAF, for example, is now a very infrequent visitor and I do not expect to hear of any reliable reception until later in the year when the schedule is changed. W8XK and W3XAL on the 49-metre band are also very rarely picked up, because I suppose they don't come on until the last thing at night.

The Zeesen stations, particularly DJB and DJD, are coming through extremely well just now; in fact, no matter what time you listen in, there always seems to be a Zeesen station on the air, with usually quite a good programme.

Irregular Reception of VK2ME

I should like to hear of anyone who picks up VK2ME on Sundays—I can report only very irregular reception. For about three weeks at a time signal strength is R5 to R7 and then for some unaccountable reason I hear nothing for another month or so.

I hear the Skamlebaek OXY station on the 31-metre band again—actually 31.5 metres. I do not know whether they are still running the 49.4-metre relay as well and use the channel which is most free from interference.

I was surprised to hear at the last weekend two or three German amateur stations. There are so very few of these about, owing to restrictions, that one hears little of them. They certainly do not take up so much of the band as the French stations.

I don't know whether you have noticed it, but the Empire station at Daventry, GSG, has dropped its wavelength from 16.88 to 16.6 metres. This should help to clear up the 16-metre band a little, because W3XAL has been getting sandwiched very badly.



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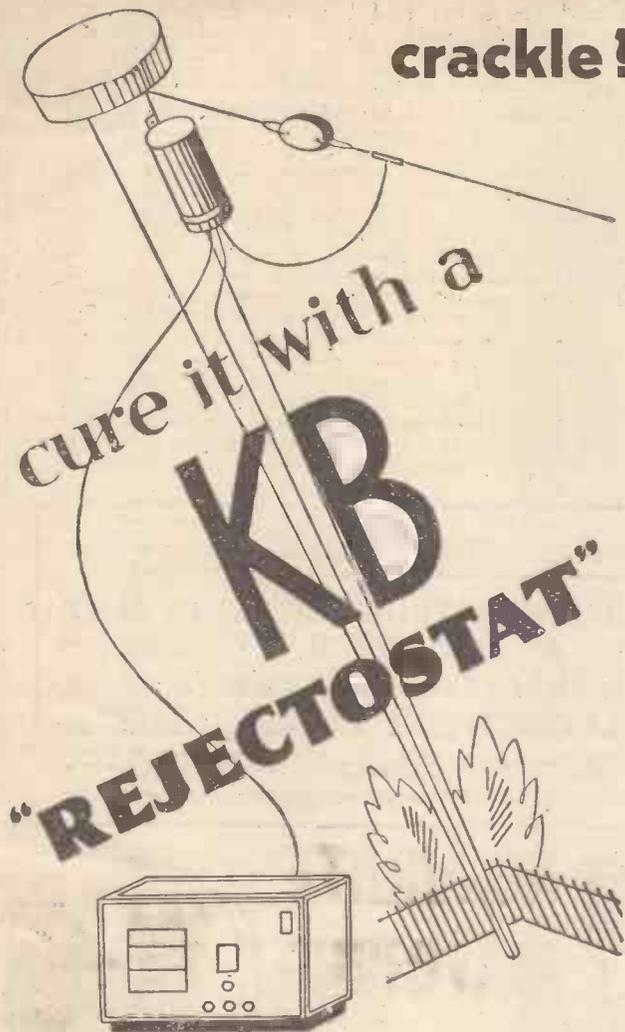
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Controlling the Cathode-ray Beam (Continued from page 552)

on many occasions, but it is advisable to bear in mind one or two points: it resembles an ordinary valve in appearance, but the bulb is filled with mercury vapour, converting it into a true "soft" valve. If the grid is biased to any value and the cathode is switched on, nothing happens until the anode voltage is raised to a certain value (depending on the characteristics of the valve). Once this value is reached the valve will "blue-glow" and the grid will lose all control. Only by reducing the anode voltage to a very low value will the valve go out and the emission cease. The value of anode voltage required to "strike" depends on the grid bias applied and can be made as high as desired. The value of anode voltage at which the valve goes out is constant and is approximately 20 volts.

Using the Thyatron

We can now appreciate how the thyatron can be successfully used to replace the neon lamp in the circuit of Fig. 1, the alteration being shown in Fig. 4. Suppose with a grid bias of 9 volts the anode requires 180 volts to start the

discharge. This will mean that the condenser will charge to 180 volts, and when discharging the thyatron will not go out till the condenser voltage has dropped to 20—a total voltage change of 160 volts.

Fig. 5 shows the charging voltage curve of the improved circuit, which is usually referred to as a "saw-tooth" wave. This should be compared with Fig. 2.

The Double Time Base

The total voltage change in the case of an ordinary neon lamp seldom exceeds 50 volts, and thus the advantage of the thyatron lies in the wider travel of the beam obtainable. The length of "voltage swing" is determined by the grid bias of the thyatron, and hence the complete time-base unit will have two controls—one for speed (the filament rheostat of the diode) and the other for length of travel (grid-bias potentiometer).

When the tube is being used for television, the beam will be caused to travel both vertically and horizontally according to a time scale, and a double time-base circuit will be required. The layout of this is shown in

Fig. 6 and the diodes and thyatrons will be recognised at the back of the chassis. Con-

structional article on single and double time bases will be given in an early issue.

The Receiver and Amplifier for Television

Continued from page 551

synchronising coils of the motor synchroniser. For this we need a synchronising frequency of 375 cycles, and this is taken from the output of the valve modulating the Kerr cell. In order to accentuate the amplification of the 375 cycles this output is fed to a special synchronising valve which follows the modulating valve through a transformer peaked at 375 cycles.

The amplifier may be summed up, then, as having three stages of resistance capacity coupling

with a final special transformer stage for the motor synchroniser, all the supplies being obtained from the mains in the usual manner. The fact that the voltages used are somewhat high need cause no concern for a set of this description is just as safe as any mains-operated receiver. In an early issue we shall give full constructional details of the amplifier with a large-scale layout which will enable anyone to construct it with the minimum amount of trouble.

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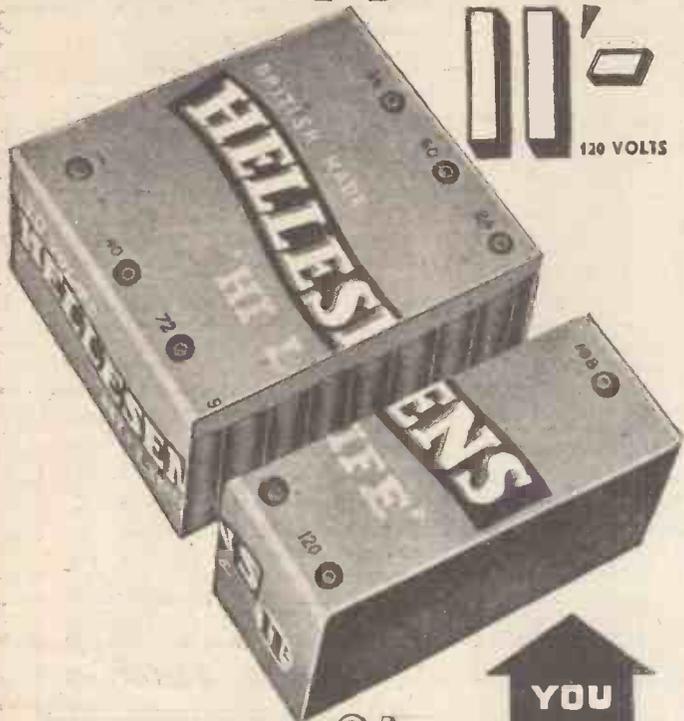
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New D.C. Valves

A NUMBER of interesting D.C. and universal valves have been released during the past few days which should help very much indeed to make D.C. sets comparable with A.C. versions.

The Cossor D.C. valves have been available since the Exhibition, but the D.C. high-frequency pentodes have only just been released. The original range consisted of a variable- μ screen-grid, a high-slope detector and an output pentode.

The introduction of the D.S.-Pen and the D.V.S.-Pen mark another step forward in high-frequency amplification. Both of these valves have 16-volt heaters taking .25 ampere, and both have slopes of 3 milliamperes per volt when operated at maximum efficiency. The D.V.S., that is, the variable- μ type, has a grid base variable between 0 and 20 volts.

The Tunggram Company have just released some new universal valves, that is, valves suitable for A.C. or D.C. mains. These are designated HP1018 and HP1118, both having 10-volt .18-ampere heaters. The HP1018 has

a grid base variable between zero and 52 volts. Both of these valves are very small and slightly less sensitive than usual. The idea of this is to make them suitable for midget and other receivers where there is a possibility of instability occurring.

The HP1018 has an amplification factor of 1,500 and a mutual conductance of 1.2 milliamperes per volt. The maximum anode voltage is 250.

The Osram D.C. high-frequency pentode will be designated DSP1, having a fixed grid base, and the VDP1 having a variable grid base—both valves will retail at 17s. 6d. These are similar to the Cossor valves, having 16-volt .25-ampere heaters and are designed to take a maximum anode voltage of 200.

The maximum slope of the DSP1 is 4 milliamperes per volt, measured with 200 volts on the anode and 100 on the screen. The maximum slope of the VDP1 is 3.5 milliamperes per volt, dropping to .004 milliamperes per volt with 30 volts bias. Both valves are supplied with seven-pin bases.

Notes and Jottings

EXTRACTS from popular films were given by the latest Baird 120-line television system at a meeting of the British Association recently at Leicester. One of the extracts transmitted was a part of the Gaumont-British film, *I Was a Spy*, and the results were comparable with a home-cinema show. The film was projected at the receiving end by means of a cathode-ray tube.

programmes from Athlone, Fécamp, Luxembourg, and Radio Paris. Copies can be obtained from the I.B.C., price 1 1/2 d., post paid.

A new series of sponsored programmes is being broadcast from Fécamp every morning in the week between 11 a.m. and noon, except on Thursdays when the time is from 10.30 to 11.30 a.m.

In our issue of September 16 we stated in the "Postcard Radio Literature" feature that the Igranip tuning unit, the Igranipak, includes a radiogram switching device. This was an error; the Igranipak includes wave-change and mains switching, but not gramo-radio switching.

A new earthing device of the chemical type, known as Siltit, has been marketed by Clifford Pressland (Sales), Ltd. Claimed to be remarkably efficient, the Siltit costs 3s. 6d.

Several types of wet electrolytic condensers are being marketed by the Franklin Electric Co., Ltd., of 150 Charing Cross Road, W.C.2; 4- and 8-microfarad types are available for 275- and 450-volt peak working.

McMichael Radio, Ltd., who have supplied wireless sets to many Royal listeners, have now supplied a moving-coil portable to the Princess Royal. The sale was carried out by Court Radio, of Gloucester Road, W.

Several of the provincial broadcasting studios are in the hands of the decorators. Cardiff's big single-decker is being doubled in height. The architect for this work is Edward Maufe, who was responsible for the decoration of the religious studio at Broadcasting House. New premises have been taken over at Bristol, where J. C. Procter, the architect who decorated the new Leeds studios, is busy working on a new dramatic studio.

Raymond McGrath, who was responsible for many of the Broadcasting House decorations, is preparing new designs for all the studios at the B.B.C.'s headquarters in Manchester.

We have received from the International Broadcasting Club, of 11 Hallam Street, Portland Place, W.1, a copy of the weekly programme of the I.B.C. transmissions. Full details are given of all the Club's sponsored

The Mayor of Barking, Alderman Colonel A. E. Martin, J.P., opened the Block Battery Co.'s new factory on the Barking by-pass recently. Rather an imposing ceremony! The Mayor pressed a button which actuated a siren as a signal for the workers to begin work in the new factory. Leonard Fuller, whose grandfather helped Michael Faraday in his early experiments, gave a short explanation of the new Block high-tension accumulator, which is no bigger than a double-capacity high-tension battery and which has the advantage of being rechargeable when it has run down.

Tennis fans should listen to a talk entitled "Great Britain on the Map Again" by "Bunny" Austin on September 30.

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with an "A.W." full-size blueprint. They are inexpensive and invaluable. See the Blueprint List on page 584 this week

If you are interested in the explorations of Livingstone, Captain Scott, and Francis Drake listen to Clifford Collinson on October 3.

Lovers of Shakespeare's plays will be glad to know that *Othello* is to be heard again in the National programme on October 8.

Sir Walford Davies fans should make a note that his *Everyman* will be conducted by Adrian Boulton on October 15.

Is chamber music your idea of the perfect broadcast entertainment? Whether it is or not, the Busch String Quartet are broadcasting on October 20. The concert will be held in the Concert Hall at Broadcasting House and you can go there if you like.

Wha's New in the New Radio

Continued from page 557

Have Catkins Special Characteristics?

No, they are available as alternatives to existing glass-bulb valves. There is a variable-mu screen-grid, a normal screen-grid, a high-slope detector and a pentode.

Catkins are specially useful in car-radio sets, as they are compact and practically unbreakable even under the difficult conditions of being transported in a car.

Another important advantage of the Catkin is the entire absence of microphonic noises. They are thus ideal in transportable and self-contained all-electric sets, particularly in big sets where there is a great deal of amplification.

A point that might be overlooked is that owing to the very rigid construction the characteristics are unusually uniform, and many set makers are using them for this reason.

The Catkin valves are just as easy to use as any other valves. With the pentode, though, some form of tone-correcting circuit is needed to avoid high-note emphasis.

Is Tone Correction the Same as Tone Control?

Usually it is. Tone correction is usually fixed, whereas tone control, in the nature of things, is variable. Both systems aim at reducing the high-note response of boosting the bass.

In a set with a pentode valve a resistance and a condenser are almost invariably connected in the anode circuit, this being called tone correction. The high-note emphasis is corrected.

For tone control it is usual to use a variable resistance and a fixed condenser, and to introduce these two components earlier in the set, such as across the primary of the inter-valve transformer.

Lately, the idea of tone control has been developed. It is now possible to obtain a two-way control of tone. Moving the control one way cuts off top notes, and moving it the other way reduces the bass.

This can be done by two distinct circuits operated by one spindle to which are connected two separate variable resistances.

One circuit consists of a variable resistance in series with a small inductance choke, and the other circuit consists of a variable resistance and a fixed condenser.

By rotating the common spindle knob, you can then obtain just the right balance of high and low notes you like. This type of tone control should be widely used, as it enables everyone to obtain musical satisfaction from their reproduction.

Usually the values are .01 microfarad for the condenser and 25,000 ohms resistance, with a similar resistance used in conjunction with a .25- or .5-henry choke.

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| AF7 | 1/1.75 | 400/100 " | 30/- |
| AF8 | 1/3.5 | 45/20 " | 11/6 |
| AF10 | 1/3 | 25.5/15 " | 8/6 |

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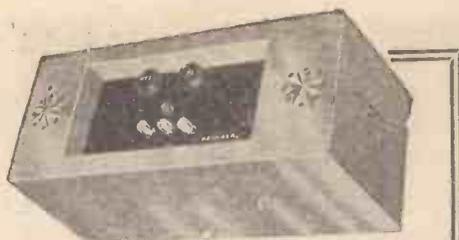
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Potted Biographies—4

Colonel Dawnay

AN additional senior post has been created at Broadcasting House. For a very good reason—increased work and responsibilities. The addition, which does not affect Sir Charles Carpendale, who (as Controller) still remains in charge of administration, is one sincerely welcomed at Broadcasting House.

Colonel Alan G. C. Dawnay, C.B.E., D.S.O., M.A., may be regarded as Controller of the Output Division as from the first day of September.

Colonel Dawnay is forty-four years of age. You can judge what sort of man he is from the fact that he has always taken a keen interest in international affairs. Educated at Eton and Magdalen, Oxford, he joined the Coldstream Guards in 1909. At the outbreak of war he went to France as adjutant of the 2nd Battalion. Later on he transferred to the East, and went to Egypt and Palestine as a member of the general staff.

During the last year of the war Colonel Dawnay was closely associated with Colonel T. E. Lawrence in his campaign against the Arabs.



Colonel Dawnay, the new Output Controller of the B.B.C.

After the signing of the armistice, Colonel Dawnay was in Turkey for some time as Deputy-Chief Political Officer under Field Marshall Viscount Allenby, and took a hand in the administration of the ex-Turkish province of Palestine.

Since the war Colonel Dawnay has passed through a staff college connected with Imperial defence, and has commanded both the Oxford University O.T.C. and the 1st battalion of the Coldstream Guards. He was also with the British delegates at the disarmament conference at Geneva.

Altogether, Colonel Dawnay seems to be a brilliant soldier—the sort of man who should manage to keep them in order up at Portland Place. At all events, from what I hear his appointment has caused deep satisfaction at the B.B.C. Whether he will be the "D.G."’s successor ultimately is hard to say at the moment. Neither does it signify.

Sir John is fortunately still with us, and we hope he will not think of resigning the post he so eminently fills for a long time yet. W.-W.

All About the "Mike"

"THIS is the first general news bulletin" or "This is Henry Hall and the B.B.C. Dance Orchestra"; these phrases are spoken daily into a microphone, or "mike," as it is usually called; but have you ever given the microphone a thought or wondered how it is made? Do you know who made the first microphone, how many different types there are, or the many uses to which it can be put? Do you know a microphone button costs only a shilling or so, and a Narconi Reisz mike about £25? You can learn all these things from an interesting booklet obtainable, price 1s., post free, from Electradix Radios, of 218 Upper Thames Street, London, E.C.4.



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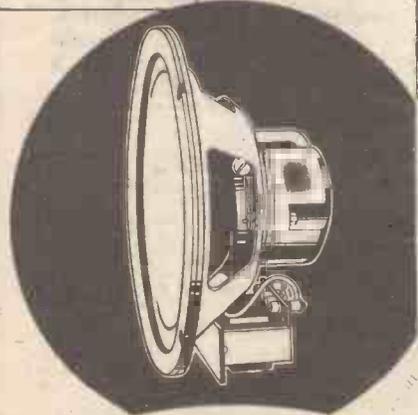
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Postcard Radio Literature

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.

W.B. Microlode Reproducers

I WOULD like to draw your attention to a new leaflet that I have received from W.B., the loud-speaker firm, illustrating the complete range of Microlode loud-speakers. The feature of these loud-speakers is the novel switching arrangement of the matching transformer fitted in the base of the loud-speaker. There are two switch arms on the side of the loud-speaker, the setting of which gives the choice of seventeen ratios for accurately matching of the reproducer to a power or pentode output and four ratios for sets with Q.P.P. or class B.

56

New Runbaken Parts

"It's right if it's Runbaken," says the Runbaken Magneto Co., Ltd., on the cover of their new catalogue, which they have just sent me. It is a book that will interest the radio fan and the motorist. Runbaken list a range of reasonably priced voltmeters, high-tension units and pole finders that will interest all constructors. For the motorist there is a useful selection of electrical accessories.

57

A Radio History Book

"A City of Sound" is the title of an interesting publication I have received from the Marconiphone Co., Ltd. The book, which has been written by E. P. Leigh-Bennett, tells about Marchese Marconi's early experiments and leads up to the activities of the Marconiphone Co. at the present day. At the end of the book a special section is devoted to the range of Marconiphone sets and loud-speakers.

58

Bryce Products

These well-known makers of power equipment and public address amplifiers have sent me some interesting leaflets about their new lines. Bryce make far too many products to describe here, but mains transformers for valve and metal rectifiers, class-B parts, low-frequency transformers, amplifiers, loud-speakers and smoothing chokes are just a few of the chief lines. There is an interesting leaflet about the Bryce-Lynch aerial system which the makers claim abolishes the effects of man-made static.

59

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| 1 | J.B. Lintune 3-Gang .0005 condenser with full-vision scale and dust cover | 1 7 0 |
| 1 | Sovereign pre-set condenser .0005 mfd. | 1 3 |
| 3 | 4-pin valve holders, W.B. | 1 6 |
| 1 | 5-pin valve holder, W.B. | 8 |
| 7 | Belling-Lee indicating winder plugs | 17 |
| 2 | " spot terminals L.T.-4, L.T. | 3 |
| 0 | " indicating terminals | 1 |
| 1 | Westinghouse Westector, type W.4 | 7 6 |
| 10 | Eric resistances, to specification | 10 0 |
| 1 | Bulgin Variable resistance with switch type V.C.92, | |
| | 10,000 ohms. | 5 3 |
| 3 | Belling-Lee Terminal Blocks | 1 6 |
| 3 | Mounting brackets | 9 |
| 1 | Bulgin 3-point switch type S.39 | 1 0 |
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| W.B. type P.M.4A Microlode moving-coil loud-speaker | 2 2 0 |
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| Telsen Super Six, complete kit with valves | 9 15 6 |
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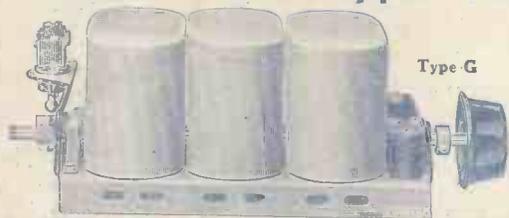
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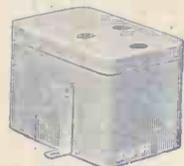
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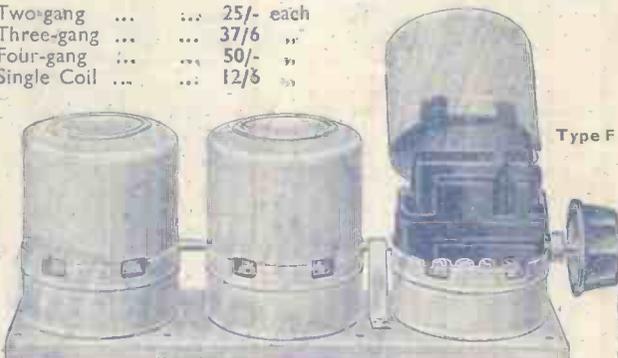
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