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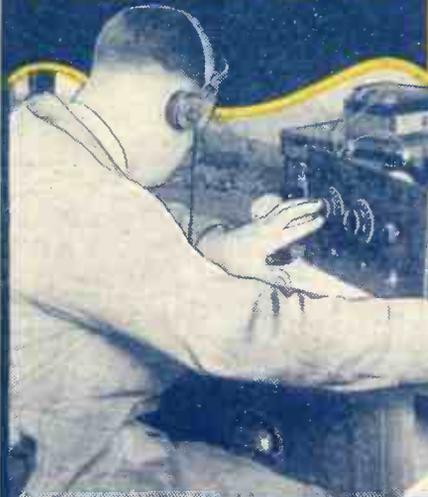
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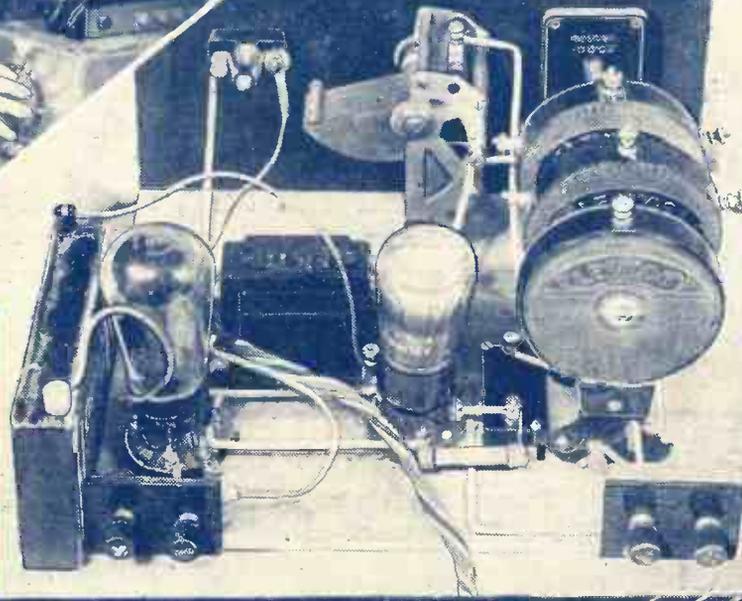
INCORPORATING "WIRELESS"

October 15th, 1932.

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ANNOUNCEMENT ON PAGE 295

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LOTUS GUARANTEED COMPONENTS, specified by all the Leading Designers of the day, are also tremendously popular among amateur enthusiasts, because they represent the certain way to success

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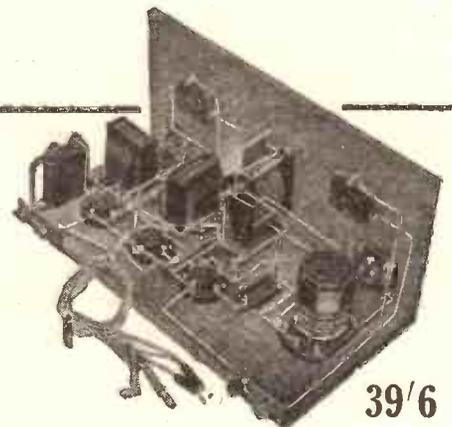
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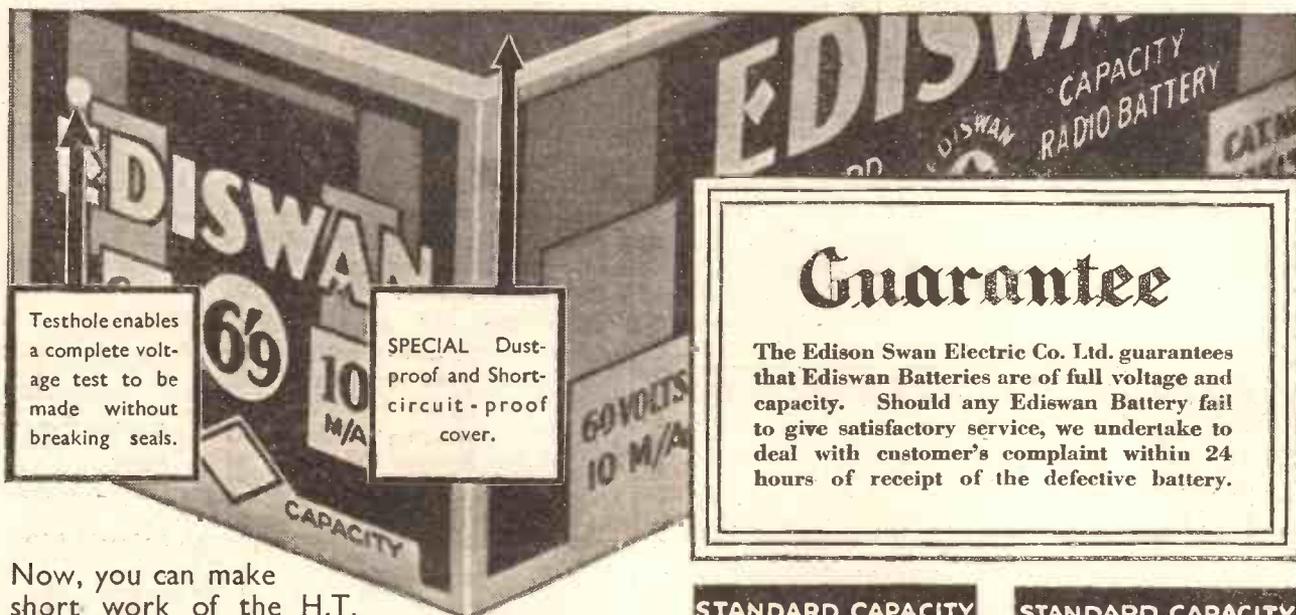


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The Edison Swan Electric Co. Ltd. guarantees that Ediswan Batteries are of full voltage and capacity. Should any Ediswan Battery fail to give satisfactory service, we undertake to deal with customer's complaint within 24 hours of receipt of the defective battery.

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RADIO H.T. BATTERIES**

STANDARD CAPACITY

60 6'9
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STANDARD CAPACITY

120 13'
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9 v. grid bias **1/-** 108 v. grid bias incorporating **12/-** Standard Capacity. Where the anode current required does not exceed 10 M/a these batteries will give highly satisfactory service. If super-power valves are used, the super-capacity type should be used. Super Capacity. These batteries have twice the capacity of the standard type and, owing to their large reserve of power, last nearly three times as long when used as replacements to standard capacity batteries.

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REDUCED PRICES

The growing popularity of American type receivers makes it imperative that their owners should have at their disposal a complete range of American type valves when replacements become necessary.

The range of ETA American type valves is extremely complete and valves can be supplied for almost every set using American type valves. They are of the same high quality—both as regards performance and reliability—as the famous ETA British type valves and they are offered at exceptionally advantageous prices. Once again, the ETA claim to furnish a first-class valve for every type and every set is fully justified. Buy ETA valves and you will be more than satisfied.

VALVES FOR AMERICAN TYPE SETS

A.C. VALVES

Type	Max. Fil. Voltage	Fil. Current Amp.	Anode Current mA	Amplification Factor	Impedance Ohms	Slope mA/V	Function	Reduced Price
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E.Y.635	2.5	1.75	1.25	385	350,000	1.1	Variable-Mu	15/-
E.Y.627	2.5	1.75	5	9	9,000	1	Detector-Amplifier	12/6
E.X.626	1.5	1.05	6.5	8	7,500	1.1	Power	12/6
E.X.645	2.5	1.5	34	3.5	1,750	2	Power	13/-
E.Y.647	2.5	1.5	32	95	38,000	2.5	Pentode	18/-
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E.X.610	7.5	1.25	18	7.5	3,500	2	Amplifier	37/-

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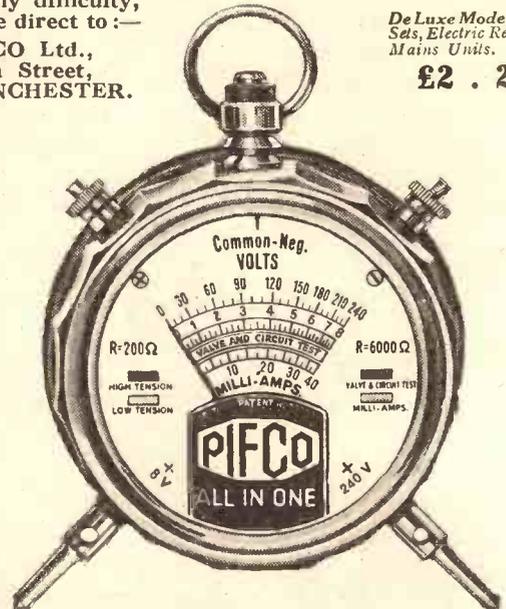
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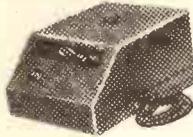
... Dry batteries to give the necessary power for modern valves are expensive and last but a few months. Power from the Mains with an "ATLAS" Unit costs less than a shilling a year and lasts for ever.

The wonderful new "ATLAS" A.C. 300 gives, for the first time, three alternative outputs and supplies H.T., L.T. and G.B. for all sets up to 5 valves. £6.10.0 or 10/- down. Ask your dealer for a demonstration and insist on "ATLAS," winners of the Olympia Ballots in 1930 and 1931.

10/- DOWN AND BALANCE IN EASY MONTHLY PAYMENTS



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Please send me folder describing the complete range of "ATLAS" Mains Units and Components.

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JUST ATTACH UNIVOLT TO YOUR RADIO SET

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INSTANTLY CONVERT IT TO A RADIOGRAM without Cabinet or Mounting

UNIVOLT is needed in every home where there is Radio. Connected in an instant, it reproduces electrically all recorded music through your Radio with full clear beautiful volume... giving the performance of an expensive Radio-Gramophone at the least possible cost. Equipped with a controllable speed motor and the super-sensitive Univolt Pick-up. The case itself is made of solid walnut grained bakelite, effectively harmonising in any home. Univolt is only two inches high to top of turntable.

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STANDARD MODEL For A.C. Mains of Standard Voltages. Equipped with a patented super pick-up with swivel head and weight adjustment, square law volume control and automatic start and stop. **5 1/2 GNS.** Junior Model without pick-up equipment and start and stop action. **3 1/2 GNS.**

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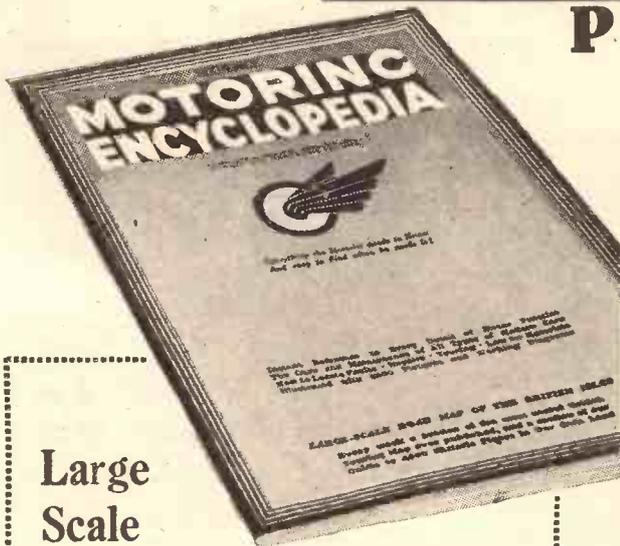
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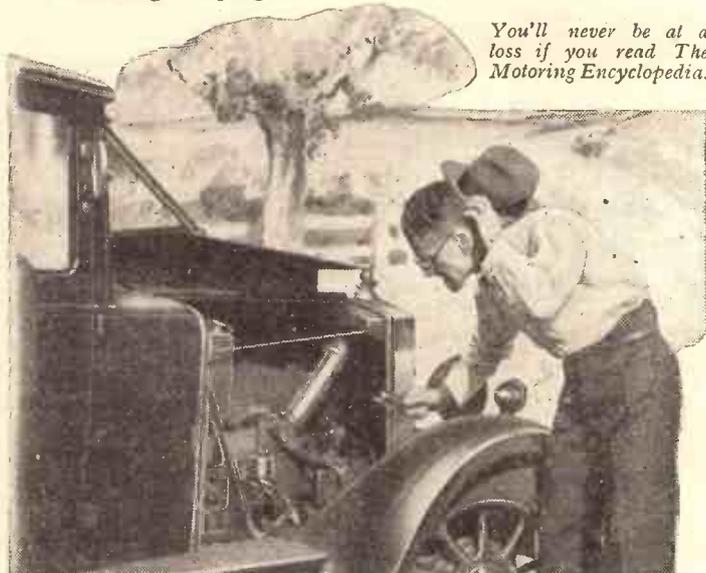
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With metallised Variable-Mu S.G. and 10/-
detector valves, power valve and cabinet. only
Cash Price £6/7/6. Carriage Paid.
Balance in 11 monthly payments of 11/10.

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Complete with valves, speaker, and 10/-
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Chassis model with (Lissen) 8/3
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Lissen Valves, Walnut Console Cabinet 11/6
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OSRAM "THIRTY-THREE" MUSIC Send
MAGNET. Complete with valves, cabinet 15/-
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R & A "VICTOR" PERMANENT Send
MAGNET MOVING-COIL SPEAKER DE 6/5
LUXE. With 6-ratio input transformer and only
protecting grille. Cash Price £3/10/0.
Carriage Paid.
Balance in 11 monthly payments of 6/5.

ROLA PERMANENT MAGNET MOVING- Send
COIL SPEAKER F.6. With universal 4/6
tapped input transformer. Cash Price, only
£2/9/6. Carriage Paid.
Balance in 11 monthly payments of 4/6.

EPOCH "20 C" PERMANENT MAGNET Send
MOVING-COIL SPEAKER. (New Edition.) 6/6
With 5-ratio input transformer. Cash only
Price, £1/15/0. Carriage Paid.
Balance in 5 monthly payments of 6/6

BLUE SPOT SPEAKER UNIT AND Send
CHASSIS. Type 100U. Cash Price £1/12/6. 5/2
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Balance in 6 monthly payments of 5/2.

ATLAS ELIMINATOR. Type A.C.244. Send
Three tappings, S.G., detector and power. 5/6
Output: 120 volts at 20 m/a. Cash Price only
£2/19/6. Carriage Paid.
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GARRARD INDUCTION GRAMOPHONE Send
MOTOR. For A.C. Mains. Model 202. 4/7
Mounted on 12-inch nickel motor plate only
with fully automatic electric starting and
stopping switch. Cash Price, £2/10/0
Carriage Paid.
Balance in 11 monthly payments of 4/7.

BLUE SPOT UNIT AND CHASSIS, Type Send
99 P.M. Including matched trans- 5/6
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THESE PILOT KITS QUALIFY FOR THE "P.W." FREE QUERY SERVICE

Remember, all Pilot Kits are always covered by our own
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APEX THE KIT THAT FITS THE EXACT TO SPECIFICATION FREE BLUEPRINT EXACTLY

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(less valves and cabinet.) Reduced only
Price, Cash or C.O.D., £3/19/6. Carriage Paid.
Balance in 11 monthly payments of 7/3

EKCO A.C. 25 ELIMINATOR. 3 Tap- Send
pings, S.G., 50/80, 120/150 at 25m/a. 7/1
Cash Price £3/17/6. Carriage Paid. only
Balance in 11 monthly payments of 7/1

SONOCHORDE PERMANENT MAG- Send
NET MODEL. With Universal Trans- 6/-
former. Cash Price £1/12/6. Carriage only
Paid.
Balance in 5 monthly payments of 6/-

These are the parts the author used

- | | | | |
|---|---|-------|------|
| 1 | Baseboard, 14" x 10" | s. d. | 1 0 |
| 1 | PETO-SCOTT Panel, 14" x 7", ready drilled | | 4 0 |
| 2 | COLVERN screened coils, type T.D. | | 17 0 |
| 1 | TELSEN '0003-mfd. solid dielectric reaction condenser | | 2 0 |
| 1 | TELSEN 3-point wavechange switch (push-pull) | | 1 3 |
| 1 | TELSEN 2-point wavechange switch (push-pull) | | 1 0 |
| 1 | BULGIN on-off switch, snap type, S.102 | | 1 3 |
| 3 | BENJAMIN valve holders | | 2 6 |
| 1 | FERRANTI '0003-mfd. fixed condenser, mica type | | 1 6 |
| 1 | T.C.C. '0002-mfd. fixed condenser, type 34 | | 1 6 |
| 1 | DUBILIER '0001-mfd. fixed condenser, type 610 | | 1 3 |
| 1 | FERRANTI 2-mfd. condenser, type C.2 | | 3 9 |
| 1 | TELSEN 1-mfd. condenser | | 2 3 |
| 2 | ORMOND No. 6 '0005-mfd. slow-motion variable condensers | | 13 0 |
| 1 | FERRANTI 2-meg. grid leak with holder | | 1 6 |
| 1 | GRAHAM FARISH 30,000-ohm resistance | | 1 6 |
| 1 | DUBILIER 200,000-ohm resistance, 1 watt type | | 1 0 |
| 1 | READY RADIO H.F. choke, S.G. type | | 5 6 |
| 1 | LISSEN Hypernik L.F. transformer | | 12 6 |
| 4 | BELLING & LEE indicating terminals | | 10 6 |
| 2 | Terminal strips, 2" x 1 1/2" | | 6 6 |
| 1 | Wiring, sleeving, screws, etc. | | 1 6 |
| 1 | Piece of copper foil, 10" x 5 1/2" | | 1 0 |
| 2 | G.B. plugs | | 4 6 |

KIT A, Cash or C.O.D. £3 19 0

Lissen Tone Compensator 10/- extra if required.

APEX ALTERNATIVE KIT CHOSEN FROM EDITOR'S LIST.

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Alternative Editor's Kit including Ready Drilled Panel and Terminal Mounts but less Valves and Cabinet. CASH or C.O.D. Carriage Paid.

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Amazing Reception — 40-50 Stations

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*A Triumph of
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SCOUT S.G.3.

- ★ Kit includes the famous Slektun Super Transformer
- ★ Slektun Dual Range Coils.
- ★ Cydon Ganged Condenser with Sector Vision Escutcheon.
- ★ T.C.C. Fixed Condensers.

W.B. Valve Holders and Switches.

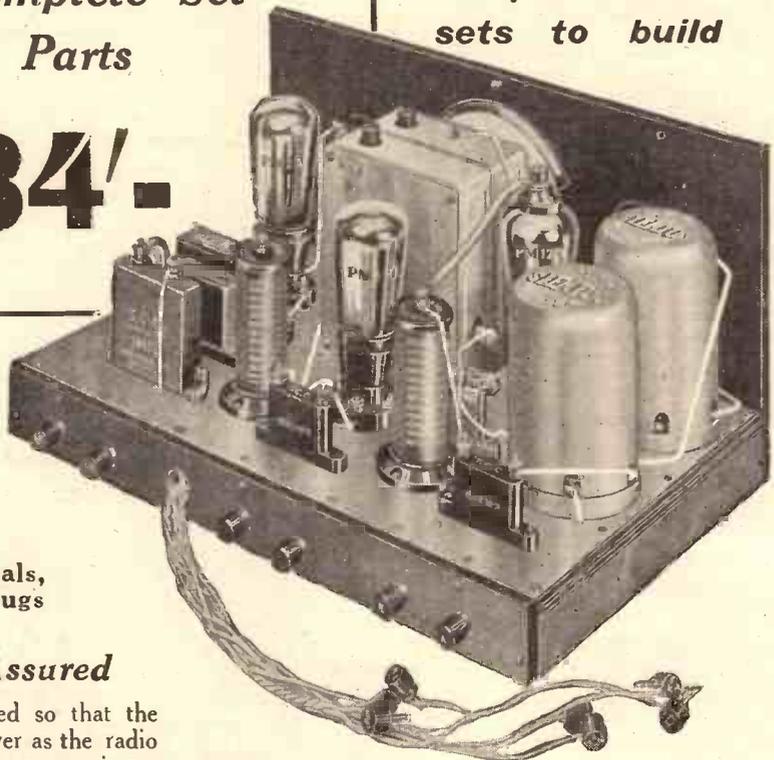
- ★ Ready Drilled Panel and Terminal Strip of "Permcot" non-discolorable Ebonite.
- ★ Baseboard Assembly covered with "Konductite" metallic screening material.

- ★ All necessary screws, terminals, connecting wire, wander plugs and flex.

*Complete Set
of Parts*

84'-

*Simplest of all
sets to build*



Perfect Results Assured

This super set has been designed so that the amateur can build as good a receiver as the radio engineer. All you have to do is to put it together. Every component has been carefully chosen for easy construction and perfect results. Amazing range and selectivity are obtained, and powerful, distortionless performance is assured by the use of Slektun Dual Range Coils and the Slektun Super Transformer. 40-50 stations can be tuned in at full loudspeaker strength—including even Fecamp, a station almost impossible to get with most receivers.

The entire set can be built in an evening by anyone—at very moderate cost. Ask your dealer or write for the FREE Constructional Book.

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FREE *Blue Print and Construction Book*
The book of the Scout S.G.3 is the most comprehensive Radio Set Construction book ever printed. Ask your dealer or write for a FREE copy.

Use the Coupon

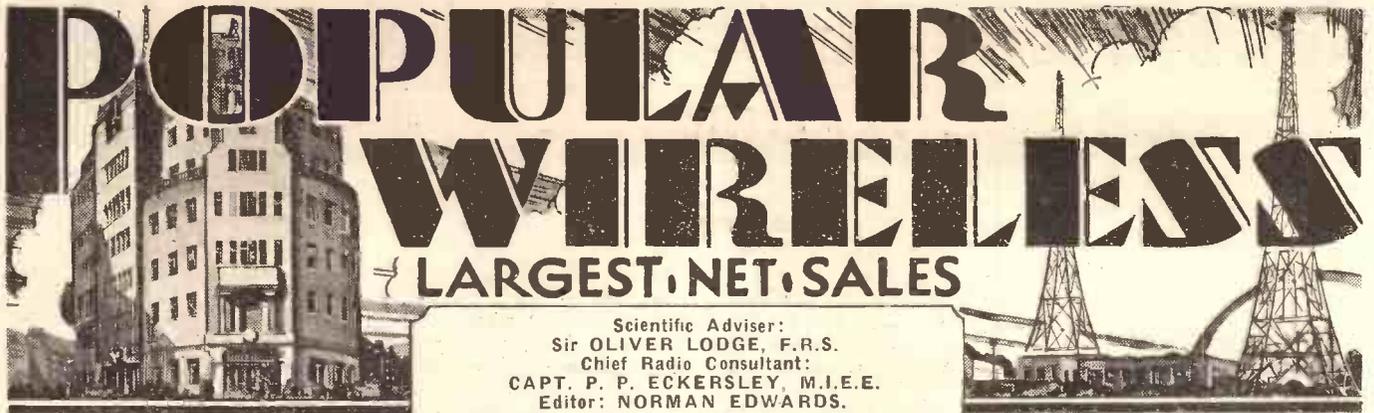
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**BACK TO WORK.
 S O S REVIEW.
 FROM RHODESIA.
 SAY THE WORD.**

RADIO NOTES & NEWS

**CRACKLES FREE.
 QUICK WORK.
 RADIO COOKING.
 SIX WICKED PIPS.**

A German Experiment.

HAVE you got Breslau? If so, have you noticed any marked improvement in its signals lately?

I ask this because the new station transmits on an entirely new type of aerial, which is said to create greater field intensities—that is, I suppose, more millivolts per unit area of field. Moreover, it is claimed for this aerial that it lobs the juice off in such a way that the nearest zone of fading occurs at much greater distances than is usual with ordinary aeri-als.

I cannot say that I lie awake o' nights thinking of Breslau's fading and field intensity, but the point is one which may well interest keen fans.

"Back to Work."

THE photograph of "Ariel" published three weeks ago has brought in some amusing letters. One reader says that he believes that he saw me at Llangollen. Never been there!

Another asks to what uniform my striped bags belong. I had them when I served as Camp Postman with the Serbian Sharpshooters! Another has assiduously searched the pages of "Modern Wireless," and has found in the 1928 (November) number a photograph of a very nice-looking chap smoking a cigarette. Sorry—never smoke 'em! Never did! Nor am I Sir O. Lodge! Entirely my loss.

Amateur League of Nations.

THE Anglo-American Radio and Television Society aims to aid radio enthusiasts and to promote goodwill and fellowship between nations." Thus writes Mr. Leslie W. Orton, one of my Valve Barts. and Hon. President of the society, from "Kingsthorpe," Willowbank, Ux-

bridge. This Society has members, he says, in thirty-three dominions, territories and foreign countries and invites you all to join.

No charge for membership, but as the society has no income you should enclose a stamped and addressed envelope when you write for particulars. Will Mr. Orton kindly let me know what the society does?

Another Society Par.

THE Thornton Heath Radio Society (Hon. Sec., Mr. O. L. Crossley, 40, Parry Road, South Norwood, S.E.25) is hereby highly commended. It has 26 white-hot members, half of them being

the grounds that "spirits" don't drink "cyder.")

Programme Note.

IT seems to me that the B.B.C. has for once hit upon a great idea, for on October 15th it begins a series of talks entitled, "Consider your Verdict." A court of law is a fascinating place if you are a spectator or a jurymen. I love to watch the counsel twitch their wigs and gowns, and to hear the beak's solemn admonitions. Then on October 20th there is to be a play to celebrate the tercentenary of the birth of Sir Christopher Wren; characters taking part include John Evelyn the Diarist, and King Charles II.

A pity they couldn't drag in Sam Pepys!

MISS ELSIE CARLISLE AT THE MANCHESTER SHOW



Miss Elsie Carlisle, the famous microphone artiste, giving an "after hours" turn in the "Popular Wireless" Reception Rooms, at the Midland Hotel, Manchester, to exhibitors at the Northern Radio Show. Her rapt listeners include Mr. W. S. Verrells (Managing Director, E. K. Cole, Ltd.), Mr. Barry Kay (at the keys) Mr. K. D. Rogers and Mr. G. T. Kelsey.

S O S Review.

DURING the first half of this year 493 S O S messages were broadcast, whereas during the whole of 1931 there were only 833. There was an increase in the number relating to missing persons, 191 for the half year as compared with 270 for the whole of 1931.

The percentage of successes in all classes of messages, except those dealing with witnesses of accidents, increased. One out of four messages about missing people was successful.

A successful case of this kind related to a girl who went to St. Thomas's Hospital to be X-rayed after swallowing a pin and ran away while the photographs were being developed. They soon got her back!

From Rhodesia.

HAVE you tried power grid with dual detectors and push-pull output? Oh, boy! Volume with quality!"

So says J. A. K. in a cheery letter from Southern Rhodesia; but I was surprised to see from his printed notepaper that he is now in the motor-engineering business,

(Continued on next page.)

short-wave fans. (By the way, they are waiting for W. L. S. to give them a word or two of encouragement!)

They can stand a lot more members and will be glad to have them. Balance sheet for year ending September 30th, 1932 (submitted on September 23rd—ha!) duly audited and found twenty-five bob on the wrong side with a quid to come. No dividend is to be paid, and they are writing down one valve which seems to have lost its filament. A healthy stock! (Invitation to "Ariel" to have a "wet" declined on

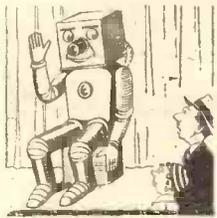
NEWS—VIEWS—AND INTERVIEWS (continued)

having forsaken baccy-growing, which was his line the last time he wrote.

Evidently his zest for radio is unabated, for he got the Somme and Ottawa relays, and wants more like them. Let's hope the new Daventry Empire Short-waver gets going by Christmas, which is the date the B.B.C. engineers are aiming at.

Say the Word.

ACCORDING to the papers, the Robot which made such a stir at Olympia could be irrevocably destroyed by a single word! And that word is the secret of the inventor, who would not hesitate to pronounce it to prevent the Robot from endangering the life of mankind!



It's not "Ur-cha!"

It must be a wonderful word, mustn't it? (No!

Britain's "Air University."

REFER to the flying school of Air Service Training, Limited, which was opened at Hamble, near Southampton, by the Duke of Gloucester in June.

A full course in air radio is available and the gear is Marconi's, who have equipped civil, military and naval aircraft in more than thirty countries. There is a career for air-minded, young, radio men here. And they will be taught by an ex-Royal Air Force instructor.

Crackles Supplied Free.

THERE'S a very crisp story going round a certain South Coast town. It appears that a well-known radio dealer was driven nearly scatty by complaints of interference. All the sets he sold to neighbouring tradesmen crackled and roared every night like Stromboli, and he could suggest no cure. Awful state of affairs.



And then a very small boy went into his shop and pointed out, in a penetrating treble voice, that these crackles always synchronised exactly with the radio dealer's own flashing sign—"Blanks for Radio"! Sure enough, when they turned off the sign the crackles stopped!

That's the sort of thing that does a business no good at all!

A Means of Escape.

A READER of "P.W.," who also reads the "Sunday Referee," that famous week-end tonic, suggests that the better the energy-collecting properties of an aerial the better one can escape from the B.B.C. programmes and rope in foreign stations. I had queried the "S.R.'s," remark about the improved entertainment

derivability from good aërials, on the grounds that a good aerial doesn't make a good programme. "But," says my reader, "I don't agree that the B.B.C. is so bad." He can't have it both ways, though. Nevertheless, he has made his point.

Mysterious Disappearances.

I NOW come to C. M. (East Finchley), who complains about the deadly dullness of the B.B.C.'s presentation of its material. No vim, no zip! Announcers appear to be half afraid—cowed.

Even Chris. Stone's friendly, chatty manner now slightly frozen. As soon as an artiste, a band, an "uncle," an engineer, becomes "popular," he or it disappears. Everyone who appears officially before the public seems to be labouring under a sense of restraint. Etcetera.

Sir, thou speakest sooth. But as to the reason—"ask of the winds, that far around do strew, etc."

"SHORT WAVES"

Listeners are complaining that the B.B.C. does not keep strictly enough to the times mentioned in its programmes. It would indeed be tantalising for a tired business man to rush home after a hard day's work and discover that the Fat Stock Prices have been announced five minutes earlier than usual.

"Punch."

OVERHEARD.

"Can you get any foreign stations on your set?"

"Yes—all at once."—"Pictorial Weekly."

COMMERCIAL CANDOUR.

"Loudspeaker. Remarkable for its completely uniform rendering of the musical scale."—Wireless Dealer's Advt.

"Wireless to Save Trains!" runs a headline in the "Manchester Evening News." But some of the programmes are enough to send the poor things completely "off the rails."

Friend (inspecting colossal wireless cabinet): "What a wonderful wireless set you've got there."

Host: "Yes, not bad; I like to know the correct time."—"Punch."

Gliding Along.

WHEN the National Glider Meet was held at Elmira, U.S.A., some of the local radio amateurs offered to erect and work a 5-metre field station to help on the good work. The weather reports, instructions to pilots, times and names, and orders for lunches, came along in thousands, but they lapped it all up and snapped out their messages in great style.

Fast? You bet they were working fast, as the following spectacular incident shows.

Quick Work.

THE chap on the "Hill 6" station sat by his radio and suddenly saw the rudder structure of one of the sailplanes collapse, leaving the machine skidding over the terrain out of control.

He snapped out an ambulance call to the airport, and before that plane crashed into the trees the Red Cross boys were on the way to it!

Happily the call proved unnecessary, and the pilot escaped with a black-and-blue-ing. But it shows what snappy team work can do!

Radio Cooking.

DID you hear that latest New York yarn about cooking by radio?

Apparently the good old cook, as we know her—big apron, susceptibility to policemen, and all that sort of thing—is as good as dead and done for.

In future the up-to-date housewife will tune in a radio heat wave, put the sausages in it, and when they are done to the proverbial turn she will switch the wave off again!

(But will she? I'll bet she won't, bless her! In that far-off day, she'll forget all about the sausages in the excitement of describing some perky little hat she "tuned-in" on the televisior!)



Rival of the Six Wicked Pips.

COMPLAINTS about the B.B.C.'s tuning note reach me, and the charge is that this totally unnecessary shriek begins long before it is really necessary to those for whom it may—inconceivably!—be necessary. Sometimes it is started a quarter of an hour before broadcasting begins.

No doubt a committee of wise old owls has decreed that these things shall be. For example, a policewoman, the Principal of the Postponed Irish Stew Syndicate, the Chief Chemist of the Association for the Betterment of Steam-whistle Attendants and the Acting Secretary of the Society of Screech Owl Cultivators. A typical B.B.C. Committee!

What we need, however, in this matter, is the exercise of a little plain horse-sense on the part of the B.B.C. They are not allowed to do it. But they will be—one day.

So Slow!

EUROPE has had a nasty set back. When Hugo Gernsback, the American journalist, left our shores, he tried to be kind, no doubt, but he felt impelled to be candid. And his candid opinion of Europe was no skyscraper.

Hugo says radio in Europe is five years behind the U.S.A., and likely to remain so—owing to the slower adaptability of Europeans to new ideas."

But Hugo forgets that, anyway, it was a European who first thought of America. And another European went there just over thirty years ago to show them how to receive these new radio messages he'd invented, and was bridging the Atlantic with!



The "APEX" in ACTION

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

Trying out a new set is always exciting, but the connecting up and installation should not be hurried in a desire to get down to operation. There are a number of important items dealt with this week which should be borne in mind to ensure good results.



IN your very natural desire to get the "Apex" working, you may be tempted to hurry on the job of connecting up the batteries and so on. I always am, and I find it difficult to go about the job cool, calm and collected! Trying out a new set is an exciting event.

However, memories of favourite valves burnt out, and of time wasted in trying to locate faults in sets which were eventually revealed as errors of installation, now effectively apply the brake.

You see, I learnt the necessity of "hastening slowly" by bitter (and sometimes expensive!) experience.

Running a few external leads seems such a simple business and one that ought to take only a few minutes. But to be on the safe side, you should leave an hour, if possible, or at the very least half an hour, for installing any new receiver.

The time won't be occupied with actual labour, because there is not much to do, but remember it involves operation every bit as vital as those you encountered in assembling the set.

Suitable "Teams."

First of all, however, you must get the accessories together. A special table describes suitable valve "teams" and I would urge you to adhere to these as closely as you can.

Makes can be mixed so long as the correct types are employed for the individual stages, and you can try existing valves if you have any in your possession. However, there is this that should be borne in mind. Valves age. They are not everlasting.

And the older the valve the more likely it is to be on its last legs, not so much on account of its actual age in years, but because it is only fairly recently that long-life valves have made their appearance.

A modern valve may give many

thousands of hours of useful service, whereas at one time we calculated the life of a valve in mere hundreds of hours.

A team of new ones is a good investment and, in any case, a good set deserves considerations such as this.

And then there is the loudspeaker. Ask yourself if your present loudspeaker, if you have one, is as good as it ought to be.

Super-Capacity Batteries.

The "Apex" is able to operate a first-class speaker in the way it should be operated. But if you are unable to afford such an instrument, there are numerous

inexpensive models from which to choose that will be vastly superior to any "old-timer."

About 10 milliamperes of H.T. current will be needed, and while a "standard" battery can give this, it will be an economy in the long run to purchase a double- or super-capacity type.

One-hundred-and-twenty volts will be ample, and you would get quite good results with 108, but don't on any account go lower than that.

The grid bias specified for the power valve you obtain at the above-mentioned H.T. will no doubt be about 9 volts, or even less.

However, I am going to advise you to purchase a 15-volt grid-bias battery and endeavour to use a little more G.B. than is recommended. By doing that you will economise in H.T. without in anyway detracting from the volume or tone.

Month Between Charges.

The grid bias is specified for maximum loads, but you may never want to use the valve in this manner. There is only one stage of L.F., and the power valve derives its input from the detector valve instead of, as is often the case, taking it from a preceding L.F. amplifier.

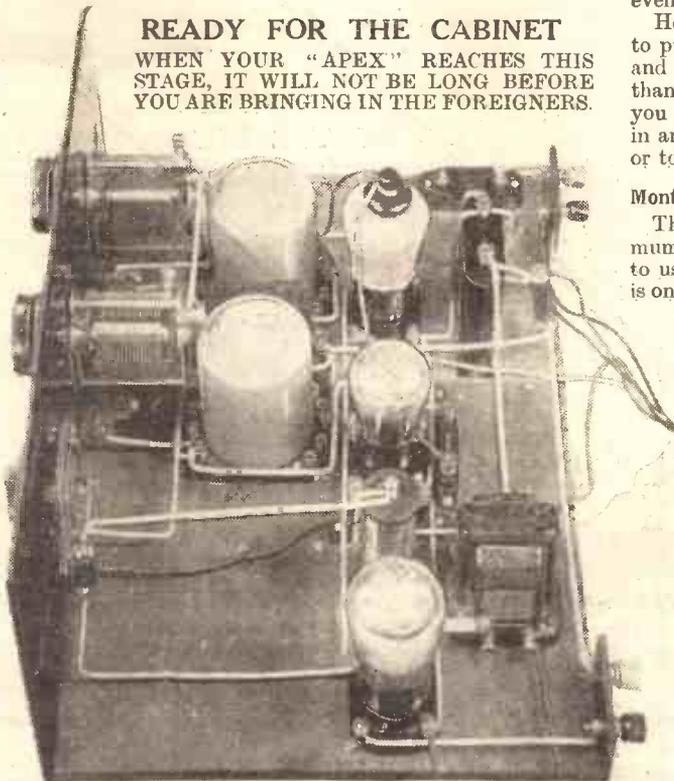
You will, of course, employ 2-volt valves as most other people do these days, and so will require a 2-volt accumulator for supplying the L.T.

I would advise one of 40-ampere-hours capacity. If kept in moderately good condition, this will run the set for almost a month between charges.

It is true that there is something to be said for a large capacity, say 60-ampere hours. For example, it is not so likely to be run right down (a dangerous practice) should the charging be delayed a few days. But you have to pay for capacity and I suggest that every accumulator

(Continued on next page.)

READY FOR THE CABINET WHEN YOUR "APEX" REACHES THIS STAGE, IT WILL NOT BE LONG BEFORE YOU ARE BRINGING IN THE FOREIGNERS.



Terminals are not used on the "Apex" for connecting up the batteries; instead flex leads in a combined cable are employed, and these are joined up direct to the various points on the components. The four terminals are for aerial, earth, and loudspeaker.

THE "APEX" IN ACTION

(Continued from previous page.)

should be charged at least once a month, however little it is used in between times.

No doubt many listeners wait until their accumulators are exhausted before taking them to be charged. They look to their sets to remind them. The set suddenly "packing up" is certainly a reminder, but it's bad for the accumulator.

During the summer such a reminder might also be a comparatively long time coming, and that nasty trouble, sulphation, is apt to develop with charming rapidity once the battery begins to go off colour.

Probably a number of constructors will

THE "APEX" ACCESSORIES

THREE VALVES.—See separate table.

BATTERIES.—L.T. Accumulator: Oldham, Ediswan, Pertrix, Lissen, G.E.C., Exide.

H.T. Battery: This should be of ample size to deal with the requirements of the valves chosen. Lissen, Pertrix, Magnet, Ediswan, Ever Ready, Marconiphone.

G.B. Battery: See above list.

LOUDSPEAKERS: Blue Spot, Marconiphone, Celestion, R. & A., Epoch, H.M.V., B.T.-H., W.B., Ormond, Lanchester, Igranic, Clarke's Atlas.

RECOMMENDED AERIAL AND EARTH EQUIPMENT.—Electron "Superial;" Graham Farish "Filt" earthing device.

want to use a mains unit for the H.T., and so eliminate one battery.

The "Apex" is perfectly satisfactory on the mains.

Vital Links.

I do not propose to discuss aerials and earths at length on this occasion, for the subject has been adequately dealt with in previous issues, and will again be covered

in a week or two's time. I add all this so it



should not be thought I am passing it over as of little consequence.

The aerial and earth are vital links in the reception chain. The "Apex" will operate quite well on an indoor aerial composed of nothing more than a thin wire round a skirting board or picture rail. But you will get more stations on a good outdoor aerial.

Everything being ready for the installation of the set, pause awhile and survey the whole outfit leisurely. Give the internal wiring a final check and make sure stray scraps of material haven't lodged on or near any of the components.

Along the Correct Route.

I find it a good plan to trace through the H.T. connections, for the H.T. can, as I have said, burn out the valves if there is an error in the wiring which leads it in the wrong direction.

Start from the H.T. plus terminals and make sure that the H.T. can travel through only its correct route to the valve anodes and the screening grid of the S.G., and nowhere else.

The H.T. battery connections should be left until aerial and earth, loudspeaker and L.T. are all joined up. Then connect the two H.T. positives, leaving the H.T. negative until you are ready actually to switch on. See that the L.T. switch is in an off position, and then insert the valves in their holders and secure the anode connection of the S.G. valve. Plug in the grid-bias plugs and be careful that you keep these the right way round. If they are reversed, the power valve may be damaged and the H.T. battery overloaded.

**CONNECT
UP THE S.G.'s
ANODE LEAD
CAREFULLY
AND
SWITCH OFF
L.T. WHEN
ADJUSTING
G.B.**

Place the aerial coil plug in socket No. 1. The H.T. positive plug No. 2 should be given the maximum H.T. voltage available, and No. 1 about twenty or so volts less. This latter can be decreased somewhat in cases for better results.

Critical Moment!

Now pause again and survey all these external connections. When you are satisfied that all is well, join up the negative of the H.T. supply and switch on. Switch on! What is the set going to do? Everything or nothing?

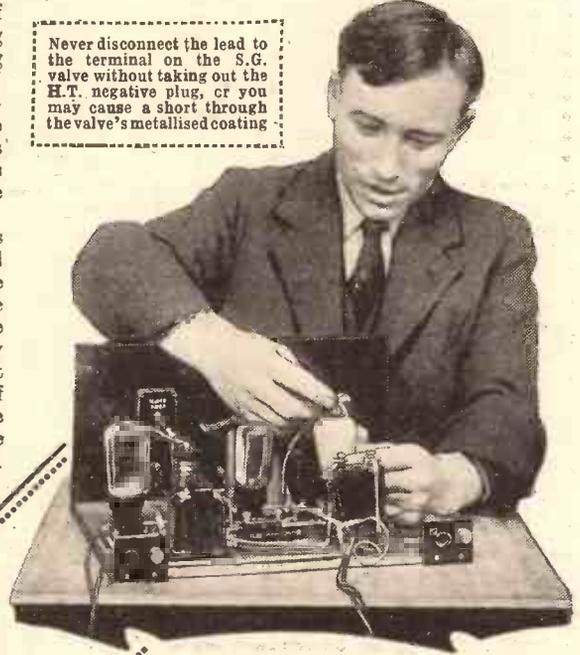
Moving the negative plug of the G.B. battery while the valve filaments are switched on is a very bad practice and one which should be avoided.

It will do nothing if you haven't got the wave-change switches in similar positions, both pushed in for long waves and both pulled out for medium waves!

The present aerial coil tapping is the one giving least selectivity, too, so don't be surprised if your local spreads rather more than you feel it should spread.

No. 5 tapping gives you the greatest selectivity, but on this there is bound to be a little loss of power. So use the lowest number your own particular conditions permit. No. 2 will be better than No. 4, and No. 1 provides the maximum sensitivity.

Don't decide on the coil tapping at once: fix it arbitrarily and leave your final decision until you have had a few evenings with the set.



Never disconnect the lead to the terminal on the S.G. valve without taking out the H.T. negative plug, or you may cause a short through the valve's metallised coating

Having in due course discovered the lowest number of tap you can employ, you can leave it permanently set after that.

In operating the "Apex" remember that the second tuning condenser (from the left looking at the front) is the one which "couples" with the reaction adjustment.

The finer tuning adjustments are made with these two components, and the first variable condenser is not critical to a few degrees. So long as it is approximately correctly tuned, it need not be altered until you have fixed the other two controls.

You Can't Interfere.

You don't want three hands for the "Apex!"

The "Apex" does not radiate, and so you can use the reaction as much as you like when searching for stations.

This is a great advantage. It means that you can introduce a modicum of regeneration and locate your stations by their squeals without interfering with neighbour's reception.

But don't set the reaction too hard over. That is to say, only have the receiver gently oscillating.

A kind of paralytic effect is given by an overdose of reaction.

You should acquaint yourself with the "feel" of the controls at the very earliest opportunity.

(Continued on next page.)

THE "APEX" IN ACTION

(Continued from previous page.)

First learn how to keep the tuning dials in step so that as you rotate the right-hand one in search of stations, your left hand almost automatically flicks the left-hand dial into its approximately correct position.

And when you have located the desired station, perhaps by its squeal, then you can leave the left-hand tuning dial alone while you make the fine reaction adjustment.

Of course, it won't be necessary to make fine reaction adjustments with a large number of stations. In the majority of cases you will not need to refer to the reaction at all except as an initial location and as a final strength adjustment.

You would make the set oscillate by applying just enough reaction, twist the tuning dials until you hear the squeal (which ought to be very loud) and then put

that as you go up the wavelength scale it is necessary to apply more reaction in order to make the set oscillate.

Therefore, to maintain the above-mentioned sensitive condition, it is necessary to make continuous readjustments of the reaction condenser in the same direction as the rotation of the tuning condenser.

SEE THAT THE H.T. POSITIVE PLUGS ARE IN THE RIGHT VOLTAGE SOCKETS



If you get the H.T. positive leads reversed the set will certainly not work properly! It is worth experimenting with the voltage applied to H.T.+1.

I will now briefly describe how I go about the job of finding stations on the "Apex."

I first try the set out on the medium waves without any reaction at all. By this means I hope easily to locate three or four stations. I closely tune each of these with both variable condensers, so as to note the matching of the dial readings.

Juggling the Controls.

Having discovered and memorised this I am in possession of invaluable knowledge, and have reduced the working controls on the set to two.

I know that so long as the left-hand dial shows something within ten or twenty degrees of the probable reading of the station, I can proceed to forget about it and apply myself to the task of adjusting the second tuning condenser and the reaction condenser.

In tuning in a weak distant station I juggle these two controls in and out of the "silent point." I first get the squeal and then tune very carefully to that point from which you run up the squeal as the tuning condenser is moved in either direction.

Although the music or speech is heard in the "silent valley," I edge out of this with the reaction, because there is always distortion in "silent-point" reception.

FROM HERE AND THERE

Random notes on radio topics of to-day.

In the attempt to get a good short earth lead, do not make the fatal mistake of burying the earth plate close up to the wall of the house. Such a situation is far too dry.

Don't let your lead-in wander half-way round the room before it gets to the set, but keep it as short and direct as possible.

The masts of the new Luxembourg station are about 500 ft. high.

Provision is made in Broadcasting House, London, for two types of microphone—the Reisz carbon type, and the condenser microphone which threatens to supplant it.

Buenos Aires recently ordered a new high-power station from this country.

Portugal is planning to build a new station, of 20 kilowatts power, at Barcarena.

The day's programme at Prague starts with a lusty cock-crow, taken from a gramophone record.

Despite its sponsored programmes, the Irish Free State broadcasting service is being run at an annual loss of over £7,500.

VALVES FOR THE "APEX."

Make	H.F. Stage	Detector	Output Stage
Mullard ..	P.M.12	P.M.1H.L.	P.M.2 A
Cossor ..	220 S.G.	210 H.L.	220 P.A.
Mazda ..	S.G.215	H.L.2	P.220
Marconi ..	S.22	H.L.2	L.P.2
Osram ..	S.22	H.L.2	L.P.2
Tungsram	S.210	H.210	P.220
Lissen ..	S.G.215	H.L.210	P.220
Six-Sixty ..	215 S.G.	210 H.L.	220 P.A.
Eta ..	B.Y.6	B.Y.1814	B.W.1304

The S.G. valve chosen should preferably be of the metallised type.

the reaction at zero and get the tuning dials properly lined up.

After a certain amount of experience you will also acquire the knack of "sitting on the edge."

This is to maintain the receiver in the condition of just-not-oscillating all round the tuning dial.

The tuning adjustment which follows the alteration of the capacity of the right-hand condenser (we are, of course, looking at the front of the set all this time) is bound slightly to affect the reaction.

Amaze Your Friends.

It won't be affected much in a modern circuit like the "Apex," but the "on-edge" condition is so delicate that the tiniest variation from a certain set of conditions is likely to upset it.

MORE "APEX" ARTICLES IN "POPULAR WIRELESS"

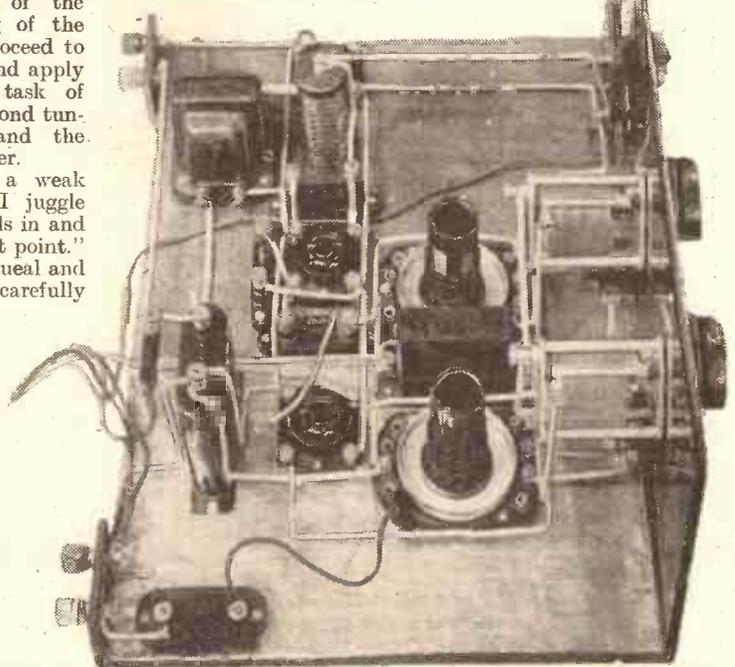
NEXT WEEK: Adding a tone control to the "Apex."

AND THE WEEK AFTER: The "Apex" on short waves.

But if you can juggle the tuning and the reaction so that you keep within a hair's-breadth of oscillation as you swing round the wavelengths, you will amaze your friends by the rapidity with which you tune stations in.

In this connection it should be noted

CHECK EACH PART BEFORE YOU START



When the set is completed it is worth while checking over the wiring to each component before you put in the valves or connect up the accessories.

POLITICS WITHOUT POISON

Some notes on the B.B.C.'s new plan for presenting political broadcasts.

By THE EDITOR.

SOME few weeks ago news leaked out that Mr. Whitley, the chairman of the B.B.C., and Mr. Siepman, the recently-appointed Talks Director, were both endeavouring to obtain more freedom of action in promoting political broadcast debates and discussions.

Quite apart from the occasional official political broadcasts undertaken by the accepted leaders of the various political parties, the new scheme allowed for more free and unhampered political talks, the speakers not necessarily to be party chiefs, or even well-known parliamentary luminaries.

Spontaneity of Snappiness.

In short, Mr. Whitley and Mr. Siepman sponsored an idea which, if put into practice, would provide listeners with political broadcasts of a really genuine brand—unencumbered by festoons of red tape, undiluted with party considerations, and—to continue the variety of metaphors—redolent of the rich, varied, and spicy aroma of genuine entertainment.

The plan was a good one, and allowed for a spontaneity of snappiness sadly lacking in the majority of the official political broadcasts we have experienced in the past.

Mr. So-and-so, an obscure back-bencher in the House of Commons, might suddenly be invited to appear before the microphones to air his views on Protection, or to voice his opinion on the League of Nations; and, perhaps, to debate some such vital subject with his confrère and brother back-bencher, Mr. Such-and-such who sported the colours of a different political party.

Lost His Temper.

If the protagonists got properly warmed up, and somewhat acrimonious—all the better. What a change from the dry-as-dust and "prepared beforehand" speeches made recently by the more exalted party leaders!

And if Mr. So-and-so thought fit to heckle his opponent, all the better; and if the opponent lost his temper and replied, "Go and boil your head!"—why, marvellous! What variety entertainment can possibly compete with the outpourings of political invective of two rival party M.P.'s? What non-stop vaudeville expert of wise-crackery could provide better fun than a couple of back-biting back-benchers?

Indeed, Messrs. Whitley and Siepman hit upon a grand idea, and we watched its development with interest, but also with anxiety. Was it possible that such a revolutionary move in the direction of brighter broadcasts could pass unobstructed? Was it conceivable that this proposal to "off gags" would meet with unanimous approval?

Unofficial Blessing.

Apparently not. Up to a point Messrs. Whitley and Siepman succeeded; indeed, the first of the new "free" discussions was arranged for October 21st.

The Prime Minister had been won over to the idea, had even given it—so we learn—his unofficial blessing at a Cabinet Meeting, and the stage was set for the inauguration of a new era in Politics *carte blanche* and *à la carte*.

Considerably Pruned.

But sinister forces were at work. The scheme aroused violent disapproval in the jealous and conservative hearts of those mysterious beings, the party whips, and now, as we sadly write these lines, we learn that the "date" for October 21st is "off." October 28th is named instead; but it is quite likely that will be "off" too.

In any case, the original plan has been considerably pruned, and, as far as we can judge, if these "free" debates ever get on

spot of repartee, or a pertinent reply to an impertinent interruption. Just a quarter of an hour's uninterrupted "talk" from each speaker! Why, the conditions will be farcical and artificial. The studio will become the politician's idea of Heaven; for not even in the House of Commons, let alone on a debating platform, is there any rigid enforcement of a rule forbidding interruptions.

Handing Out Compliments.

And to conclude, the "neutral chairman" will wind up the debate, handing out, no doubt, what reporters would call "graceful compliments."

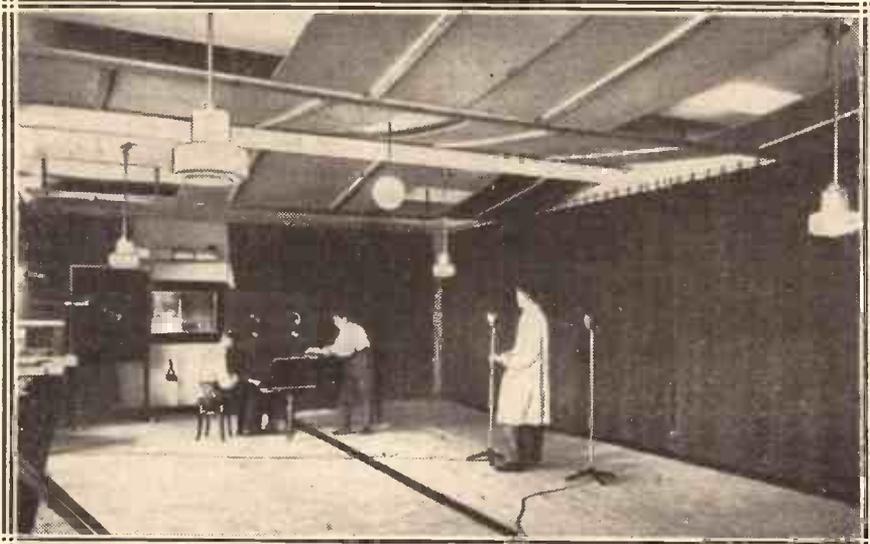
To quote the "Daily Telegraph": "In short, the broadcasts seem to have been arranged with a minimum consideration for entertainment value."

Our condolences to Messrs. Whitley and Siepman.

It was a gallant and worthy plan they conceived, and it deserved a better fate. Still, they might have known that any serious attempt at introducing the human touch into broadcast politics was foredoomed to failure.

Let us hope their fecund minds will evolve other schemes in the near future

IMPARTING "LIFE" TO THE GERMAN BROADCASTS



The Germans are constantly seeking to improve the acoustic effects of studio, etc., and anyone who listens to their political speeches knows how clear and convincing the voices sound. These are Berlin engineers engaged in studio experiments.

to the air, they will be singularly lacking in entertainment value. Up to date, it has now been decided—as a sop, no doubt, to the whips and other opponents of the scheme—that when two politicians appear before the mike, the debate they will be permitted to indulge in will not be of the catch-as-catch-can variety. It will be distinctly formal. There will be a neutral chairman, who will introduce the speakers and deliver himself of a judicial and impartial synopsis of the question to be debated. The two protagonists will then be invited to step on the gas for a period not exceeding thirty minutes, i.e. fifteen minutes each, and they will not be allowed to interrupt each other!

Shame! With one single rule the B.B.C. thus robs the scheme of its joyous possibilities. No chance of hearing some snappy interjection; no chance of hearing a witty

which will mature unimpeded, and which will escape the fate of all schemes which outrage the dignity and scruples of the omnipotent whips.

A READER'S "THANK YOU"

Appreciations of "Wireless in War-time" from a "P.W." enthusiast.

Dear Sir,—Please allow me to congratulate you on publishing the series entitled "Wireless in War-time." This, I consider, is easily the finest series of non-technical articles that you have published, and I am sure that most "P.W." readers will agree that we have followed the amusing and sometimes exciting adventures with great keenness. The author is also to be congratulated on making the articles so entertaining.

Again thanking you

I am, Sir Yours truly,
KENNETH B. CAPLIN.

CAPT. ECKERSLEY'S QUERY CORNER

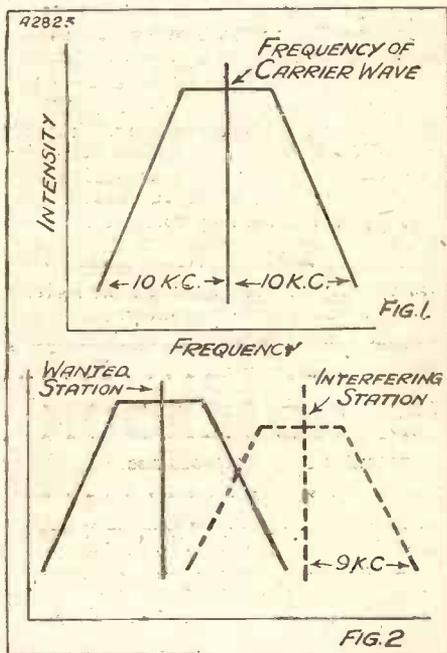
Under the above title, week by week, our Chief Radio Consultant comments upon radio queries submitted by "P.W." readers.

SET DESIGN—FRAME AERIALS—CHOKE RESISTANCE—POSITIVE BIAS.

High Note Cut-off and Heterodynes.

A. R. W. (Harrow).—"Since it seems impossible to obtain good reproduction due to heterodyne interference, and as a result we have to cut off all the high notes, surely it would be possible to design sets at a lower cost if the high notes were ignored. At present sets are designed to respond to the higher frequencies, and then extra components are introduced to

INTERFERENCE CURVES



In daylight, reception of one's "local" may be free of interference, but when night falls a powerful foreign station may impose its programme on the "local."

eliminate heterodynes, and these also eliminate the high notes."

When a broadcasting station sends out programmes it sends out not one, but several frequencies, and the picture of its spectrum looks something like Fig. 1. It's the job of a receiver to pick up all the spectrum of 10 kc., plus 10 kc.=20 kc. wide. If it doesn't it is too selective, and "cuts top."

But suppose a foreign station has its carrier-wave separated by only 9 kc. from the frequency of the carrier-wave of the station you want to hear, and suppose the foreign station is pretty powerful, and suppose you listen at night—then the

powerful foreign station makes the picture look like Fig. 2!

So the poor receiver has to narrow its response to take in only the full line (Fig. 2) wanted station or else there's interference. So the receiver must either cut top and get bad quality or have interference.

I don't think sets are designed just to pick up and then to reject, surely? Isn't it that they do their damndest to pick up all there is to pick up without interference? Or are you referring to this band-pass business?

The general idea is to get a good response of what there is to get and reject the rest. The idea is to make a response like B, and not like A (Fig. 3), but band-pass is not the only or, indeed, the best way to do that.

Directional Properties of Frame Aerials.

B. R. D. (Middlesbrough).—"I understand that a frame aerial has certain directional properties.

"Why is it, then, that my portable set receives stations equally well, irrespective of whether the frame is pointing to the station, or is arranged at right angles to the station?"

Because your portable set hasn't got a true frame—it's half a frame and half an aerial, probably.

A true frame has to be quite symmetrical and free from earth points. It will work earthed sometimes, but there's no assurance that a casually mounted frame having all sorts of capacities here, there, and everywhere will exhibit directional effects.

Inductance and Resistance.

C. T. (Cambridge).—"I have always understood that an inductance only offers opposition to the flow of alternating current. I find, however, that inserting a low-frequency choke in the anode circuit of a valve causes the anode current to drop, which would seem to indicate that the inductance of the choke offered impedance to D.C.

"Is that so?"

An inductance can have resistance, can it not?

In fact, you could not wind a few tens of thousands of turns of fine copper wire without there being a substantial resistance in the winding.

All wire has some resistance, and the more and the thinner the wire the more the total resistance.

You could, I believe, however, make a resistanceless inductance by using a conductor of—is it mercury in liquid helium?



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

Something like that, but no component makers market these. A pity!

Reversed Bias.

R. T. (Dundee).—"On connecting up my new Det. and 2 L.F. set, I made a silly error, and reversed the grid-bias battery, and ran the set for some time with positive bias. Of course, it was very distorted until I located the trouble.

"Do you think that the valves are still O.K.? The set sounds reasonably good, but is not very loud."

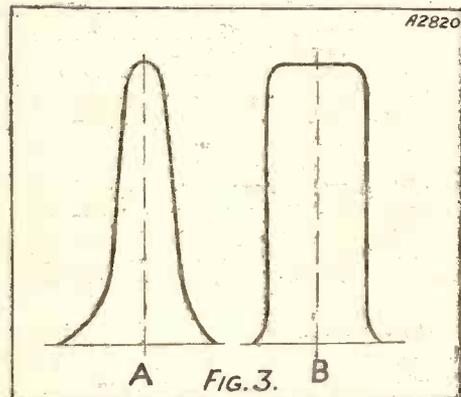
Yes. I think the valves will be O.K., but I should suspect the last valve, if any, of having suffered.

If you had a mains unit the power you could put into the valves is limited and only sheer power could do harm. If you had dry batteries they would limit too.

Only if you had wet batteries or a very "powerful" mains unit could harm have occurred.

By the way, you could have run down your grid-bias battery, because it would have been supplying current, would it not?

IDEAL CONDITIONS



The sharp "peak" causes high-note loss, but good reproduction would result from the ideal "flat-top" curve.

THE MIRROR OF THE B.B.C.

By O. H. M.

PUBLIC PERFORMANCE OF THE B.B.C. ORCHESTRA
THE END OF PLYMOUTH—SCOTTISH NATIONALISM—BIRTHDAY
WEEK PREPARATIONS—PLAYS FROM GERMANY

NOW that London is supplied with two new orchestras, the question has become acute as to whether the B.B.C. should continue public performances by its main orchestra. The issue will be raised in Parliament in November, but the B.B.C. is fully committed to its next series of Public Symphony Concerts, which will run on until May.

Any suspension or modification could not take effect until the season of 1933-1934. Even then, I imagine the B.B.C. will be very reluctant to abandon public performances, which are regarded not only as a useful advertisement but also as essential training for the orchestra.

"Mush" Conditions.

Although original performances from Plymouth in the form of its Children's Hour, local news and an occasional talk are being tried under "mush" conditions since Plymouth, Swansea, and Bournemouth have had to share with Scottish National 238.5 metres, the experiment is not likely to succeed.

When Scottish National is working the range of Plymouth is reduced to an area with a radius rather less than half a mile. It is likely, therefore, that Plymouth will cease original broadcasting at the end of October.

After that, local listeners will get a dance music relay from London instead of the Plymouth Children's Hour. Those who wish for a Children's Hour will have to get it by listening direct to Daventry 5 X X.

Anti-B.B.C. Movement.

The big new campaign against the B.B.C. which has been organised by Provost Murray of Dingwall has encountered a serious set-back in the resignation from the Government of Sir Archibald Sinclair, Secretary of State for Scotland.

Much trouble and time had been devoted to convincing Sir Archibald of the rightness of the anti-B.B.C. movement in Scotland. He was sufficiently impressed to begin to discuss the matter with Sir Kingsley Wood, the Postmaster-General, and although his early advances were rebuffed, he was expected to return to the attack with the reassembly of Parliament.

Now Sir Archibald's successor at the Scottish Office is understood to have no sympathy with the anti-B.B.C. movement North of the Tweed.

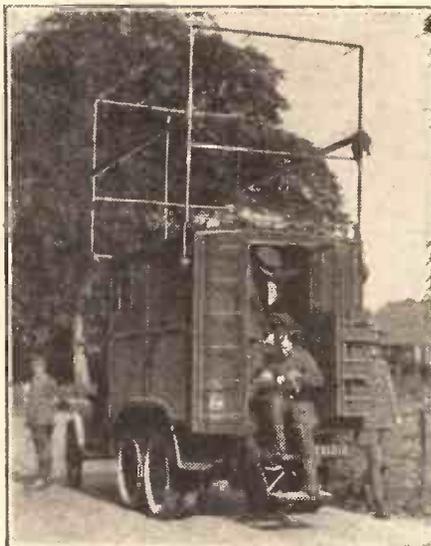
Complete Sound Picture.

A lot of work is being done by many people in preparation for the Birthday Week programmes, which as I have already announced, are being broadcast during the period Sunday, November 13th, to Saturday, November 19th.

It is still too early to give many details of the plans, but listeners can rest assured that as these are developed, and without undue risk of alteration, something will be found in my notes from time to time about

the way the B.B.C. proposes to mark the first ten years of broadcasting in Britain, and the first year's work in its new home at Broadcasting House.

One particularly interesting programme upon which I can touch just sufficiently to

EARS OF THE ARMY

These signallers have halted on a roadside in East Anglia, where they are in touch by radio with divisional H.Q. For mobile work of this kind the short wavelengths are usually employed.

whet your appetites is that to be called "Communications: 1922-1932." Mr. Gerald Cock, Director of Outside Broadcasts, is personally responsible for this.

I understand he is trying to arrange a complete sound-picture covering every form of communication, by means of an elaborate system of about fifty relays from all parts of the world. He will, of course, deal with wireless, the ordinary telephone and telegraph systems, as well as communications by air, rail, road and sea.

I believe that the connecting narrative of the production is being written by Mr. L. du Garde Peach, whose experience of the requirements of radio technique are unrivalled, and that Mr. H. G. Wells will conclude the programme with a brief prophecy of what he believes to be the future of communications generally. With a spot of luck (and in such a complicated series of relays, the Outside Broadcast Director deserves a little) the programme promises to be one of the most fascinating ever devised.

No Foreign Favouritism.

The announcement that another German radio play, "Tannhauser and the Jockey Club," by Hans G. Lustig, is to be adapted for broadcasting to British listeners need cause no alarm that the B.B.C. is favouring foreign authors at the expense of Britishers.

During the last three years no fewer than a hundred and sixty wireless plays have been broadcast from London, of which only three have come from Germany. This fact apart, the excellence of German radio plays is undisputed, mainly because their authors seek to discover good subjects for the microphone which they combine with good dialogue.

In other words, the Germans have taken to writing for broadcasting more seriously than we have in this country.

THE LISTENER'S NOTEBOOK

A rapid review of some of the recent radio programmes.

THE First General News Bulletin is making such a habit of finishing at 6.13 p.m. that I see no reason at all why its allotted time should not be halved.

Apparently these eventful days aren't nearly eventful enough for the B.B.C. to provide a thirty minutes' bulletin. Or is it that they don't know what constitutes news?

Continental stations always seem to find plenty to say, and if the B.B.C. News Department were to listen to these occasionally it might pick up a wrinkle or two.

But if the B.B.C. is satisfied that it gives all that's necessary, and if it doesn't intend to alter its present practice of filling up with a gramophone record or two, may I suggest that announcers take Mr. Desmond MacCarthy's advice *and read more slowly*.

I quite realise that 6 p.m. on Saturdays begins what they might call their rush hour: Reading out football results is a lengthy business, and the announcer has to get a move on if he is to be through by 6.30 p.m.

On other days, however, this speeding

is quite unnecessary. I wonder if one announcer in particular has ever put himself in the position of the racing enthusiast, vainly trying to mark off the 1, 2 and 3 on his race card as they are rattled off in the studio.

If he hasn't, then let me tell him that it can't be done. And let me tell him also that after he has been racing like a hare and we like greyhounds in pursuit it is particularly annoying to hear him say: "It is just 6.13—rather a short bulletin this evening," for this amounts almost to insult.

Too Energetic.

While on this question of speeding, I hope Señorita Maria de Laguna won't mind if I drop a hint. It's no use listeners arming themselves with notebooks and pencils if she is always going to dictate her notes at whirlwind speed. I listened to her first Spanish talk rather with the idea of giving it a trial, but she and her language were far too energetic for my liking.

I fear her course for beginners may prove more of a finishing course for many. The

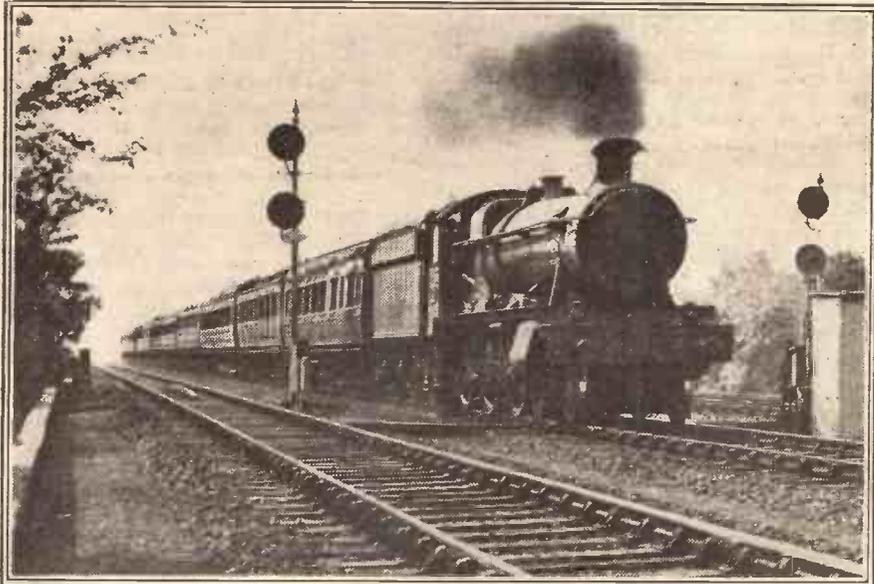
(Continued on page 303.)

GETTING AWAY FROM RADIO

By VAL GIELGUD.

The B.B.C.'s Director of Productions.

The author of the recently broadcast play, "Exiles," tells, in this entertaining article, how difficult it is to be an exile from radio!



THE problem of where to go for a holiday is, for the professional of broadcasting, a serious one. Whether "Nation ultimately will speak peace unto nation" remains something of a moot point, but speak to each other the nations undoubtedly do, since the advent of broadcasting. Therefore, to achieve anything like decent isolation from the circumstances of his daily round and common task is, for the broadcaster, not easy.

I have found a capital set with first-class reception in the smallest of Alpine huts, and been offered headphones—modestly veiled in paper bags—in both French and Hungarian railway trains.

These Charming Men.

The length of my holiday prevents me going further afield than Europe; and not until this year did I succeed in escaping the voices of my colleagues, the announcers; certainly at intervals faint, but quite definitely pursuing. There have been moments when the equable tones of these personally charming men have assumed the appalling attributes of the Furies.

For though it may not be good for man to live alone, it is certainly bad for a broadcaster to listen to wireless programmes on his holiday. It is only when one returns to the consideration of those programmes with a temporarily fresh mind that one realises on the one hand their extraordinary merits—their maintenance of standard, their occasional excellence, their breadth and scope; and remembers on the other their limitations; their monotony, their similarity to Bradshaw, their tendency to Safety First.

His Own Critic.

Unfortunately no broadcaster dare forget that he must, besides being a competent workman, remain the harshest critic of his own work. So he looks anxiously to his holidays for the renewal of his critical faculty if for nothing else.

In previous years I had tried hard to solve the problem. I had chosen where to go largely because I had reason to believe that I might escape wireless there. And, as I have said, I failed dismally. Quality of reception might vary. Its existence was inevitable. This year I trusted to luck, and I very nearly succeeded. True, I gave luck something of a helping hand.

A Steamer Without Frills.

I chose a small steamer sailing to Gdynia in Poland; a steamer whose job was to carry bacon, timber and machinery first, and passengers only second; a steamer, therefore, if I may so express it, without frills. I do not imply I was uncomfortable. I like Polish food, and a Polish captain is a prince of hospitality, and the life and soul of a party. But the passengers were bent mostly on business, there was only one lady on board, and the principal relaxation of all but myself was bridge. I was glad that I no longer played bridge. At any rate, there was no wireless set on board,

apart from the normal ship's equipment.

My heart bounded. I wished to communicate my joy, but my fellow-passengers were as weak in English as I am in Polish. And then my heart fell. For I distinctly heard the word "Radio." I believe there are those who dislike the word as an Americanism or worse, in spite of "The Radio Times." Alas, they are trying to put back the clock. Poles, Germans, and I, we all murmured of "radio" and its implications in most indifferent French.

Films For Bucharest.

And it then materialised that not the least important part of our cargo was electrical equipment for one of the big Polish radio stations! Another, curiously enough and quite by the way, was a consignment of films for Bucharest, which seemed to be going a long way round through Danzig, Warsaw and Buda-Pesth.

Still, on our three days' voyage there was no loudspeaker to provide the atmosphere of home from home; nothing more reminiscent of broadcasting than the trim line of aerials above the houses of Kiel, and the rather less trim line above the houses of Gdynia.

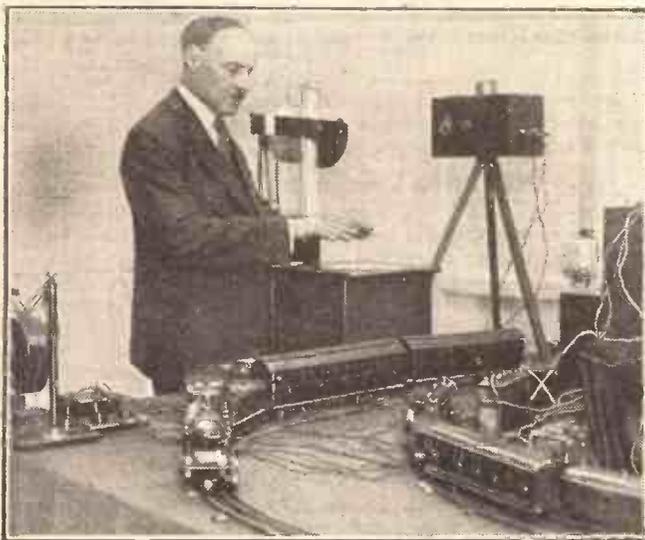
Too Good to Be True.

I was due to spend ten days in Poland, and for escape from wireless during them I had little hope. The Polish stations are powerful, and their programmes popular. I have been told—though I do not vouch for its accuracy—that in order to check the inflow of propagandist broadcasts from Soviet Russia, one Polish station maintains an even flow of the works of Puccini on an equivalent wavelength! I confess it sounds to me too good to be true!

But on this occasion I reaped something of the reward of the true adventurer. I had made no plans beyond Gdynia—except a vague determination to find a beach to laze on, a sea to bathe

(Continued on next page.)

A SCIENTIFIC EXCURSION!



Shown at the Model Engineering Exhibition, in London, recently, this model train automatically obeyed a wave of the hand or a stern command by voice!

GETTING AWAY FROM RADIO

(Continued from previous page)

in, and a fairly cheap hotel. And I took the advice of one of my fellow-passengers without the precaution of any further enquiry whatever.

As a result I found myself in possession, not only of the hot sand, and blue water I desired, but also of what must be the only hotel in Europe without either a wireless set or a gramophone. Music of course there was, or it would not have been Poland. But it was provided energetically, if a trifle wildly, by some students also on a holiday, who, if I was not mistaken, were "playing for their supper."

Breach of Good Manners.

I will not pretend that the very place knew not wireless. There was another hotel. There were villas. Their aerials betrayed them. And one night, warmer than ordinary, I passed a terrace on which young men and maidens, tanned beyond the dreams of Antibes, and wearing brilliantly coloured beach pyjamas of an astonishing bagginess, were dancing with a loudspeaker blaring behind them. It was the only instance, in spite of the prevailing hot weather, of that monstrous breach of good listening manners.

It was perhaps with the faintest suspicion of homesickness that I listened to hear if it was Henry Hall who played. It was not. And that was all I heard of wireless for ten days.

So back to Gdynia and aboard another steamer, of the same type but smaller, and with yet fewer passengers. For this time we were but five in all. But now it seemed that the fates thought I had had enough rope—or perhaps merely sufficient holiday. After dinner I went on deck to recover something of the eternal undergraduate in admiration of a night of full starlight over the Baltic.

Inspired by Factories.

The captain approached me, diffidently, charmingly, apologetically. Did I perhaps care for music? Himself he enjoyed a little music after dinner. Before dinner, Wagner. After, dinner, music—the romantic—Schubert, Schumann, Chopin. He confessed himself musically an emotionalist. He disliked the moderns—the composers inspired by factories and machines. An old-fashioned man. My heart warmed to him.

I followed him to his cabin, where the other four passengers were also gathered at a table strewn with Polish illustrated papers. The captain sat down. A switch turned. Knobs revolved. From Warsaw came a concert of Mozart.

"Very classical on Fridays," murmured the captain, rather regretfully, I thought.

We heard a symphony through. We were good listeners. We did not talk. I hardly dared to smoke. And we enjoyed it.

"Very selective, my little set," said the captain, when it was over.

A Man I Met in Breslau.

He showed us. We heard the beginnings of a talk from Denmark. We heard a superb O.B. concert of light operetta music from a big hall in Berlin. We heard some Brahms—oddly enough no propaganda—from Soviet Russia. That I admit gave me a queer thrill; the unexpected coming out of the unknown. We heard a Mendelssohn trio from somewhere else in Germany. And then I had a real shock, for we heard the Schlesische Rundfunk calling from right away in the south, and I recognised the

THEY LISTEN AS THEY FLY



How ubiquitous radio has become is well illustrated by these passengers on an air liner listening as they fly across the Channel.

voice of the announcer as that of a man I had met when I visited Breslau a little over a year ago.

"My Holiday Was Over."

One had the most uncanny longing to answer him, and draw his attention, as though one saw a friend on the other side of a thick plate-glass window. And then finally London, and one of my own colleagues reading the "Second News Bulletin, Copyright Reserved." I thanked the captain politely and went to bed. I felt a trifle melancholy. England was still two full days and nights away. But Broadcasting had caught me by the heels. My holiday was over.

And when I woke the next morning, wishing vaguely to write, and seeking equally vaguely for a subject, I did not have to wait long. This article is the result.

AN "ANNUAL" FOR THE AMATEUR

("The Chronicle Wireless Annual," tenth edition, published by Allied Newspapers, Limited, at 1s., post free 1s. 4d.)

THE publication of "The Chronicle Wireless Annual" is an event looked forward to every year in the household of many a radio enthusiast. The tenth edition of the Annual has just reached me, and I cannot help remarking how thoroughly the compilers have kept up with the march of progress in radio technique.

The year 1932, which sees the close of the first ten years of broadcasting, has brought with it the need and the desire for "bigger and better sets." But the popularity of the super-het., and the powerful mains-operated receiver has brought with it a tendency in many quarters to disregard the needs of the more modest home constructor.

The Chronicle Wireless Annual sets out to cater for the amateur set builder, be he a novice of one week's standing or an expert with years of practical experience behind him. How well this aim has been achieved is shown by the fact that the new circuit designs in the Annual range from a five-valve super-het. and an A.C. three-valver, down to a simple but highly selective crystal set; while the technical chapters deal with such widely separated subjects as television and tone-control, or gramophone speeds and reception problems.

A Coloured Map.

Actually eleven different chapters are devoted to the construction of eleven different valve sets, each with its own wiring diagram and

explanatory photographs.

Among the attractive novelties in the Annual may be mentioned a coloured map of the principal broadcasting stations in Europe, a full-size gramophone-speed tester which deals with either 78 or 80 r.p.m., and a comprehensive list of foreign broadcasters with details of wavelength, call-sign, interval signal and power.

With regard to advertisements in a publication of this sort you are often apt to take the advice of the Bellman in the "Hunting of the Snark" and to "skip your dear uncle!" I found, however, that the advertisement pages of the Chronicle Wireless Annual are not the least interesting part of the book.

The Chronicle Wireless Annual is a really good investment for a shilling, chiefly because it has succeeded in studying the requirements of every sort and condition of amateur constructor.

P.C.

TELSEN

L.F. TRANSFORMERS COUPLING UNITS and OUTPUT CHOKES

TELSEN "RADIOGRAND" L.F. TRANSFORMERS

Typical of all that is finest in British Radio craftsmanship. Designed in accordance with recent research, constructed on the soundest engineering principles and tested rigorously for immaculate performance and ensuring efficiency.

Ratio 3-1 No. W.59 7/6
Ratio 5-1 No. W.58 7/6

TELSEN "RADIOGRAND" (Ratio 1-75-1) TRANSFORMERS

For use in high-class receivers employing two stages of L.F. amplification. When used following an L.F. stage employing choke or resistance coupling, it gives ample volume with remarkable reproduction.

No. W.61 10/6

TELSEN "RADIOGRAND" (Ratio 7-1) TRANSFORMERS

Gives extra high amplification on receivers employing only one stage of L.F. amplification. Not recommended for use with two L.F. stages, as overloading is likely to occur.

No. W.60 10/6

TELSEN POWER PENTODE OUTPUT CHOKE

For mains operated pentodes taking an anode current of up to 40 m.a. Serves both to prevent direct current passing through the speaker and to match the speaker to the pentode valve, with the choice of three ratios—1-1, 1.3-1, 1.7-1. Used with a 1-mfd. condenser it gives a great increase in both quality and volume.

No. W.172 10/6

TELSEN TAPPED PENTODE OUTPUT CHOKE

For mains and battery operated pentodes taking an anode current of up to 20 m.a. The single tapping provides (by reversing) ratios of 1-1, 1.6-1, 2.5-1, ensuring perfect matching under widely varying conditions. Also suitable for matching a low impedance speaker with an ordinary power valve, a 1-mfd. coupling condenser being recommended for this purpose.

No. W.72 7/6

TELSEN INTERVALVE L.F. COUPLING CHOKES

Primarily designed for use as coupling chokes, but may be used in any circuit carrying not more than the stipulated maximum current. The 100 H type is for H. or H.L. type valves, and the 40 H for L. types.

Rating	Normal Current	Max. Current	No.
40 H. @	5 m.a.	10 m.a.	W.68
100 H. @	3 m.a.	8 m.a.	W.69 5/-

TELSEN OUTPUT CHOKE

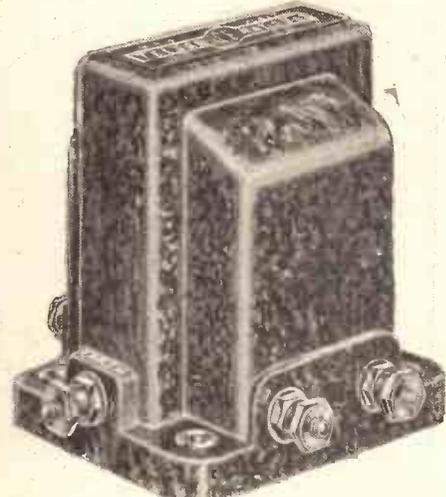
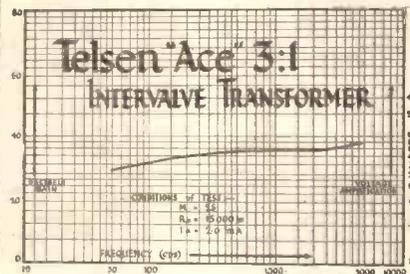
Designed for use with power or super-power valves taking an anode current of up to 40 m.a., this output Filter provides an ideal response curve under all conditions. For use with a condenser of not less than 1 mfd. capacity.

W.71 7/-

THE TELSEN "ACE"

The Telsen "Ace" is eminently suitable for Receivers where highest efficiency is required at low cost and where space is limited. As its characteristic curve will show, it gives a performance equal to that of the most costly transformers. Ratio 3-1 No. W.66
Ratio 5-1 No. W.65

5/6

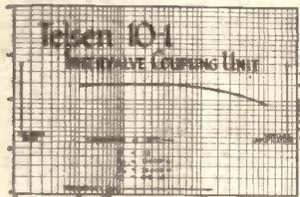


TELSEN 10-1 INTERVALVE COUPLING UNIT

A filter-fed transformer using a high permeability nickel alloy core, securing a 10-1 voltage step-up while preserving an exceptionally good frequency characteristic. The response is compensated in the higher frequencies for use with a pentode valve giving an amplification greater than anything previously achieved, equal to two ordinary L.F. stages but with better quality of reproduction.

No. W. 215

12/6



TELSEN 1-1 INTERVALVE COUPLING UNIT

A modern development of the deservedly popular R.C. unit incorporating a low pass filter feed in its anode circuit, thus preventing "motor-boating," "threshold howl" and other instability due to common couplings in eliminator and battery circuits. Used with an H.L.

type valve it gives an amplification of about 20 and a perfect frequency response on a negligible consumption of H.T. current. No. W.214

7/6



TELSEN MULTI RATIO OUT- PUT TRANSFORMER

For use with moving-coil speakers, having a low impedance speech coil winding, and suitable for anode currents of up to 40 m.a. Three ratios—9-1, 15-1, 22.5-1—allow for correct matching of speakers of widely varying characteristics.

No. W.63 10/6

TELSEN OUTPUT TRANS- FORMER (Ratio 1-1)

For connecting the speaker to the output stage, using a triode valve. Avoids saturation by isolating the D.C. from the speaker windings. Also keeps H.T. voltage from the speaker and its lead, which is especially important where a D.C. eliminator is being used. Suitable for anode currents of up to 40 m.a.

No. W.62 10/6

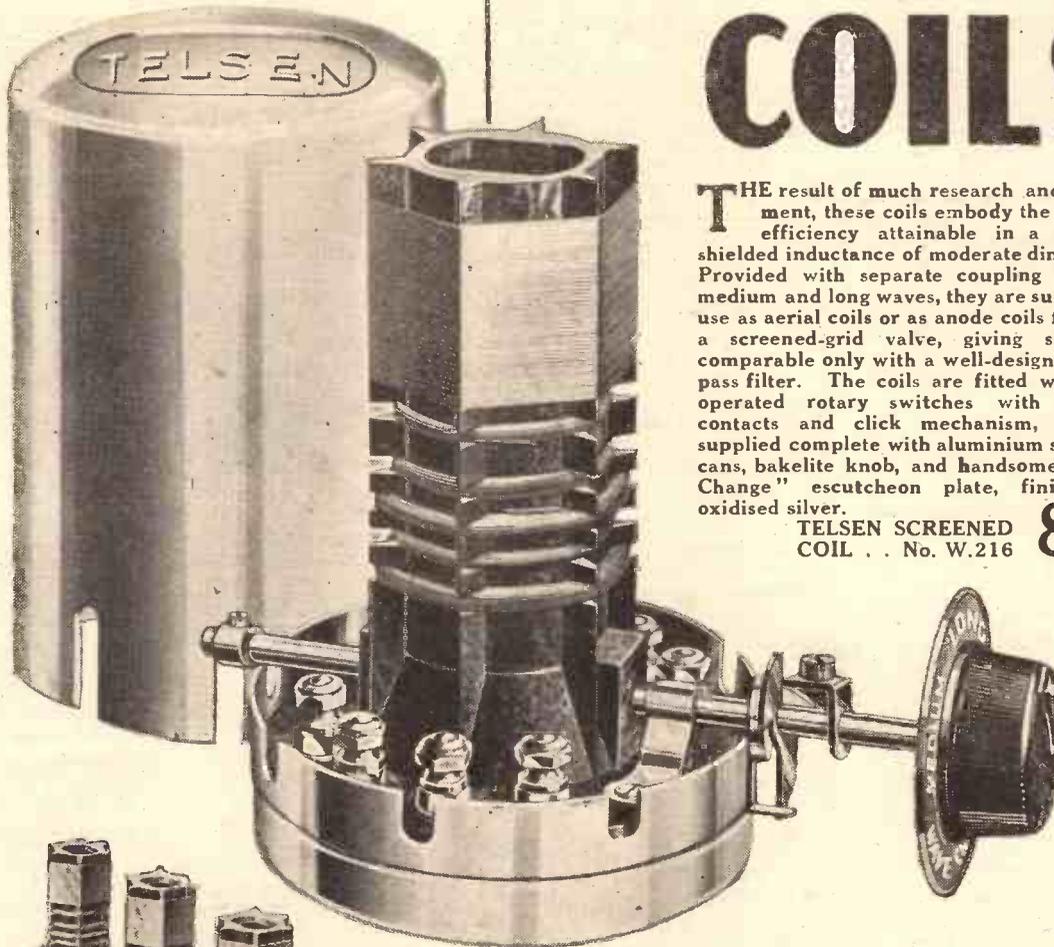
TELSEN

RADIO COMPONENTS

BUY A COPY OF THE TELSEN RADIOMAG - PRICE 6d.

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

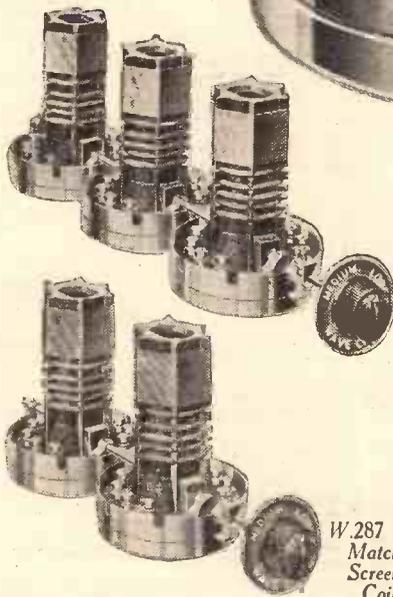
TELSEN SCREENED TUNING COILS



THE result of much research and experiment, these coils embody the ultimate efficiency attainable in a perfectly shielded inductance of moderate dimensions. Provided with separate coupling coils for medium and long waves, they are suitable for use as aerial coils or as anode coils following a screened-grid valve, giving selectivity comparable only with a well-designed band-pass filter. The coils are fitted with cam-operated rotary switches with definite contacts and click mechanism, and are supplied complete with aluminium screening cans, bakelite knob, and handsome "Wave Change" escutcheon plate, finished in oxidised silver.

TELSEN SCREENED
COIL . . . No. W.216

8/6



W.288
Triple
Matched
Screened
Coils
25/6

W.287 Twin
Matched
Screened
Coils
17/-

Full instructions are supplied with every Telsens Screened Tuning Coil, showing you the alternative methods of mounting the coils, either singly or in twin-matched or triple-matched form as required.

TELSEN

RADIO COMPONENTS

BUY A COPY OF THE TELSEN RADIOMAG - PRICE 6d.

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



IT is unfortunate that although thousands of pounds are being spent on Empire publicity, the B.B.C. maintains a very "hush-hush" attitude regarding the new Daventry Empire stations.

Right at the start, when the contract was first placed for the huge amount of plant needed for the stations to cover the whole of the Empire, there was too much secrecy. It was costly. Rumour went round that an American concern had the contract. Daily papers with an "Empire" complex were up in arms.

The builders of a great deal of the gear at Rugby, Standard Telephones and Cables, had to spend a large sum of money in dispelling the rumour and showing that not only was it a British organisation that was building the Empire station, but that all the apparatus would be built just outside London.

The present position is that at Daventry the B.B.C. has fifty acres over which to spread the seventeen aerials needed for the two transmitters. By taking the 5XX plant to Droitwich, 42 miles west of Daventry, and putting up the power to 100 kilowatts, the present 5XX site is left clear for Empire work.

Meters on High.

The seventeen aerials will be directional. Beam reflectors will be fitted. The aerials will be on short wooden poles, and the aerials will be switched on according to the time of day and that particular part of the Empire for which any transmission is required. The H.F. meters in the aerials will be high up in the air, and at the station building there will be

Rapid progress is being made with the new B.B.C. short-wave station at Daventry, and when finished it will represent the most up-to-date short-wave technique in the world. Here are some interesting details.

By Our Special Correspondent.

optical arrangements, so that the station engineer can see the H.F. input to any directional aerial working at the moment.

Keeping the Wave-length Steady.

I have been privileged to see the type of gear which is to be fitted at Daventry. It is not possible to disclose the style of apparatus, as in a short-wave transmitter this is the whole key to the power output. The power varies with the wave-length.

The power-handling capacity of a valve normally rated at 10 kw. may vary from 7½ kw. at a wave-length of 40 metres to only 5 kw. at 15 metres. A type IV transmitter is part of the plant at Rugby, with a group of short-wave aerials hung on a cable between 250-ft. high masts.

The great thing, I am told, with the new plant will be to keep it stable. In the Standard system a bank of crystal controls is used. The crystals are in sealed brass holders in a cast iron box lined with asbestos. There are four crystals in each box and a big knob on top, switching from one to the other. Inside the box is the usual thermostat and electric heater working off the mains.

There will be several wave-length controls at Daventry, as the wave-length will be altered during the day to correspond with reception conditions and if, in emergency, there is no crystal available for the

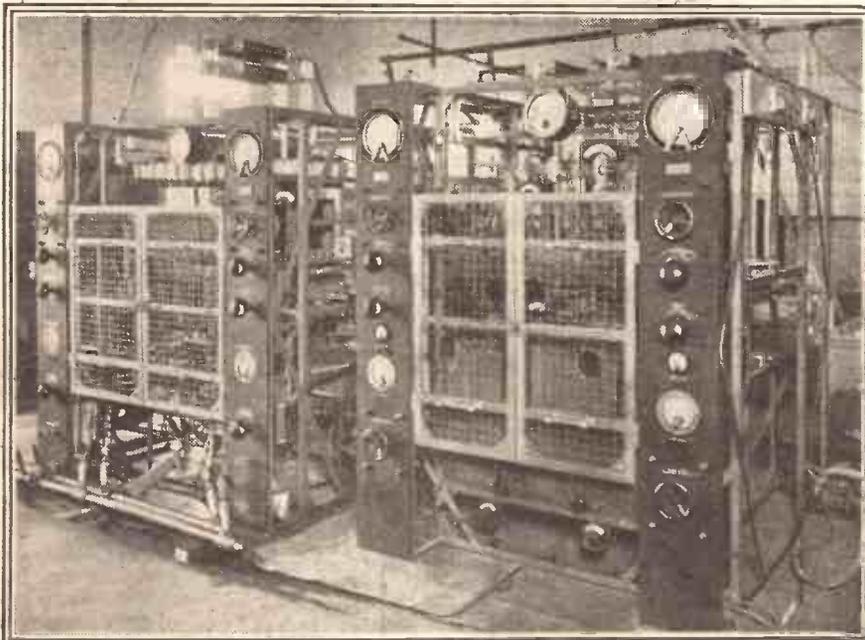
wave-length needed, the oscillator can be changed by a switch to the "free" type and adjusted by a wave-meter.

Cooling Methods.

In these transmitters there are three radio units, three power panels, and a very extensive water-cooling system. The transmitters can tune from 15 to 40 metres, and the second type from 15 to 60 metres. It takes about ten minutes to change over the crystals and retune the H.F. circuits. The H.F. panels are of slate, with all the apparatus behind on duralumin framework. There are the usual safety switches to the doors, and copper tubing runs from one panel to the other.

(Continued next page.)

KNOWN BY BRITONS THROUGHOUT THE WORLD



The transmitting apparatus at G5SW, the Chelmsford short-wave station of the B.B.C. After many years of faithful service to 700,000 across the seas, it is to be replaced by the new stations being built at Daventry.

THE NEW EMPIRE STATION

(Continued from previous page.)

The valves take twenty or thirty gallons of water a minute for cooling. In the Standard equipment the heat is dissipated by four radiators, enclosed in a wind tunnel, through which air is drawn from outside the building by a large fan. These big water radiators are 5 ft. high. This scheme may be modified at Daventry for outside cooling.

Permanent Crystals.

I am not yet at liberty to disclose full details of the method of modulation, but everything points to excellent quality. The Rugby telephony is among the best speech heard on the short waves. Anyway, there will be no wavelength wobbling. I hear that very thick crystals will be used, meaning a low frequency. The frequency is, of course, stepped up by valves. These thick crystals are much more stable, and there is less risk of a fracture.

There is an amplifier between the harmonic generators and the master oscillator. The harmonic generators have a very high grid bias, and this produces powerful harmonics which are made use of instead of the original crystal frequency. The last stage of the doublers is connected to a 500-watt amplifier, where modulation starts. As a guide to enthusiasts, I might mention that the Heising choke control system is used.

I will not delve too far into technicalities, but all short-wave "fans" will know that unless something special in the way of modulation is used, the short-wave quality is bad.

Bottled Programmes.

The method to be used is known as Class 3 amplification, and although this method produces harmonics the envelope of the amplified wave is not distorted. The harmonics are, of course, filtered out and are not broadcast.

Each of the dual transmitters will have its own cooling pump, motor, radiator set, and expansion tank. Big 10,000-volt water-

cooled valves in push-pull are connected to the aerial. These valves take over 500 volts grid bias. The H.T. and G.B. for all the crystal-control valves will come from the banks of accumulators to be fitted up for emergency working at Daventry.

There will be a small studio for testing, but all the programmes, even those which are "bottled" for broadcasting during what is to us the night, will come from London on the existing 5 X X lines. The Broadcasting House control room will be the key-point of the new Empire transmissions.

IN THE FIELD



A portable field station in operation somewhere in Sussex during Army manoeuvres. Note the short, unobtrusive mast.

ITEMS OF INTEREST

Don't be satisfied with a twisted joint in your aerial or earth wire—it will be a graveyard for weak stations.

The word "Pronto" sometimes heard from Italian stations means "Ready" and is used very much as we use "Hullo."

An eight-fold increase in the power of the receiver is claimed as a result of a special "bird-cage" aerial now used at Zeesen, the German short-waver.

Five years ago there were only twenty-odd short-wave programmes to listen for. There are now well over one hundred.

THE "EARS" OF THE ARMY



Radio plays a vitally important part in the Army to-day. Short waves are used considerably, compact low-power valve transmitters being generally employed.

"POLARISED"

By ERIC O'MAHONY, who tells readers some of his experiences with Daniell cells.

THREE weeks of continuous drought had reduced charging by water motor to a mere pious hope, so our thoughts reverted to the question of Daniell cells for accumulator charging.

We made up three cells according to the book of words. A pound and a half of bichromate of potash, 3 large zincs and carbons, and about a gallon of 10-1 sulphuric acid completed the outfit. Sulphuric, by the way, is rather a messy liquid, and as a reminder that you have a cut finger leaves iodine well in the rear.

Having constructed the outer jars with the carbons, and a mixture of the acid solution and bichromate crystals, a little of the 10-1 acid in the porous pots, and all was ready for the reception of the zincs. We carefully inserted them.

Now zinc is a very peculiar substance. Give it a job like hanging on to a piece of solder, and it is perfectly docile. Harness it to almost any primary cell, and it loses its head, gets into a flurry, and needs careful nursing to prevent it falling into an early decline.

Volcanic Action.

For a few moments all seemed well, then the cells commenced to spray acid like a soda fountain, till the air was heavy with the unpleasant fumes. It was a case for literally pouring oil on the troubled waters; we deluged the porous pots with liquid paraffin. This improved matters, for the fountain ceased to play, and was replaced by a frothing, bubbling inferno like a volcano preparing for action.

Something was wrong with the zincs. Out they came, and the cause of the trouble was evident. Beautifully amalgamated for half their length, the remaining portion was rapidly dissolving under the action of the acid. The remedy was at hand. A piece of soft rag moistened with dilute sulphuric acid, and dipped in mercury.

After cleaning up the offending portion, the mercury was rubbed well in, till the zincs shone like a counterfeit half-crown.

Calm After the Storm.

The test was an all-night run to charge an H.T. accumulator wired in parallel. When we looked in next day to see how things were going on, there seemed to be a lack of energy about that H.T. accumulator.

Instead of the frothing activity we had hoped for, the mirror-like surface of the cells was quite unbroken. We uncoupled it, and put a meter across the bichromates.

It may have been an optical illusion, but I thought I saw the needle quiver; my brother swears it didn't. However, the question was one of purely academic interest.

It didn't need the aid of mental telepathy to account for the word which leapt simultaneously to our minds. "Polarised." And sure enough, polarised they were.

The carbons are now reposing on the roof of an outhouse, where the sun, rain, and wind may in time knock the hydrogen out of them. It seems a pity, for otherwise the bichromates are great cells.

AMAZING DISCOVERY

98% RADIO SETS "DOWN" IN EFFICIENCY THROUGH FAULTY GRID LEAKS OR MICA CONDENSERS!

A RECENT analysis of Kit sets and Home Constructor Receivers reveals the astounding fact that 98% were considerably 'down' in efficiency through faulty Grid Leaks or Mica Condensers. These tests were carried out by one of the foremost Radio Engineers in the Country on sets which the owners thought were working satisfactorily.

The above facts were brought to the notice of TELSEN Engineers who immediately commenced intensive research and experimental work to discover the causes. Every known make of Grid Leak and Mica Condenser was tested and examined in conjunction with all types of Receivers.

Invaluable information and new data were obtained from these investigations among which were startling revelations concerning the rapid deterioration and consequent loss of efficiency in these components.

The new TELSEN Grid Leaks and Mica Condensers are the direct outcome of this

amazing discovery. They have been designed on entirely new lines and embody the new



TELETYPE FIXED MICA CONDENSER (Shown with Grid Leak Clips removed).

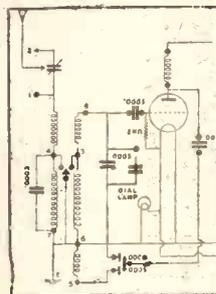
principles formulated by the Telsen Radio Engineers to overcome the numerous faults



Two views of the TELETYPE GRID LEAK.

disclosed and to attain permanent efficiency.

TRY THIS SIMPLE TEST



Tune in a station at the top of the medium wavelength band—say the Northern Regional. Note the signal level. Now connect a Telsen Mica Condenser (up to .0003 mfd. in value) across the aerial tuning condenser. Decrease the value of the

tuning condenser until the same station is heard, and it will be found that the signal strength is equal to that previously obtained, proving that the Telsen Mica Condenser has an efficiency comparable with that of the variable air condenser, the most efficient type of condenser used in radio broadcast reception.

The new TELSEN Grid Leaks and Mica Condensers set a world's standard in lasting efficiency.

IT'S THE 'LASTING EFFICIENCY' THAT COUNTS



TELETYPE FIXED MICA CONDENSER. (Complete with Grid Leak Clips & Grid Leak)

WE HEAR

That well over a quarter of a million radio components are produced every day in the new Telsen Works (the largest and best equipped radio organisation in the world, employing in the neighbourhood of 8,000 workpeople)—and that even this record output is only barely sufficient to meet the enormous and still rapidly increasing demand for these popularly priced quality components.

★ ★ ★

That enormous numbers of home constructors are fitting the new Telsen Drum Drive and Ganged Condenser Assembly, whose single knob operated tuning scale, calibrated in actual wavelengths, makes station logging literally as easy as A.B.C.

★ ★ ★

That the new Telsen Telomor (illuminated variable ratio slow-motion Disc Drive, whose handsome silver oxidised escutcheon plate permits of the very effective grouping of all controls) gives home-built sets the dignity and beauty of line of expensive commercial radio receivers.

★ ★ ★

That home constructors everywhere are thrilled with the performance of the sensational new Telsen JUPITER S.G.3 and AJAX 3 receivers, and that free 1/- blueprints and constructional details of these amazing sets are given with the Telsen Radiomag No. 3, price 6d.

TELSEN

MANSBRIDGE AND MICA

CONDENSERS

THE 100% PERFECT CONDENSERS



TELSEN TAG CONDENSERS

Of extremely compact and sturdy construction. May be mounted on either insulated or metal panels by utilising the two baseboard screw holes in the neatly designed moulded casing. The tags enable the condensers to be connected to any other components, either directly or by soldering. H.F. losses are negligible.

Capacity	No.
'0001	W.207
'0002	W.208
'0003	W.209
'0004	W.210
'0005	W.211
'001	W.212
'002	W.213

6D.



TELSEN 'MICA' CONDENSERS

Represent an important advance in technique: H.F. losses have been practically eliminated, even in the larger capacities. Enclosed in a very attractive moulded case, adaptable to flat and vertical mounting. Grid-leak clips which may be mounted in series or in shunt are supplied at no extra charge, with capacities of '0001, '0002 and '0003 mfd.

Cap. Mfd.	No.
'0001	W.240
'0002	W.241
'0003	W.242
'0004	W.243
'0005	W.244
'001	W.245
'002	W.246

PRICE

'006	W.247
1/3	



TELSEN PRE-SET CONDENSERS

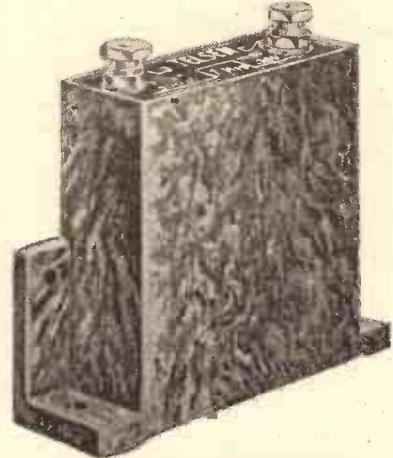
Very low minimum capacity, giving a wide range of selectivity adjustment when used in the aerial circuit. Substantially made, easily adjusted and provided with locking ring. High insulation and low loss.

Max. Cap.	Min. Cap.	No.
Mfd. '002	Mfd. '00025	W.149
'001	'000052	W.150
'0003	'000016	W.151
'0001	'000005	W.152

1'6

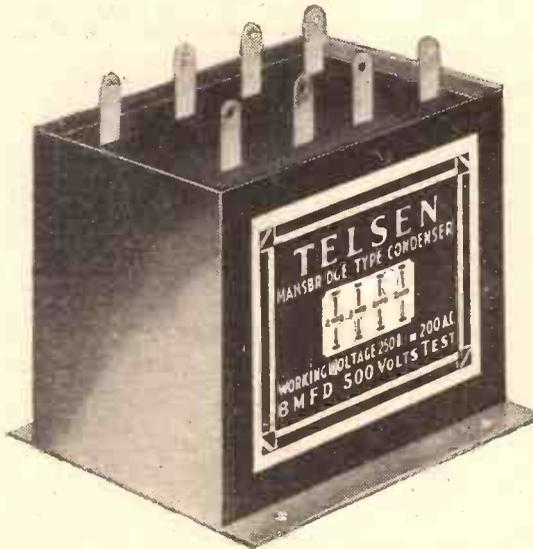
TELSEN MANSBRIDGE TYPE CONDENSERS

Made by the most advanced processes from the finest materials, and subjected during manufacture to a series of stringent tests under laboratory conditions. True Mansbridge type, self-sealing, non-inductive and hermetically sealed. Offered in two types—the capacities from .01 to 2 mfd. in Bakelite cases, and in blocks of 4, 6, and 8 mfd. in metal cases with soldering tags.



Cap. 500 Volt Test		1,000 Volt Test	
Mfd.	No.	No.	Price
'01	W.232	1/6	W.239 2/6
'04	W.230	1/9	W.237 2/9
'1	W.231	1/9	W.238 2/9
'25	W.229	2/-	W.236 3/-
'5	W.228	2/3	W.235 3/3
1	W.227	2/3	W.234 3/6
2	W.226	3/-	W.233 5/-

THEY SET A WORLD'S STANDARD IN LASTING EFFICIENCY



TELSEN MANSBRIDGE BLOCK CONDENSERS

Contained in metal cases with fixing holes. Like the other Telsen Mansbridge Condensers, they are self-sealing, non-inductive and hermetically sealed. Made in three types, each having total capacities of 4, 6, and 8 mfd., each type being divided into 2-mfd. sections, so that several arrangements of capacity may be obtained. Soldering tags provided for each section.

Cap. 500-Volt Test 1,000-Volt Test

Mfd.	Cat. No.	Price	Cat. No.	Price
4	W.175	5/6	W.178	9/6
6	W.176	8/-	W.179	14/6
8	W.177	10/6		

TELSEN

RADIO COMPONENTS

IT'S THE 'LASTING EFFICIENCY' THAT COUNTS

Using Multi-Mu S.G's



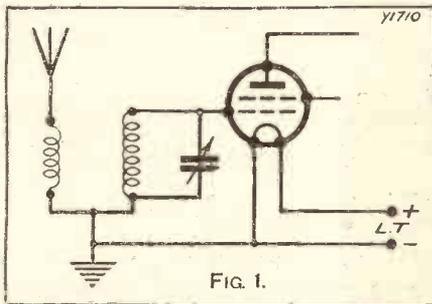
FOR a long time it seemed as though only those who could run their receiving sets from A.C. or D.C. mains would have the benefit of the multi-mu screened-grid valve. Owing to its design there were peculiar difficulties about making this type of valve in the battery-operated class. British manufacturers, however, have solved the problem, and for some little time 2-volt multi-mu S.G.'s have been on sale at the same price as screened-grid valves of the original pattern.

Peculiar Characteristics.

What are the advantages of using multi-mu valves? Well, there are a good many, and perhaps the best way of appreciating them is to see first of all what are the drawbacks of screened-grids of the original "fixed-mu" type.

The most important of these are three in number. First, owing to the rather peculiar shape of its characteristic, the older screen-valve is exceedingly apt to introduce what

THE OLD WAY



The connections for an ordinary S.G. valve, as used before the introduction of the "variable-mu."

is known as cross-modulation; that is, it enables a powerful transmission to force its way through on wavelengths some distance away from its own.

Secondly, the fixed-mu S.G. cannot, without introducing distortion, deal with an input of large amplitude. These two inherent facts are exceedingly important to the man who lives near a high-power broadcasting station. The first means that despite all precautions its wipe-out may be inordinately great; the second, that the very strength of the local transmissions is liable to make the valves distort them.

Something of a Misnomer.

The third drawback is that with screened-grid valves of the original pattern it is exceedingly difficult to devise any form of volume control which will be smooth in action and will not cause distortion.

The variable-mu valve does away to a very great extent with each of these troubles. Actually the term "variable-mu" is something of a misnomer, for it is really the mutual conductance of the valve that is variable, and the curves published

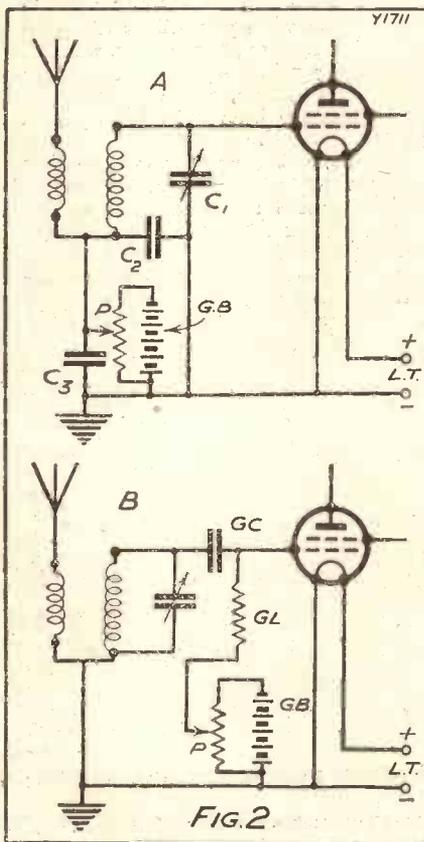
The advent of the variable-mu valve has opened up innumerable possibilities for the circuit designer, and in the following article this absorbing subject is fully dealt with by
R. W. HALLOWS, M.A.

by valve makers show how this factor does vary as the grid bias is changed.

By adjusting the grid bias to suit the circumstances the tendency to introduce cross-modulation can be reduced to a minimum, whilst the valve can be made capable of handling a large input without distortion. We can make the grid bias continuously variable by means of a grid battery and a potentiometer, in which case we have an ideal form of volume control.

The variable-mu screened-grid valve gives somewhat less amplification on the whole

MODERN MODIFICATIONS



These two modifications of S.G. circuits have provision for volume control.

than does the older pattern, but the improved quality from the local station and the reduction of this station's wipe-out area more than compensate for this.

Many readers have no doubt wondered whether the variable-mu screen-grid valve can be fitted into existing sets. The answer is that in many cases this can be done, though some small alterations in the circuits are required; you cannot simply exchange the valve for an existing S.G. without making certain changes.

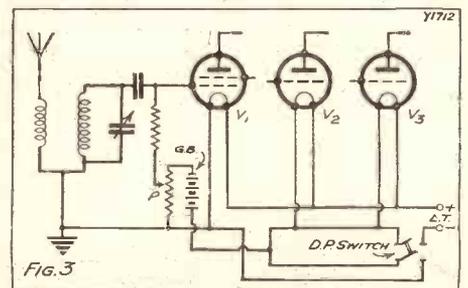
Ganging Condensers.

Fortunately, though, these are by no means difficult to carry out. In Fig. 1 are seen the grid and filament circuits of an ordinary screened-grid valve, and two good modifications are illustrated at A and B in Fig. 2.

The circuit shown at A works quite satisfactorily, providing as it does a directly earthed L.T.—busbar and enabling the tuning condenser to be ganged, since the spindle carrying its moving vane is also earthed. This is done by means of the blocking condensers C2 and C3, each of which may have a capacity of 1 microfarad. It may be found in practice that C3 can be dispensed with.

But what I have found by far the most satisfactory circuit for the variable-mu battery valve is one that for some reason I have not seen suggested anywhere. It is that shown at Fig. 2B.

SEE THE SNAG?



The combined switching arrangement referred to by our contributor, which has a nasty snag in it. Can you spot it?

Biasing potential is applied to the grid by means of a grid leak, whilst grid condenser GC acts as a barrier to direct current and as a free path for oscillating impulses. Values of from 2 to 4 megohms for the grid leak and of .0001 to .0003 microfarad for the grid condenser will be found satisfactory.

An examination of the diagrams will show that one necessary part has been omitted. This has been done purposely because I want to discuss it in detail with special drawings of its own. The part in question is a switch to disconnect the grid

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USING MULTI-MU S.G.s

(Continued from previous page.)

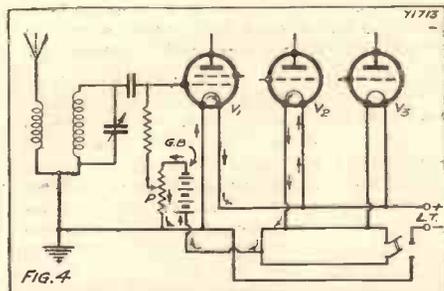
battery from the windings of the potentiometer.

A moment's thought will show you that in the absence of such a switch the grid battery will be continuously under load; the load is not a heavy one—9 volts through 50,000 ohms means less than a fifth of a milliampere—but even a small constant drain quickly runs down a battery made of small dry cells.

Not So Ingenious!

There are certain pitfalls in the matter of grid-battery switching which you should avoid. An ingenious friend of mine did not wish to have separate L.T. and G.B. switches, so he evolved the scheme seen in Fig. 3. By means of a double-pole switch the L.T.—busbar is broken both at its entrance to the set and just before it reaches the S.G. valve V1. My friend explained that as there was no connection between the two parts of the L.T.—busbar when the switch was open the battery was cut right out—but he could not understand why it was that his grid battery ran down in the matter of a week or two. Can you detect the snag in Fig. 3?

THE EXPLANATION



The same circuit as Fig. 3, but explaining, by means of arrows, why it is that the grid battery runs down.

You can't? Now follow the arrows shown in Fig. 4, starting from the negative pole of the grid battery. Imagine an electron starting on a journey from that pole.

It travels through the windings of the potentiometer to the left-hand portion of the L.T.—busbar, then up the negative leg of V1, through the filament, down the positive leg, along the positive L.T. busbar, up the positive leg of V2, through its filament, down its negative leg and so back to the positive pole of the grid battery.

A Path for the Current.

Remember that the resistance of the average 2-volt valve's filament is only about 20 ohms, and you will see that this resistance is neither here nor there in comparison with that of the potentiometer windings.

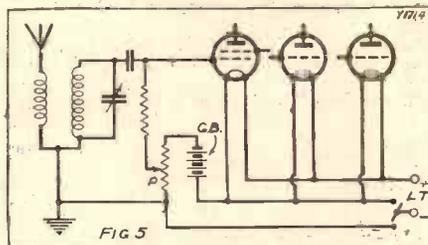
Whenever you are arranging switches in a set it is always as well to bear in mind the possibility of there being a path for current through the filaments of the valves when one of the busbars is broken by the switch, or even if both of them are so dealt with. The simplest way of switching the grid battery and potentiometer, and one which will appeal to many of those who convert their sets for the Multi-Mu S.G., is just to

place an ordinary on-and-off switch between the positive pole of the grid-biasing battery and the low-tension negative busbar.

There is, however, one drawback about switching in this way. Unless you have a particularly good memory you may forget to switch off the grid battery when you switch off the set.

So long as you can remember, all well and good, but when I first came to use the Multi-Mu S.G. valve and used a switch of this kind I found that I was always leaving the grid-biasing battery in circuit.

ALL CORRECT!



The correct method of switching the two batteries. Note that a three-point switch is employed.

The soundest and safest way of switching a set containing a Multi-Mu S.G. is shown in Fig. 5. Here, instead of the ordinary make-and-break switch, one of the double contact pattern is used. Since the latter are usually no bigger than the former you will quite probably be able to substitute a two-point switch for the existing one in your set, and you will not have any difficulty in altering your low-tension negative busbar to correspond with the filament and grid-bias battery circuit of Fig. 5.

Reducing the Spread.

I am quite sure that when you come to use a Multi-Mu valve you will be delighted with its performance at once. You will find that you can considerably reduce the spread of your local station, and what you will appreciate is the beautiful smoothness of the volume control.

To obtain the best possible working from the volume control choose a potentiometer specially made for the purpose with a tapered resistance. An ordinary potentiometer will do perfectly well if you have one by you, but you may find that quite a small movement back from the "all out" position effects a big reduction in the volume.

With the tapered potentiometer equal movements of the knob effect almost equal reductions in volume all round the scale.

FROM A READER

An interesting letter received from a "P.W." constructor.

WORKING WITHOUT A GRID LEAK.

The Editor, POPULAR WIRELESS.
Dear Sir,—I have read with interest the published letters of J. K. Woodward and others regarding the removal of grid leaks from sets. I did this long ago, and failed to notice any difference in results. My set, by the way, is a straight two-valve (det. and power) and, being within four miles of the North Regional transmitter, it is a two-programme set only.

For curiosity I removed the 0003 grid-condenser and connected the grid of the first valve straight to the aerial. Result: The stations (two only, of course) come in much louder and the quality remains the same. The set goes into oscillation sooner; but a smaller reaction coil has made this right.

I have tried this arrangement on the W.L.S. one-valver, and find it an improvement. This, I think, is due to the fact that the set oscillates easier, and I can keep the pre-set screwed right down.

In conclusion, may I say that, in all fairness to set designers, the grid-condenser and leak are necessary for foreign reception (apart from short waves). But the idea may be worth trying by some readers who are near a big transmitter and desire the last ounce from a small set.

Yours, truly,
Brighouse, Yorks. J. S.

RADIO TIT-BITS

A selection of short items of general interest.

It is estimated that about two million new radio sets will be sold in Gt. Britain within the next twelve months.

Of the ten shillings paid by the listener, the Post Office returns only about five shillings to the B.B.C. as a contribution to the expenses of providing broadcast programmes.

"Buenas Noches" is the Spanish announcement for "Good-night."

Belgrade, on 430.4 metres, calls itself "Radio Beograd." It uses a metronome in the intervals, ticking sixty times per minute.

The hymn-tune "Austria" with which the German stations close down is the German National Anthem, "Deutschland uber Alles."

Berlin's interval signal is a metronome ticking four beats to the second.

One of the most difficult announcer's jobs in Europe is that at Bratislava (279 m.), the announcements being made in Czech, Slovak, French, German, Hungarian, and occasionally other languages.

You can generally recognise the Breslau transmissions on 325 metres from the fact that its "ticks" in the intervals are at the unusual rate of 200 to the minute.

"Dobrou noc" is the Czecho-slovak equivalent of "Good-night."

BI-LINGUAL BRUSSELS

Brussels has two stations because about half the population of Belgium speaks Flemish and the rest French.

The distance from Budapest to London is almost exactly 900 miles.

The Budapest interval signal is a phrase of nine notes in two-part harmony—G sharp, B, A, B, G sharp, B, A, B, G sharp.

The tinkly interval signal heard from Cracow and other Polish stations is the sound of sleigh bells.

Radio Normandie, the Fécamp station on about 223 metres, gives a special transmission each Sunday night from 6.30 p.m. to 3 a.m. Monday.

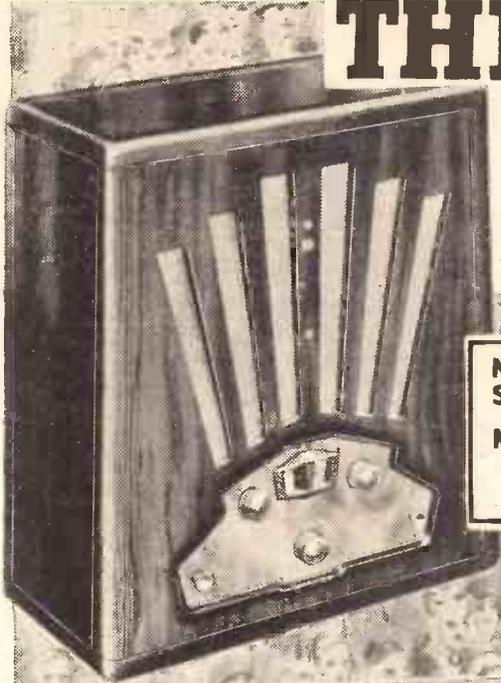
"Firenze" is the Italian for the city of Florence.

The Italian for "end of the programme" is "Fine della trasmissione." (It sounds like "Finny della trans-missy-o-knee.")

The two tunes played by Rome and other Italian stations when closing down are the Italian Royal March and the Fascist Hymn.

The Vatican short-wave station closes down with the words "Laudatur Jesu Christus."

ALL ENGLAND NOW BUILDING THE SKYSCRAPER



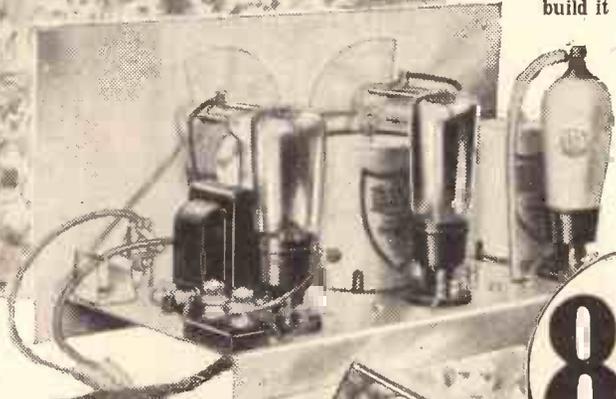
THE ONLY RECEIVER YOU CAN BUILD YOURSELF EMPLOYING METALLISED SCREEN GRID VALVE, HIGH-MU DETECTOR AND ECONOMY POWER PENTODE

MOST SUCCESSFUL SET EVER BUILT!
MOST SUCCESSFUL CHART EVER PUBLISHED!

There never has been the equal of this set within the range of the home constructor—this new Lissen Skyscraper is the only one on the market that you can build yourself, employing Metallised Screened Grid, High-Mu Detector and Economy Power Pentode Valves. No factory, however well-equipped, can build a better receiver. No manufacturer, however large, can produce a receiver whose results will surpass those you will get from the Lissen Skyscraper you build yourself. It is the *only* battery set that can deliver such power—yet the H.T. current consumption is far less than that of the average commercially-designed 3-valve set.

Yet the Lissen Skyscraper is made simple for you to build. Elaborate care has been taken to ensure your success by giving—in the Skyscraper Constructional Chart—such detailed instructions and such profuse illustrations that everybody, with no technical knowledge or skill at all, can build it quickly and with complete certainty of success.

You buy the Lissen Skyscraper Kit complete with valves—a Lissen Metallised S.G., a High-Mu Detector, and a Lissen Economy Power Pentode Valve—and the price is only 89/6. Or you can buy the Lissen Walnut Console Lissen Skyscraper Cabinet and Loudspeaker combined as illustrated. It holds all batteries, and accumulator and loudspeaker as well. It makes everything self-contained. A special Pentode Matched Balanced-armature Loudspeaker of great power is supplied with the cabinet, and the price of the Skyscraper Kit complete with valves and this cabinet and loudspeaker is only £6 5s.



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CHART FREE!

To "POPULAR WIRELESS" READERS
Send Coupon below for your copy of FREE CHART!

COUPON

Please send me FREE copy of your 1/- Skyscraper Chart.

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Address

P.W.6.

89/6

KIT INCLUDING METALLISED S.G. HIGH MU DETECTOR & ECONOMY POWER PENTODE VALVES

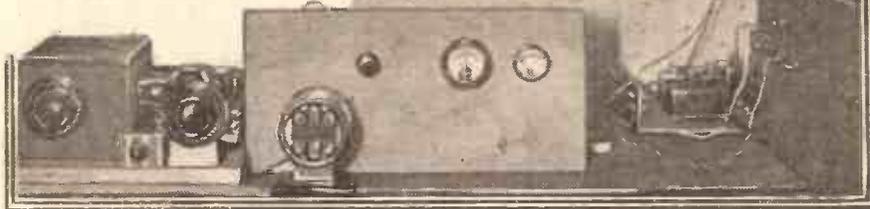
LISSEN LIMITED, Dept. P.W.6, Worple Rd., ISLEWORTH, Middlesex



LISSEN

SKYSCRAPER KIT 3

Short-Wave Notes *By* W.L.S.



AFTER many weary hours of comparing the various logs of the reception during the total Eclipse sent in by readers, I have given in. There is no similarity whatever between them, except that about half of them show a falling-off in strength about a quarter of an hour after the Eclipse.

After due reflection and comparison, I am very much afraid that "auto-suggestion" was responsible for the various fluctuations recorded. Some people imagine that W 2 X A D, for example, came up in strength during the 30 seconds of totality.

Others, by way of a change, record that he dropped away almost to zero during the same 30 seconds. Most of the logs, however, in common with my own, show "no change" until quarter of an hour later.

Good Times Coming ?

I am rather disappointed to find all this variation, but I am summarising those of the logs that do seem to agree, and take this opportunity of thanking the hundreds of readers who went to the trouble of sending their experiences in.

Incidentally, who shall say that short-wave people are not keen? In contrast to these large numbers of logs from short-wave listeners, I received *one*—just one!—from a listener on the broadcast bands, in spite of a half-page article in "P.W." appealing for their experiences.

I should rather think—although I dislike these minor prophets—that the general run of short-wave conditions ought to be quite good this winter. For one thing, we have got past the worst point of the Eleven-Year Cycle (if there is one!) and our receivers have been built to cope with bad conditions.

Plug-in Coils for Efficiency.

Any small improvement from now onwards, therefore, should show up very well. If we had our present-day receivers and 1927-8 conditions, we should all be *very* surprised.

One or two readers, notably "E. W. D." (Rossendale), inquire whether they can make up any of my short-wavers with the home-made six-pin coils that I described for the single-valver. The answer is most decidedly "yes."

That type of six-pin coil, whether home-made or bought complete, is very hard to beat for simplicity and efficiency. In "E. W. D.'s" case, I should advise him to make three plug-in coils of similar sizes to the One-Valver coils rather than to attempt a single coil with wave-change switching.

This latter business is something of a problem. We are all agreed that wave-change switching *does* cut down efficiency slightly, although if it is done carefully the losses may be so small as to pass quite

unnoticed. In that case, naturally, they don't matter, since we are only concerned with results and not with what we might learn from a valve voltmeter or a mirror galvanometer.

A Mysterious Dead-spot.

The whole question hinges upon whether the reader is prepared to *risk* a slight loss for the sake of saving the trouble of occasionally changing coils. I have designed and described sets of both types, so as to cater for everybody, but I think I

TO TRANSMIT TELEVISION



One of the new Marconi Broadcast Television transmitters used in the recent television demonstrations between York and Chelmsford. Written messages were easily transmitted at high speed between these two places.

must confess to a preference for coil-changing myself.

"F. N. B." is still in trouble with his dead-spot, for which the bath is still being blamed. He explains in a further letter that it is not just a "super-dead spot," but something much deeper.

Suppose he covers 28 to 45 metres on the dial; 28 to 33 metres and 38 to 45 metres are evenly spread out, but in the middle of the dial there is just a loud click, and, hey presto!—it has jumped from 33 to 38 metres in a degree or so.

He quite rightly suggests that the bath

might absorb H.F. energy, but that it can hardly appropriate a whole band of wavelengths for itself.

Personally, "F. B. N.," I doubt the guilt of that bath. The whole thing sounds to me more like absorption from something in the set, possibly the reaction coil. Something seems to "pull" when you get to that critical point, and the only time I have had that trouble myself was due to the use of too large a reaction coil, which tuned to the same wavelength as the grid coil.

I think that suggestion is too obvious for your trouble, but pass it on for what it is worth.

How Conditions Vary.

"F. N. B." also makes a new suggestion about the Eleven-Year "Cycle," and wants to re-christen it the Eleven-Year "Sunspot Crop." He puts forward the idea that the general level of conditions does not rise and fall so much as we think during the eleven years, but that the alternate periods of good and bad conditions become shorter, and therefore more frequent, as we go down into the "trough" of the cycle.

That seems thoroughly sound to me, and my log bears it out. But we must find a more elegant name for the beat than "Sunspot Crop"!

I am discontinuing the lists of five stations, since we have fairly well exhausted the more uncommon stations already. To include W 2 X A D and Rabat would reduce the thing to a farce, so I will content myself with mentions of unusual reception whenever reports of the kind reach me.

Since the Eclipse.

"W. H. R.," our champion from Plymouth, finds "X A D" almost at his last kick. Since the Eclipse he reports him as very disappointing. The other Americans, from W 8 X K (25-27 metres) upwards, however, are good. He mentions his surprise at finding W 4 X B (Miami Beach) so strong.

Hitherto we haven't heard much from Florida, although I remember hearing W I O D, the long-wave section of this same station, on the broadcast band with a super-het. last winter. He ranked them with W G Y and the other big noises.

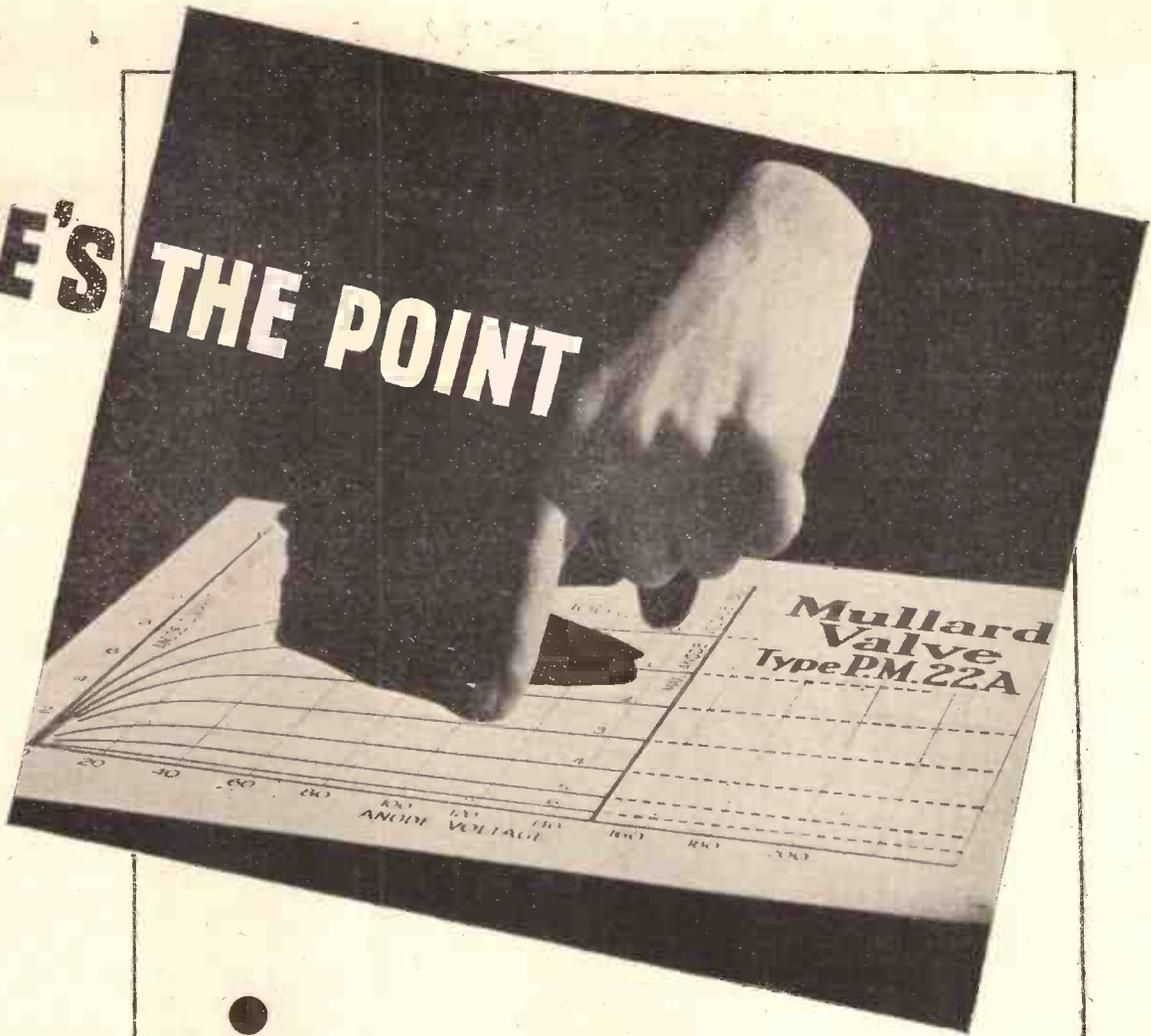
At all events, W 4 X B is a welcome and interesting addition to the 49-metre

bunch of stations. "W. H. R." quotes the following about the Europeans: "C T I A A, E A Q, D J A, R W 59, F Y A, O X Y and I 2 R O are all good. D J A shows signs of fading after 9 p.m., and C T I A A and E A Q have improved their quality."

"W. L. S."

The famous short-wave expert and writer
CONTRIBUTES EVERY WEEK TO
POPULAR WIRELESS.

HERE'S THE POINT



●

Anode current $4\frac{1}{2}$ milliamps at 100 volts high tension—convincing proof of the low consumption of the P.M.22A pentode: the pentode that users of portables and small battery sets have been waiting for—the pentode that can be used without draining the batteries—in fact, the pentode you can't be without any longer.

Price 17/6

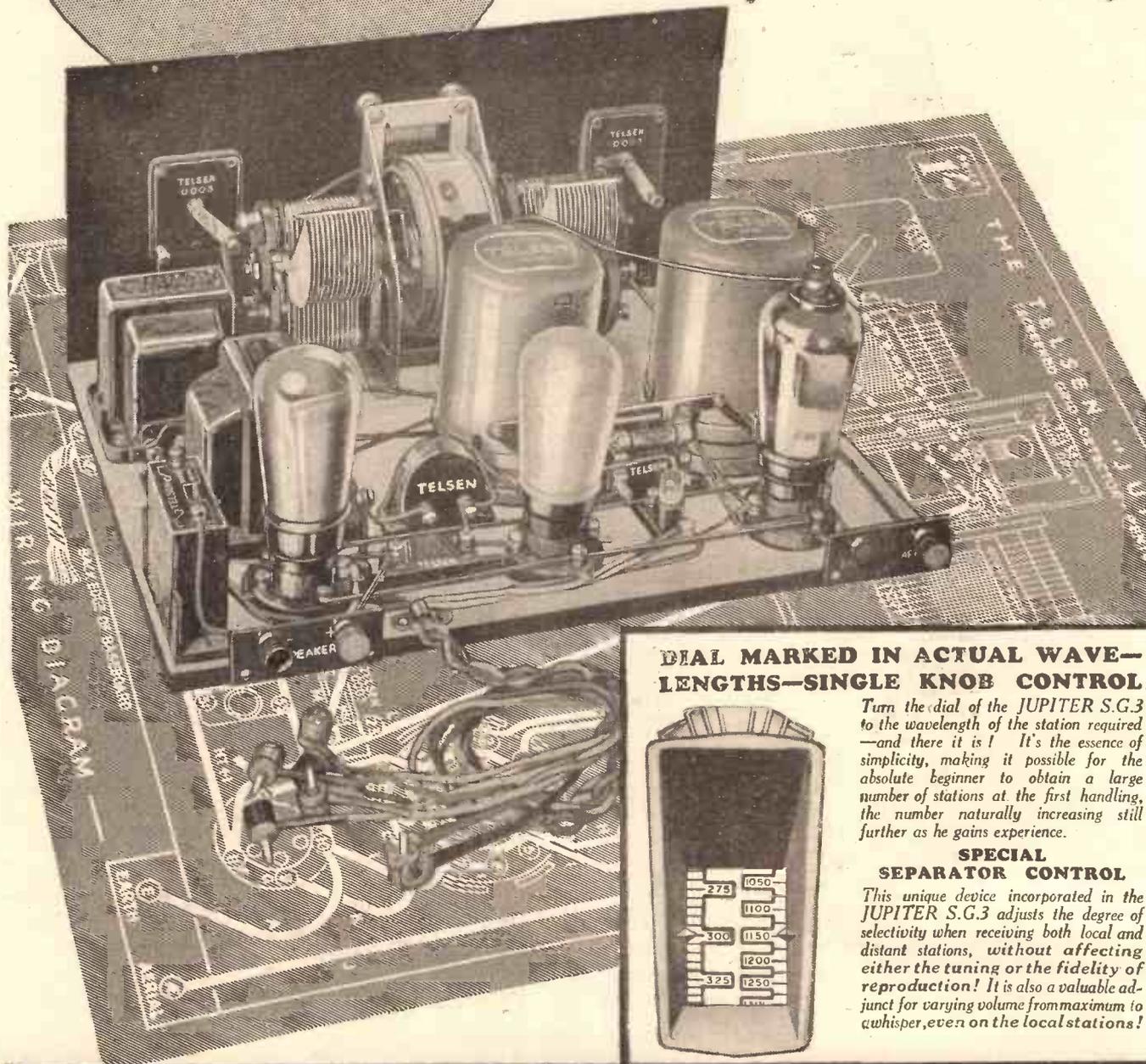
MADE IN ENGLAND

The valves specified for the "Plug-In Two" described in this issue are:—Mullard P.M.1HL and Mullard P.M.2A.

Mullard
THE MASTER VALVE

The most
marvellous
home constructor
set ever
produced!

Super-selective!
TELSEN
Single knob tuning!

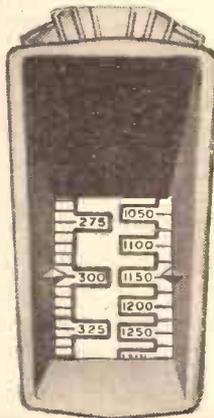


DIAL MARKED IN ACTUAL WAVELENGTHS—SINGLE KNOB CONTROL

Turn the dial of the JUPITER S.G.3 to the wavelength of the station required—and there it is! It's the essence of simplicity, making it possible for the absolute beginner to obtain a large number of stations at the first handling, the number naturally increasing still further as he gains experience.

SPECIAL SEPARATOR CONTROL

This unique device incorporated in the JUPITER S.G.3 adjusts the degree of selectivity when receiving both local and distant stations, without affecting either the tuning or the fidelity of reproduction! It is also a valuable adjunct for varying volume from maximum to a whisper, even on the local stations!



MAKE SURE YOU GET YOUR
ANNOUNCEMENT OF THE TELSEN ELECTRIC CO., LTD. ASTON, BIRMINGHAM

Hyper-sensitive!! Ultra-modern!!!

JUPITER S.G.3.

Dial marked in wavelengths! Special Separator Control!

Full size 1/- Blueprint given FREE with the TELSEN RADIOMAG No. 3.

Never before has it been possible for the ordinary home constructor to build so powerful a 3-valve receiver as the Telsen JUPITER S.G. 3! For never before has such amazing power, such tremendous range and such superlative selectivity been attained with the use of only standard components! Child's play to build, child's play to operate, it is beyond

question the most *sensational home constructor set ever produced*. Yet it is not a "Kit" set, but purely a circuit design using specified components—some of which you may already have and will not therefore need to buy!

In keeping with the highest modern practice, the Telsen JUPITER S.G.3. incorporates Ganged Condensers, Ganged Coils, a Tuning Dial calibrated in wavelengths, and Matched Output, the brilliant circuit arrangement providing for absolute control of selectivity, with entire prevention of L.F. oscillation. The revolutionary 10-1 Coupling Unit specified gives an L.F. stage gain equal to that of a *two-stage* amplifier, ensuring (in conjunction with the special low loss coils) an overall amplification never hitherto approached in any receiver of its type.

Yet you can build it yourself—in an evening—with the aid of the full size 1/- Blueprint and complete constructional details contained in the Telsen Radiomag No. 3. PRICE 6d. Get your copy NOW!



3 full size 1/- Blueprints given FREE with the new TELSEN RADIOMAG

The Telsen Radiomag No. 3 tells you how to build the very latest types of receivers—how to modernise and improve your existing set—how to rectify little faults—how to get the best out of radio in every way. Get your copy now—price 6d. of all radio dealers and newsagents.

TELSEN

RADIO COMPONENTS

TELSEN RADIOMAG No. 3

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

SOME NEW "TRUE-VIEW" EXPERIMENTS

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

A Test for Your Stereoscopic Powers—Overcoming the Granulation Effect—We Try "Mixed Screens."

THERE can be no doubt about the interest our True-Views have aroused, for letters concerning them have reached us from all over the country.

And a most surprising fact emerges; large numbers of readers are able to obtain full stereoscopic effects without using viewers.

As I have said in previous articles, I knew that this could be done, but I did not imagine more than a very few could do it.

After a fair amount of experimenting I can accomplish the feat with considerable ease, and as I would not like to believe I possess freakish vision, I presume that many, if not the majority, would be able to acquire the knack.

The simplest way seems to be to hold the True-View as close to the eyes as possible for a few seconds, and then to move it away slowly until it comes into focus. At this point you either see two ordinary pictures or, if you have allowed your eyes to remain "looking outwards," a stereoscopic view in the centre flanked by two dimly-seen ordinary pictures.

Flanking Repetition.

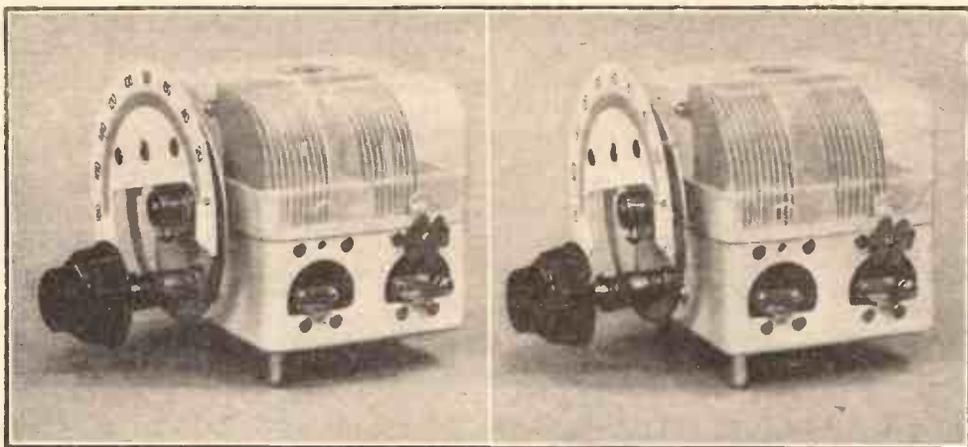
However, True-Views ought to be seen through a viewer in order to wipe out that flanking repetition, and to obtain a certain amount of magnification, otherwise you cannot appreciate them to the full and study them leisurely in every detail. And, after all, the "P.W." viewer costs only sixpence to make!

During the past two or three weeks we have been conducting experiments, in

cooperation with our Process Dept., with a view to improving the reproduction of True-Views still further.

As it is we have received compliments from all quarters for the clear way they have been printed. And remembering that POPULAR WIRELESS is produced on a gigantic high-speed rotary printing machine, it must be admitted that our initial difficulties have been very satisfactorily overcome.

THE NORMAL METHOD OF PRINTING



A fine True-View of a J.B. Ganged Condenser with its cover "ghosted" by our double exposure method. The "screen" is the same in both sections.

Nevertheless, I believe we can do even better. And it is with this in mind that I have had a number of True-Views made in accordance with the mixed-screen scheme to which I believe I have already made some slight reference.

The first one, the gang condenser, has the ordinary oblique screen for both sections, but if you carefully adjust the True-View of the "Plug-in" Two receiver, you will see that the right-hand section of this has its dots arranged in straight lines.

In all cases the size of screen is the same; there are one hundred dots per inch.

This is the finest screen we can employ in POPULAR WIRELESS, though our Process Dept. is dealing with them so cleverly that I believe we get the results of an even finer one.

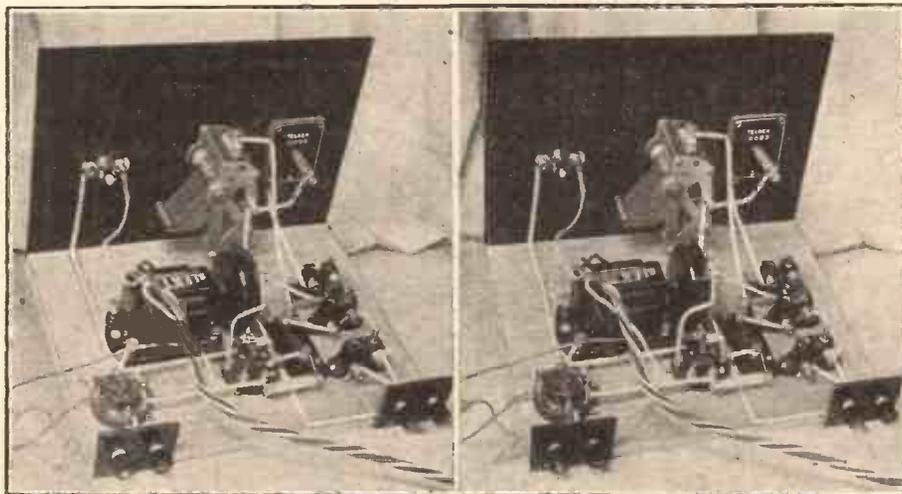
Whether or not we shall continue to "mix screens" in the manner indicated above, largely depends upon what is the consensus of opinion of our readers, so I would be very grateful if all who have viewers would drop me postcards containing, however brief, their views on the matter.

Heartening Success.

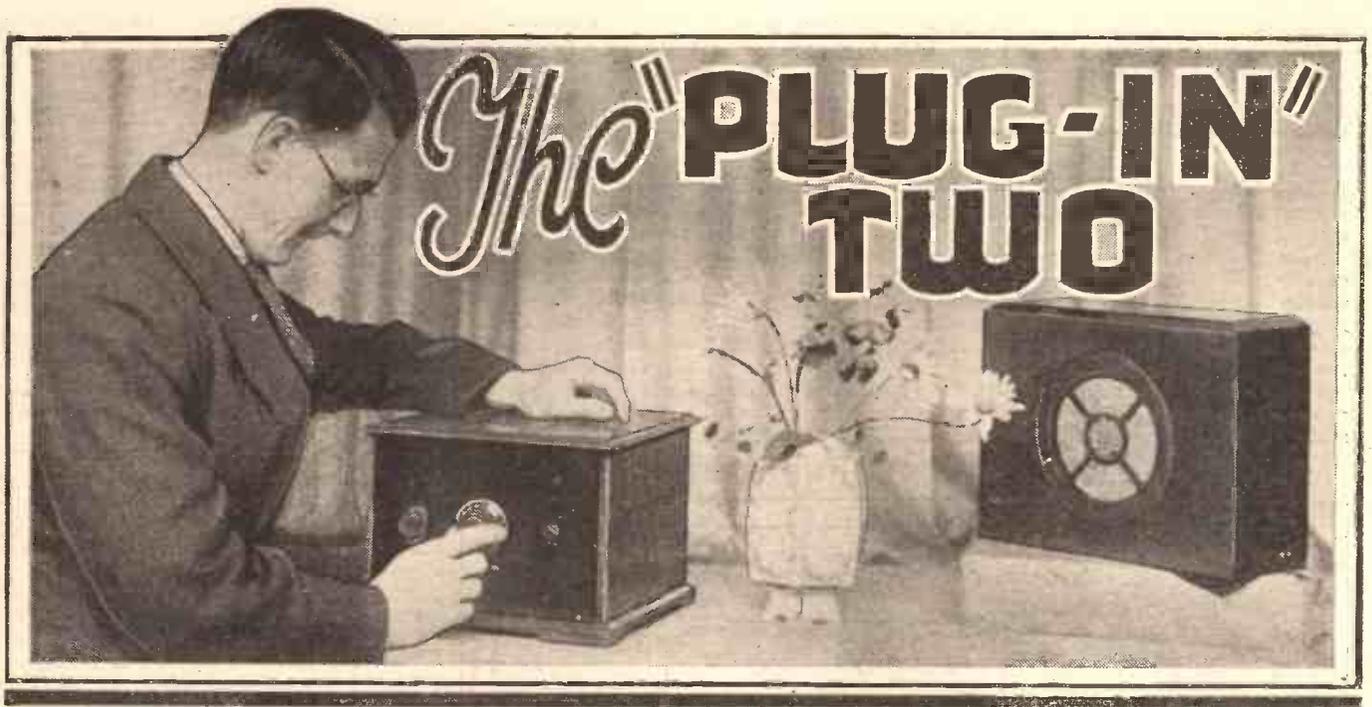
Later on we may publish further variations if any come to light that seem worth experimenting with.

In the meantime, however, the general success of True-Views is most heartening and we are especially pleased that readers are regarding them as useful contributions to radio journalism as well as fascinating novelties.

THIS ONE HAS TWO DIFFERENT SCREENS



The "mixed-screen" method is adopted in this stereographic representation of the "Plug-in" Two. The right-hand section has its dots arranged in straight instead of oblique lines. What is your opinion of this scheme? We'd like to know.



The "PLUG-IN" TWO

THE plug-in coil has lately been relegated to the background owing to the popularity and convenience of the dual-range unit.

The fact that it is necessary to remove three coils and to insert three others of suitable sizes in order to change from one waveband to another is, in the opinion of some, sufficient justification for them to turn the "blind eye" to the many points in favour of the simple plug-in inductance.

Fills Requirements of Many.

In radio, the adage "one man's meat . . ." holds good, and that a definite demand does exist for an ultra simple, inexpensive, all-wave receiver is evidenced by the large number of requests we receive for such a set.

No design can be considered retrograde if it is proved that it satisfactorily fulfils the requirements of a by no means inconsiderable section of the radio community.

There is a lot to be said for the plug-in coil. It is undoubtedly efficient, and allied to this are its compactness and inexpensive-

Many readers will be delighted to see a set using plug-in coils again, and this is a specially good one with a penchant for distance and plenty of power available from its two valves and straight circuit,

ness. But there is much more in its favour. Given three separate interchangeable coils you have a means of achieving results which cannot be surpassed by any other form of tuning unit.

A dual-range coil must necessarily be a compromise. You can only get one hundred per cent all-round efficiency by sacrificing convenience.

With plug-in coils you have at your disposal whatever degree of selectivity you wish.

Suppose for instance you reside many miles from a broadcasting station, and consequently require a maximum transference of energy between the aerial and detector

grid circuits, and that selectivity does not matter, all you have to do is to insert a suitable size aerial coil in the aerial coil holder.

Suppose on the other hand you need a high degree of selectivity in order to separate two interfering stations. Here, again, we have the adaptability of the plug-in coil. You just remove the existing aerial coil and replace it with a smaller one.

Not Limited in Wavelength.

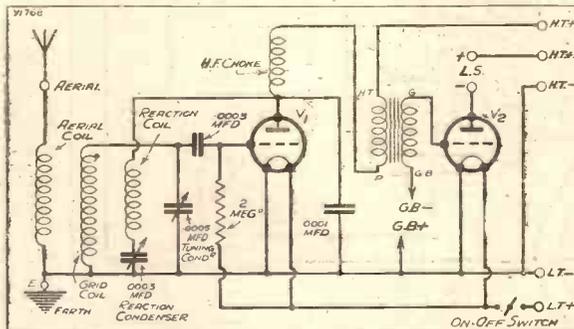
Another advantage of the plug-in coil is that one is not limited only to two wavebands. You can cover every wavelength from the medium waves up to "umpteenth" thousand metres. It is simply a question of coil size.

For example, you may want to listen to the Heston weather forecasts, to Croydon on 900 metres sending out instructions to aircraft, or to some of those medium-wave stations between 550 metres and 800 metres (Wilno, Moscow experimental, Geneva, etc.). The average dual-range coil

(Continued on next page.)

THE BASIC CIRCUIT AND THE COMPONENTS YOU NEED

- 1 0005-mfd. tuning condenser (Lotus, Cyldon, J.B., Ormond, Polar, Radiophone.)
- 1 Plain 2½ in. dial (Ormond).
- 1 0003-mfd. reaction condenser (Telsen, Polar, Lissen, Lotus, Ready Radio, Peto-Scott, Igranic, Graham Farish, Ormond, Cyldon.)
- 1 L.F. transformer (Slektun, Igranic, R.I., Telsen, Ferranti, Lissen, Goltone, Varley, Tunewell, Graham Farish.)
- 3 Coil holders (Lissen, Igranic, Magnum.)
- 1 0003-mfd. fixed condenser (Lissen, Telsen, T.C.C., Dubilier, Ferranti, Igranic, Sovereign, Goltone, Graham Farish.)
- 1 2-meg. grid leak with terminals or tags (Dubilier 1 watt, Igranic, Lissen, Graham Farish.)
- 2 4-pin valve holders (W.B., Telsen, Lissen, Bulgin, Ready



The "Plug-in" Two has an absolutely straight circuit—grid-leak detector, and transformer-coupled L.F. stage.

- Radio, Wearite, Igranic, Ormond, Benjamin, Clix, Goltone, Graham Farish.)
- 1 H.F. choke (Igranic, Lissen, Telsen, Leweos, Peto-Scott, Ready Radio, Wearite, Varley, R.I., Goltone, Sovereign.)
- 1 2-pt. push-pull switch (Ready, Radio, Telsen, Lissen, Wearite, Tunewell, Peto-Scott, Graham Farish, Goltone, Bulgin.)
- 4 Terminals (Belling-Lee, Clix, Igranic, Goltone, Ealex.)
- 1 Panel, 10 in. × 7 in. (Peto-Scott, Lissen, Goltone, Wearite, Permol, Becol.)
- 1 Baseboard, 10 in. × 8 in. × ¾ in.
- 2 Terminal strips, 2 in. × 1½ in. (Peto-Scott, etc.)
- 5 Wander plugs.
- 2 Spade terminal-tags.
- 18 gauge tinned-copper wire and sleeving (Goltone, Wearite, etc.)

THE "PLUG-IN" TWO

(Continued from previous page.)

does not cover these "in between" wavelengths, but with plug-in coils it is a mere matter of substituting a one size larger coil.

Now what sort of reception ought we to expect from this two-valve set, with its simple lay-out and few components? Actually it is capable of giving a very great many listeners everything they want in the way of programmes.

Using a fairly good outdoor aerial the volume from the local stations and from some of the more powerful foreigners is

sufficient to work a loudspeaker really well. Those who may require still greater volume can add a second L.F. stage without difficulty and this additional stage should preferably be resistance-coupled.

The constructional work involved in making up a receiver of this type can be undertaken by the veriest beginner without the slightest qualm, because the lay-out is not in the least bit critical.

It is one of those sets that cannot help working. Moreover, the total time taken to build it should not exceed three hours or so. It is just about an evening's job.

The first operation is preparing and drilling the panel. Special tools are not necessary. Most of you will already possess a carpenter's brace, a straight edge of some kind marked in inches, or anything with

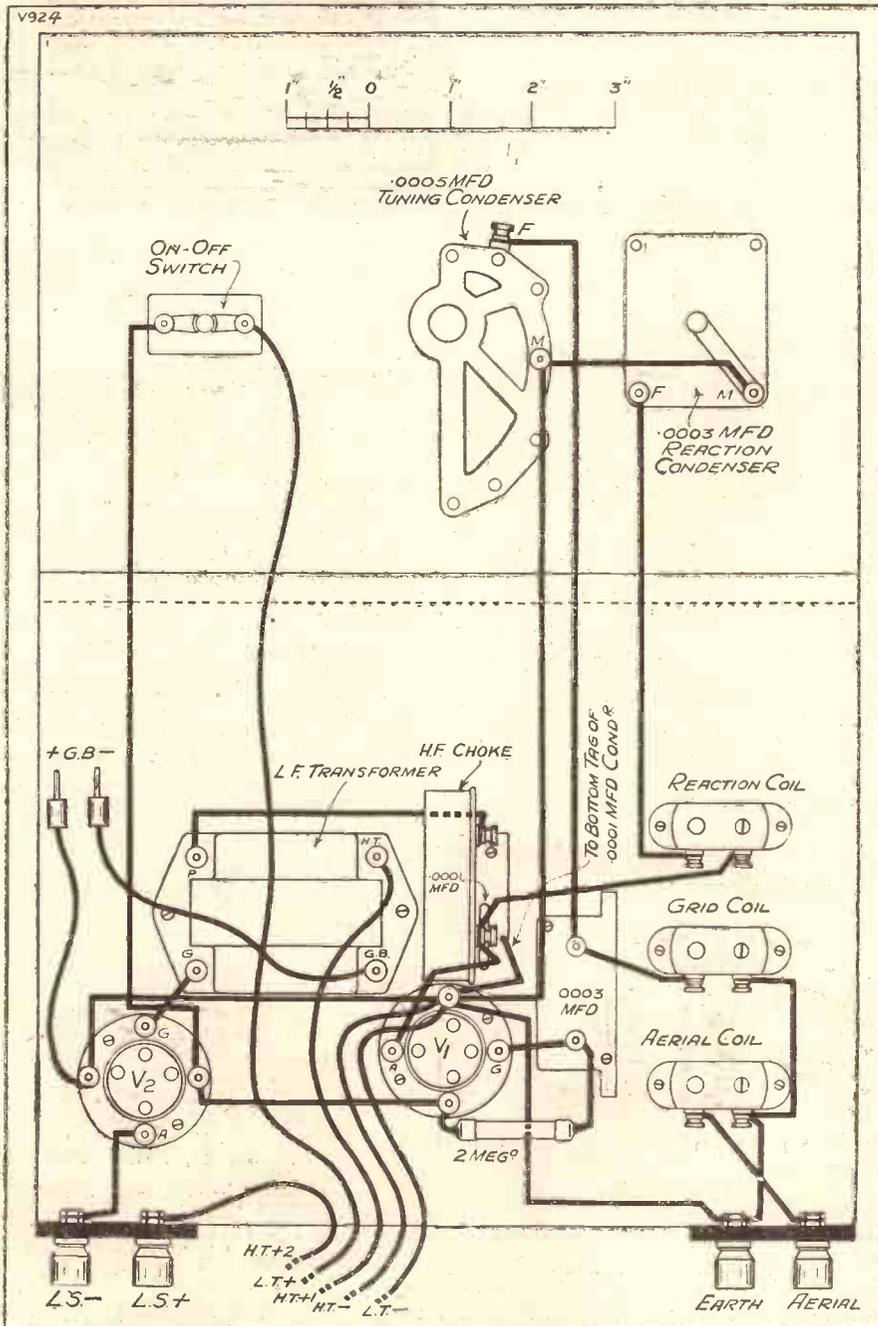
which you can scratch a line on the panel surface.

Pencil lines are inadvisable because graphite is a conductor, and therefore any pencilled dimension lines would have to be very carefully removed.

ABOUT THE VALVES

Make	Detector	Output Valve.
Mullard ..	P.M.1. H.L.	P.M.2A.
Cossor ..	210 H.L.	220 P.A.
Mazda ..	H.L.2	P.220
Marconi ..	H.L.2	L.P.2
Osram ..	H.L.2	L.P.2
Tungram ..	H.210	P.220
Lissen ..	H.L.2	P.220
Eta ..	B.Y.2020	B.W.604, 1304
Six Sixty ..	S.S.210 H.L.	S.S.220 P.A.

VERY FEW COMPONENTS AND EASY WIRING



Be very careful when connecting up the coil holders to follow the connections shown, and to space the holders correctly.

Other tools needed are a screwdriver, a pair of wire-cutting pliers, a spanner for tightening the nuts, and a 3/8-in. drill with a square shank. This only costs a few pence.

The spanner can be dispensed with in some cases, because the pliers may serve quite well for tightening up purposes. Now place the panel on its face, and with the "panel lay-out" in front of you mark off the dimensions for the panel components.

It is usual to do this work on the back of the panel, so that the highly polished face is not spoiled.

Marking Points to Drill.

So you just take your scriber and straight-edge and scratch two lines, one vertical and one horizontal, the point where the lines cross each other being the drilling centre for the component.

You will get the idea from the dotted dimension lines on the "panel lay-out" diagram.

When you have marked the drilling centres for each of the components, take a sharpened nail or a centre punch and make a dent at each drilling point by giving the punch or nail a smart tap with a hammer. Don't forget to check over the measurements before you commence drilling.

ACCESSORY FACTS

LOUDSPEAKER.—Ormond, Celestion, Blue Spot, H.M.V., Marconiphone, R & A, Epoch, B.T.-H., W.B., Atlas, Manchester.

BATTERIES.—L.T. 2-volt. (Ediswan, Exide, Pertrix, Lissen, Oldham).

H.T., 120 volts. (Lissen, Ediswan, Pertrix, Drydex, Magnet).

G.B. to suit power valve (Ever-Ready, Pertrix, Drydex, Siemens, Lissen).

MAINS UNIT.—To supply 15 m/a or upwards at 120-150 volts. (Atlas, R.I., Heayberd, Tunewell, Regentone, Ekco).

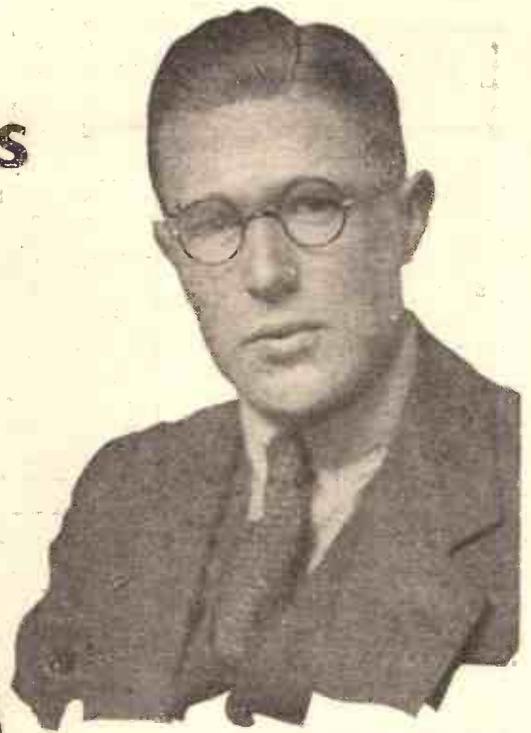
AERIAL AND EARTH EQUIPMENT.—Electron "Superial"; Graham Farish "Filt" earthing device.

COILS.—For sizes see text. (Lissen, Atlas, Lewcos, etc.).

When you are satisfied that all the dimensions are O.K. you can proceed to drill the holes. Incidentally, you must be careful here. Place a piece of wood, such as a scrap baseboard, under the panel to give the necessary support when the drill begins to bite.

(Continued on page 282.)

Read what J. H. REYNER says about FILT!



J. H. Reyner, B.Sc., A.C.G.I., D.I.C.,
A.M.I.E.E., M.Inst.R.E., Consulting
Radio Engineer. The well-known
designer of many famous sets described in
the foremost wireless publications.

THE FURZEHILL LABORATORIES,
BOREHAM WOOD,
HERTS.

TELEPHONE: ELETRE 139.
RAILWAY STATION: ELETRE (L.N.W.S.P.)

J. H. REYNER,
R.E., A.C.G.I., D.I.C., A.M.I.E.E., M.Inst.R.E.
CONSULTING RADIO ENGINEER.

24th September 1932.

JHR/MW.

Messrs. Graham Farish Ltd.
Masons Hill,
Bromley,
Kent.

Dear Sirs,

I have been much interested in the Filt Percolative Earth which you have submitted for test. The importance of a good earth connection is often overlooked, although attention to this point is repaid by improved signal strength and less liability to interference from external sources, particularly with Mains receivers.

A low electrical resistance is the first essential, and you appear to have gone to the root of the matter by providing an earth bowl filled with chemicals which firstly attract the moisture from the surrounding soil and then saturate it with salts of high electrical conductivity.

My tests indicate that the device is both simple and effective and that the earth resistance is definitely lower than is obtained by the usual methods.

I imagine that in the majority of cases the installation of the Filt Earth will give a definite improvement in results.

Yours faithfully,
J. H. Reyner

Why YOU should fit a FILT

Efficient earthing is vital to good reception. Without it you cannot obtain the power, purity or volume of which your set is capable.

Filt is the most efficient scientific earthing system ever invented. As soon as the copper receptacle is buried, the wonderful chemical it contains begins to spread through the soil, making a permanent highly conductive area to a depth of several feet, ensuring perfect earthing in any climate.

Get a FILT to-day. It may put right faults that you thought could only be remedied by expensive new valves or parts.



GRAHAM FARISH

FILT

PERCOLATIVE EARTH

Obtainable from your radio dealer or post free from the sole manufacturers,

Graham Farish Ltd.

181, Masons Hill - - Bromley, Kent



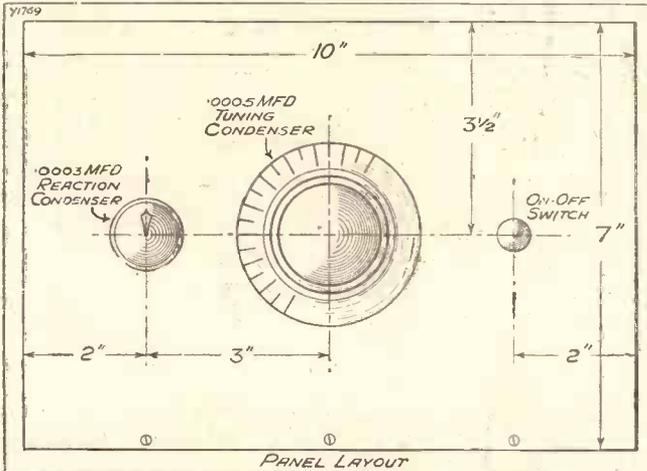
THE "PLUG-IN" TWO

(Continued from page 280)

Make sure that the panel doesn't rotate with the drill, and don't press too hard, otherwise you may chip the edges of the holes.

Apart from the $\frac{3}{8}$ -in. holes there are three smaller ones along the bottom edge of the panel for securing it to the baseboard. The centres for these holes should be approximately half the thickness of the baseboard up from the bottom edge of the panel.

ONLY THREE HOLES FOR CONTROLS



This self-explanatory diagram solves all drilling difficulties.

You have now made a good start on the construction. Secure the panel to the baseboard with three wood screws and then place the "On-off" switch, '0005-mfd. tuning condenser, and the reaction condenser in their positions.

Next obtain two pieces of ebonite strip,

2 in. by 1 1/2 in., and drill two terminal holes in each. These are the small terminal strips you can see on the back of the baseboard in the photographs. A couple of wood screws will hold each strip in place.

The baseboard components are then screwed down in accordance with the wiring diagram, but care should be taken not to place the three coilholders too far apart. The spacing is best carried out with two of the coils inserted, and there should be a clearance of about 1/4 in., or slightly less between the coils when they are in position.

For the wiring, 18 gauge tinned copper wire and systoflex are as good as anything, and there is, of course, no need to do any soldering, terminals being provided in all cases.

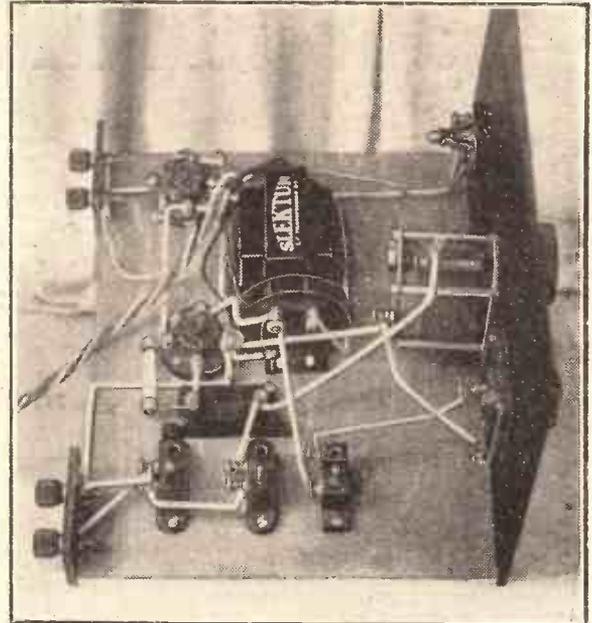
This completes the constructional work, but before you can try the set out you will naturally want to have some details of the valves, H.T. voltages, and coil sizes.

The two valves required are a special detector or "H.L." type in the first valveholder and a small power in the output stage. This valveholder is the one near the L.S. terminals.

The H.T. voltages can be 100-120 for

the small power valve and about 60 for the detector, but better results will be obtained by experimenting with this latter voltage, because smooth reaction control is the secret of success in a small set.

SHEER SIMPLICITY!



To simplify connections, the battery leads are taken direct to the connecting-points concerned.

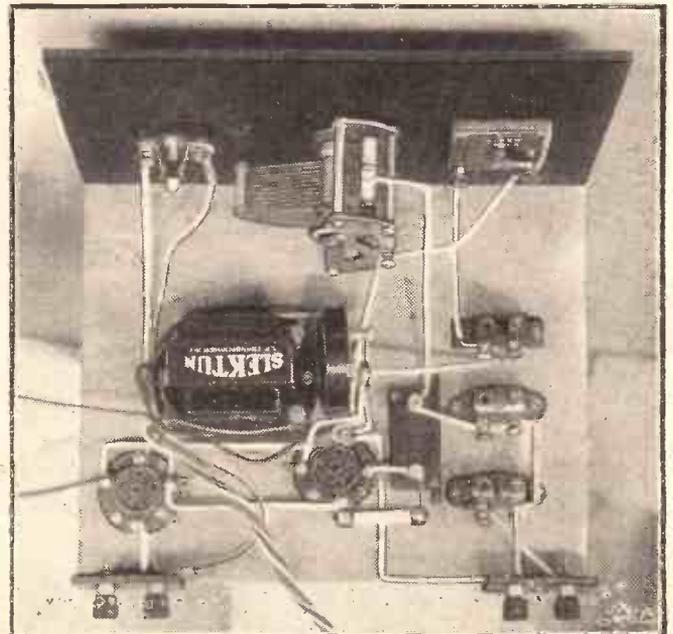
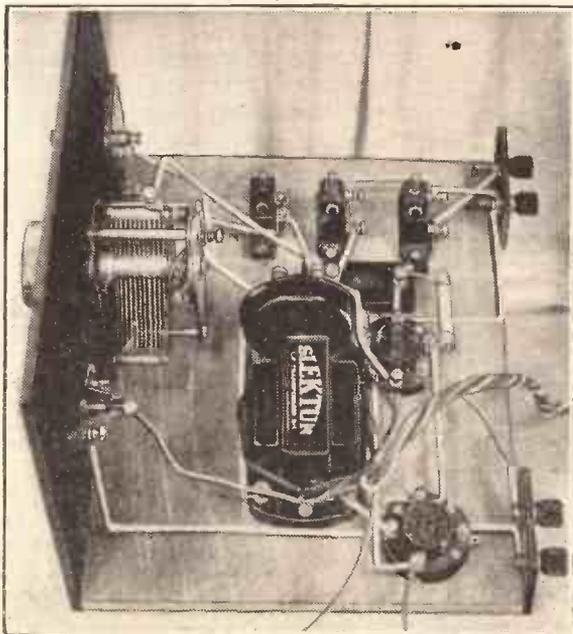
As to the coils, these will be as follows:

MEDIUM WAVEBAND.	
Aerial coil	No. 25
Grid coil	No. 60
Reaction coil	No. 50

LONG WAVES.	
Aerial coil	No. 100 or 150
Grid coil	No. 200 or 250
Reaction coil	No. 150

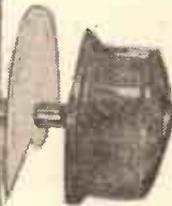
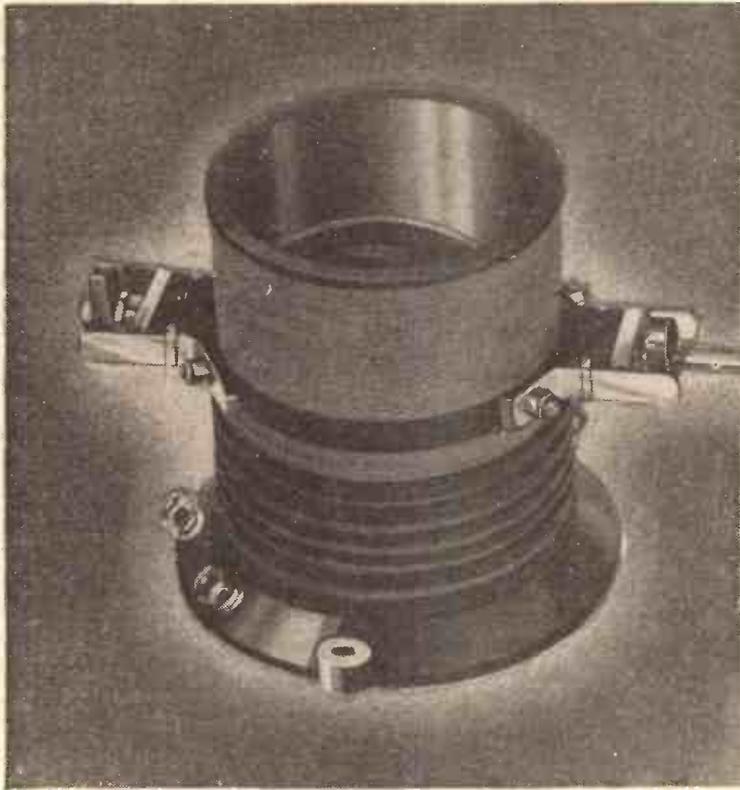
A larger aerial coil will give more volume and less selectivity, and vice versa.

HOW IT LOOKS WHEN FINISHED—A GOOD SET FROM EVERY ANGLE



Apart from the advantage of easily covering all wavelengths, the plug-in system permits a set to be "stripped" very completely for servicing or overhaul. Note how accessible each wire and component is when the valves and coils are removed.

SUPER-SHARP SELECTIVITY



Fit the wonderful Ready Radio Dual Range Coil Unit in place of your present Coil and you will be amazed at the improved performance of your set. Outstanding for its remarkable sensitivity and selectivity. The four-purpose one-knob control acts as a combined on-off switch, wavechange switch, selectivity and volume control, thus greatly simplifying wiring and operation. Instructions are included with every unit.

10/6

CONVERT YOUR OLD SET FOR 10/6

All you need to convert your old set is this wonderful coil unit.

1/- Book Free

Full details of how to use this amazing Coil are contained in the Kendall-Price Book. 36 pages describing 10 wonderful circuits, with photographs and diagrams, published at 1/-.

POST COUPON NOW OR GO TO YOUR DEALER FOR YOUR FREE COPY.



To READY RADIO LTD. (Book Department),
Eastnor House, Blackheath, S.E.3.
Please send me the 1/- Kendall-Price Book of Ten Circuits—FREE
) enclose 11d. stamp for postage.

Name.....

Address.....

If you wish to have, with your free book, ten full-sized blue prints,
enclose 1/- in stamps with this coupon. P.W. 8.



Announcement of Ready Radio Ltd., Eastnor House, Blackheath, S.E.3.

THE MOST AMAZING 'STRAIGHT 3'

TELSEN AJAX

Build it to-night with the full size 1/- Blueprint given FREE with the TELSEN RADIOMAG No. 3



3

full size 1/- Blueprints given FREE with the TELSEN RADIOMAG

The Telsens Radiomag is the finest radio sixpennyworth ever offered. In simple language, clearly illustrated by photographs and diagrams, and complete with 3 full size 1/- Blueprints, it tells you how to build the latest types of receivers . . . how to modernise your present set . . . how to rectify little faults . . . how to get the best out of radio in every way! Get your copy now—price 6d. from all radio dealers and newsagents.

NOT a "Kit" set which you have to buy complete—but simply a brilliant new circuit design using certain specified Telsens Components (some of which you may already have!)—that's the amazing new Telsens AJAX 3! It's the receiver countless home constructors have waited for—a receiver which is as inexpensive to build, as economical to run and as simple to operate as only a "straight three" can be, yet which is capable of such tremendous range and power, such razor-sharp selectivity and such superb reproduction that it literally sets an entirely new standard of performance for receivers of its type! Yet its construction has been so simplified that you can build it *easily* in an evening . . . even if you are an absolute novice! You simply can't go wrong, for not only is a *full-size* Blueprint given FREE with the TELSEN RADIOMAG No. 3, but every stage in its construction is explained by carefully worded instructions and clearly understandable illustrations. Get your copy of the TELSEN RADIOMAG now—and build the AJAX 3 this evening!

TELSEN

RADIO COMPONENTS

Make sure you get your TELSEN RADIOMAG N°3.

RECEIVER EVER DESIGNED....!

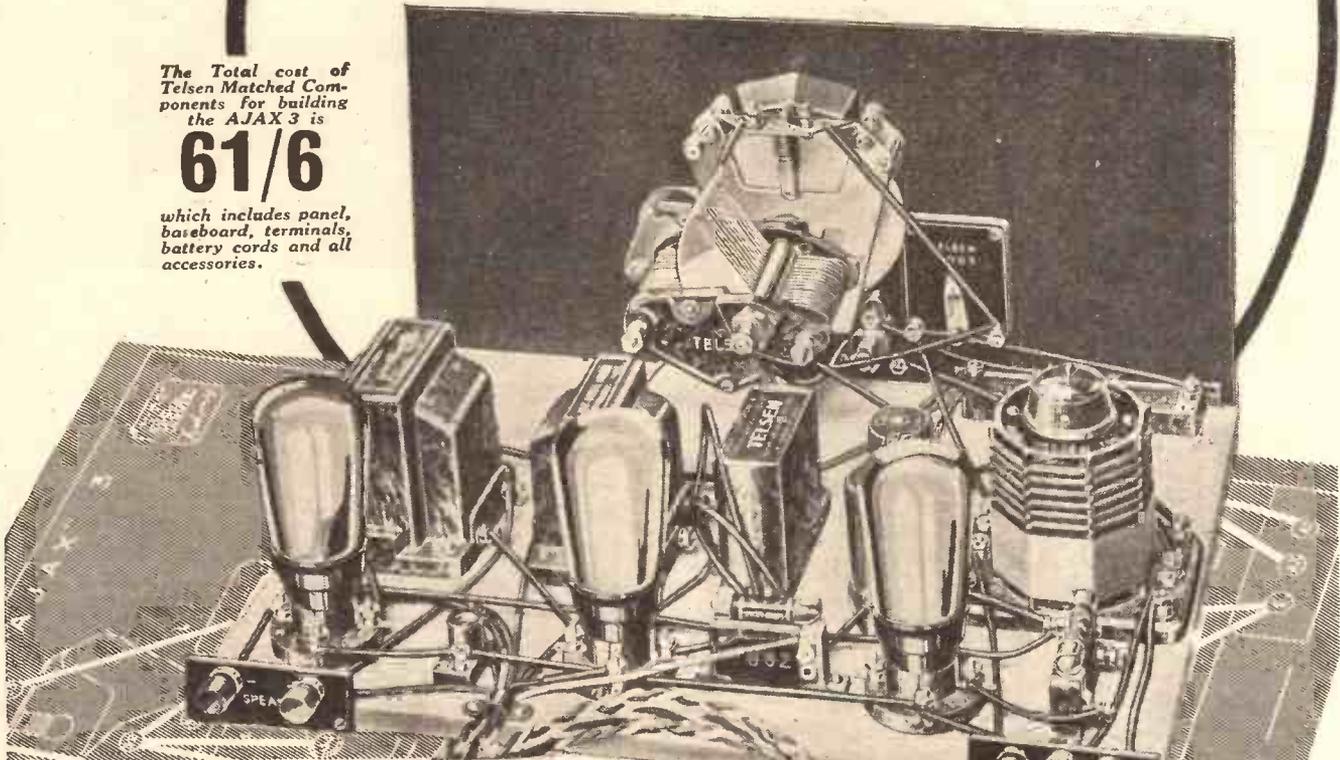
3

Gives 'screened grid' brilliance combined with 'straight 3' economy!

The Total cost of
Telsen Matched Com-
ponents for building
the AJAX 3 is

61/6

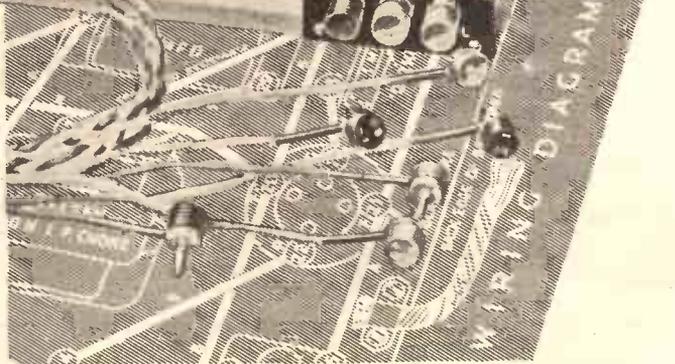
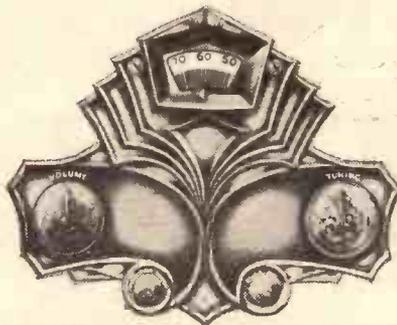
which includes panel,
baseboard, terminals,
battery cords and all
accessories.



THE "TELORNOR" GIVES THE AJAX 3

THE DIGNITY AND BEAUTY OF LINE OF A COMMERCIAL RADIO RECEIVER

The handsome silver oxidised escutcheon plate of the AJAX 3 embodies an illuminated variable ratio slow-motion Disc Drive, permitting of exceptionally fine tuning for distant reception.



Make sure you get your TELSEN RADIOMAG N°3.

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

**Listen
to the
driven
rain!**



A deluge with each gust of wind driving against the window panes wilder and wilder as the storm blows up. Only lead shot or peas flung across a drum in the Effects Studio make these sounds, but with a Lissen Battery in your set so real are they that you are immediately grateful for the fire and comfort of your room. Manufactured sounds, perhaps, but so very real to you if you use a Lissen High Tension Battery. Naturalness in your radio is worth while and you can get it by asking firmly at your radio dealer's for a Lissen High Tension Battery.

LISSEN H.T. BATTERY

an exclusive process makes it last longest and provide a pure high tension current that gives realism to your radio — always



ALL my readers will be aware what a radio gramophone is; they will know that it is a combined radio receiver and gramophone, and that it operates electrically; that is, through a loudspeaker and not with a sound box and horn as does the acoustic gramophone, and so on.

Probably they will also realise that the advantage of the radiogram is not only that the same instrument will deal with radio and record programmes, but that better reproduction can be obtained with it than is available from the old-fashioned acoustic machine.

Two Types of Instruments.

There are two types of radiogramophones, the battery and the mains-operated types. Most are the latter, for small power and sometimes comparatively poor quality are the characteristics of the battery model, unless it is exceptionally well designed and handled with circumspection.

The main trouble is that the owner will try to get too much volume from his machine, and as the battery model cannot give anywhere near as big volume as the mains-driven type, attempts to make it do so always end in distortion.

It is this that has got the battery radiogramophone into bad repute. As a medium-powered reproducer it is very good, but obviously it cannot deliver the punch that the mains type can.

In many cases the poor result is largely due to poor choice in the matter of the machine purchased, for as yet there is still large divergence in the matter of quality of reproduction, and careful tests should be made before any instrument is purchased.

Testing for Hum.

The test of the radio side is easy; it merely consists in finding what the instrument will pick up in the way of stations (preferably under the conditions of the prospective purchaser's home) and listening to the quality of the reproduction. The gramophone side needs more care if it is to be properly tested.

In the first place the machine should be tested for hum, on both radio and gramophone side (the latter when the motor is running, but without a record on).

No hum unless the ear is placed close to the speaker fret should be discovered. Switching the motor on and off should make

**Battery and Mains Instruments—
Noises Picked Up from Electric
Motors—Making Tests at Home—
High Notes and "Scratch."**

no difference to the hum, and the motor should be free from mechanical noises.

Next a test as to the pick-up chatter and induction hum from motor to pick-up must be applied. The first consists of running a record with the set at minimum volume (when nothing should be heard from the speaker) and very little should be audible in the way of chatter from the pick-up when the lid of the machine is down.

AUTOMATIC AMUSEMENT



One of the most interesting modern developments is this H.M.V. unit which can be connected to practically any radio set, enabling up to eight records to be played without manual changing.

The second test is carried out by holding the pick-up over the centre of the revolving turntable, not touching the record and listening with the volume control full on for any increase in hum above that previously audible during the hum tests.

Sometimes the motor will induce hum or crackle into the pick-up, and this will be amplified by the instrument, and cause quite a lot of interference.

The next thing to do is to test the record reproduction, having made sure that the radio side is O.K. This can be roughly tested at the dealer's, and if the record side is in order the receiver can be tried at your own home. Any reputable dealer will arrange that for you.

To test the gramophone side choose some records that you know well, of orchestral, vocal and organ items that you are familiar with, and try them over on the machine, listening for the various salient features in each.

Compare Radio with Records.

A piano record or two should also be tried, and the quality should be carefully noted. Compare the record reproduction with that obtained on radio. They should not be very different, although the radio may sound slightly more realistic.

If the salesman makes a point of emphasising the lack of needle scratch, listen carefully for the reproduction of the high piano, violin and brass instrument notes.

Without some surface noise it is impossible with pick-up design as it is at present to get good reproduction of the highest musical notes. But do not put up with too much of this noise, especially if it is rather on the harsh side.

Boyd Senter playing on the clarinet Eniale Blues is a good record to find out how the high notes are reproduced, and incidentally it will show up any nasty peaks.

Jack Hylton, George Olsen, and Duke Ellington are all dance-band leaders whose records (H.M.V.) are well worth hearing if you want to test the capabilities of the instrument on brass.

Other Good Tests.

Albert Sandler playing Gipsy Moon (Col.) is good for strings, and so is H.M.V. No. C1662, whereon The Virtuoso String Quartet performs.

Any of Gigli's tenor solos will show how the vocal side of the instrument goes, his lately released Che Gelida Manina (La Bohème) H.M.V. DB1538 being an excellent example. Note how the top C is taken at the climax of the song.

Finally listen to Columbia DX314, William Murdoch playing Sibelius' "Valse Trieste." It is a piano record of excellent tone, and is free from the wooden effect often heard in piano records. K. D. K.

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found-?



THE "GOLTONE" SUPER H.F. CHOKE

IT is claimed that this component is efficient over a wider wave-range than any other H.F. choke. On test, I find it effective from 15 metres to 4,000 (it actually goes lower and higher than that) which is a greater "coverage" than I can remember encountering on any previous occasion.

A WIDE RANGE



With the assistance of an iron core, this "Goltone" Choke is efficient over a wider wave-range.

suitable as an S.G. choke.

This, incidentally, indicates that it has almost universal applications, for only chokes of the highest efficiency can be used with success for that task.

The "Goltone" Super-Choke has the same very attractive mechanical features as Messrs. Ward & Goldstone's short-wave choke, which I recently reviewed. It can be mounted on either a panel or baseboard, suspended on wiring, fixed to a valveholder

or mounted direct on to a metal chassis.

At the low price of 4s. 6d. it should prove very popular indeed among constructors.

SIMPLIFYING SET ASSEMBLY

The Formo Band-pass Tuner comprises band-pass coils, with ganged switching and a ganged condenser, all mounted in the form of a compact unit on an aluminium base.

So the constructor who purchases one has half his set already built for him! It is certainly a most convenient method of approaching the problem of building a modern band-pass set, especially as the whole outfit is perfectly matched.

It is a scientifically designed unit, and its construction is excellent. I consider it to be one of the most interesting productions of this radio season.

On test it gave fine results—results superior to those obtained with a standard arrangement of high-quality components.

The particular model tried out was the Dual-Gang, which retails at 33s. 6d.

WELL-MADE COMPONENTS

It has been my good fortune to encounter a large number of really excellent components this season, a fact which one can accept as an indication of the high standard that has been achieved by the British radio industry in general.

A selection of new Tunewell components I recently received exemplifies this agreeable tendency, and also pointedly illustrates that you don't have to pay high prices to get first-class gear these days.

For instance, there is the Tunewell Volume Control, a component for the keen radio enthusiast to rhapsodise over.

It is wire-wound, but the moving contact smoothly rides over a circle of small studs. It is perfectly noiseless and there can be no wear.

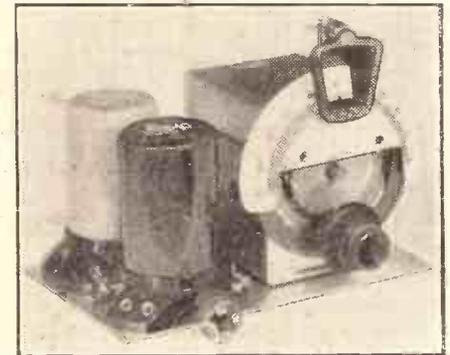
It will handle up to 3 watts, and it has a logarithmic action. This last is particularly important, and is almost essential in a modern volume control, though it is by no means universal.

The retail price is 5s. 6d.

And then there is the Tunewell Radio-Gram Switch, which is built into a cleanly-moulded bakelite case, and which has that definite snap action which is the hall-mark of a good switch. At 1s. 9d. I consider it represents as good value for money as can be obtained anywhere these days.

Finally, we have the Tunewell L.F. Transformer at 7s. 6d. This, also, is built into an attractive bakelite casing.

COMPLETE BAND-PASS UNIT



The Formo Dual-Gang Band Pass Unit.

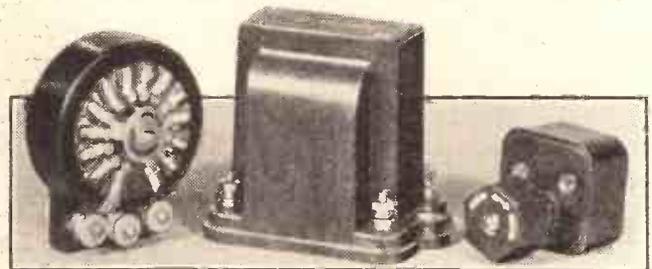
It has a 1 to 3.5 ratio (why will some still miscall it 3.5 to 1? No one wants a step-down intervalve transformer!).

For its price, the Tunewell transformer gives very good results, and is the equal of some which cost more.

"HOBROSITE" RADIO PANELS

These are made by the Vibranti Products Co., and comprise a three-ply wood having

THREE NEW TUNEWELL PRODUCTS



The Tunewell Potentiometer, L.F. Transformer and Radio-gram Switch.

a specially prepared surface. It is a kind of rich figured enamelling, which constitutes a surface of attractive appearance.

The material has a glossy finish, and its electrical qualities appear to be good.

"Hobrosite" panels are cheap and should therefore be regarded as an alternative to ebonite that is worth attention.

Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department with the strictest of impartiality, under the personal supervision of the Technical Editor. We should like to point out that we prefer to receive production samples picked from stock, and that we cannot in any circumstances undertake to return them, as it is our practice thoroughly to dissect much of the gear in the course of our investigations! And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are, therefore, framed up in a readily readable manner, free from technicalities unnecessary for that immediate purpose.

TELSEN H.F. CHOKES



TELSEN STANDARD H.F. CHOKE

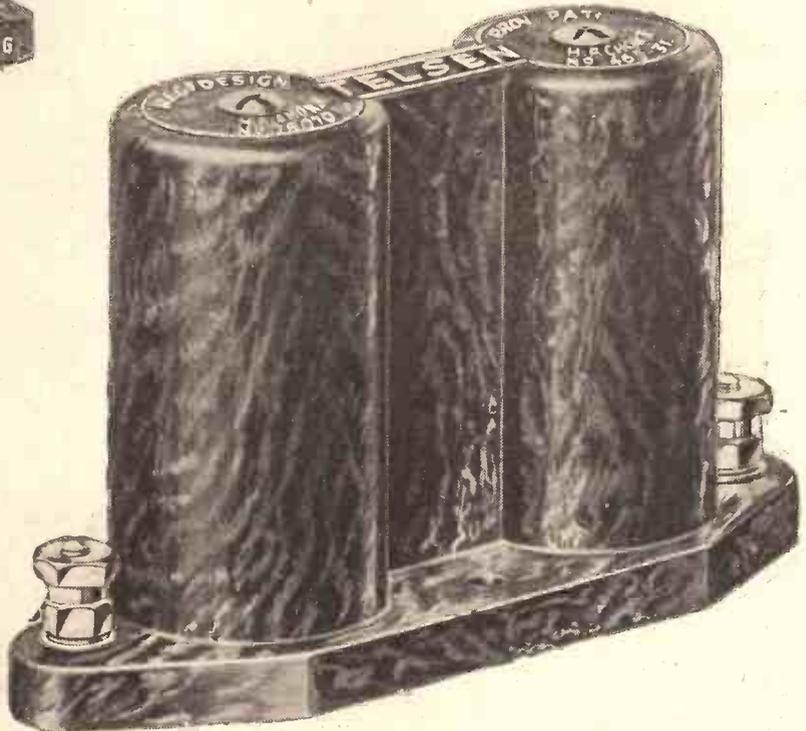
Covering the entire broadcast band, and occupying only the minimum of baseboard space, the Telsen Standard H.F. Choke has proved deservedly popular ever since its introduction. With an inductance of 150,000 microhenrys, a resistance of 400 ohms, and an extremely low self-capacity, it is highly suitable for use in reaction circuits, and is constantly being specified in this respect by the leading set designers.

No. W.75



TELSEN BINOCULAR H.F. CHOKE

In H.F. amplification, the performance of a choke is of supreme importance. Where the very highest efficiency is the primary requisite, the Telsen Binocular H.F. Choke is the inevitable choice. It has a high inductance of 250,000 microhenrys, with a very low self-capacity and a practically negligible external field (due to its binocular formation). It is from every point of view the *ideal* choke—and where high class circuits are concerned definitely the *essential* choke. No. W.74



TELSEN

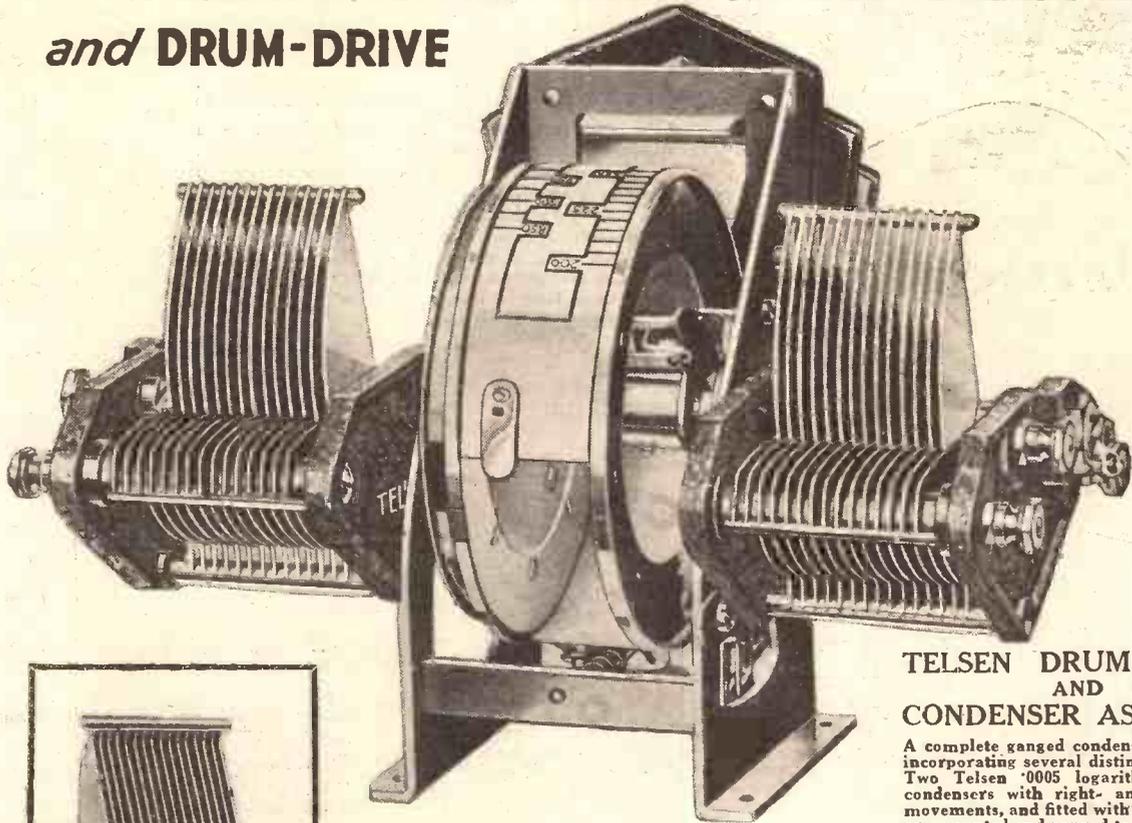
RADIO COMPONENTS

BUY A COPY OF THE TELSEN RADIOMAG - PRICE 6d.

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

TELSEN LOGARITHMIC CONDENSERS

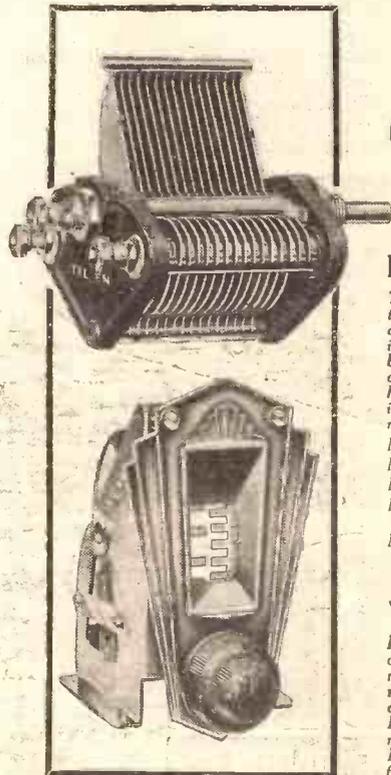
and DRUM-DRIVE



TELSEN DRUM DRIVE AND CONDENSER ASSEMBLY

A complete ganged condenser tuning unit incorporating several distinctive features. Two Telsen '0005 logarithmic variable condensers with right- and left-handed movements, and fitted with compensators, are mounted and ganged together through a rigidly constructed drum-drive control. Mounted on the same spindle axis as the main tuning drive is a trimmer, giving a swinging movement of about 20 degrees to the stator vanes of the right-hand variable condenser, enabling perfect matching of the condensers to be maintained throughout the tuning range. Two scales are supplied, one marked in wavelengths and one in graduations from 0-100. The scale is illuminated and is easily removable when it is desired to fit one of special calibration. The escutcheon is handsomely finished in oxidised silver, with knobs of the push-on type. Provision is made for panel and baseboard mounting; full instructions for mounting, together with a double-ended spanner for fitting the variable condensers, are included with every unit. No. W.262. Price

17/6



TELSEN LOGARITHMIC CONDENSERS

The frame is braced by three solid pillars, and the vanes clamped at three points, making distortion impossible. The rotor is also built into a rigid unit, the vanes being held at both ends. Generous bearings obviate backlash or end-plate. Models No. 260 and 261 (left-hand and right-hand movements respectively) incorporate a compensator (max. cap. 60 micro-micro-henrys).

No. 130.....cap. .00025	4/6
No. 131.....cap. .00035	4/6
No. 132.....cap. .0005	4/6
No. 260 (left-hand movement with trimmer).....cap. .0005	5/-
No. 261 (right-hand movement with trimmer).....cap. .0005	5/-

TELSEN DRUM DRIVE

Embodies numerous refinements, including a cord drive, arranged to reduce wear to a minimum and to prevent over-run, and a rocking stator trimmer, which gives a variation of 20 degrees, and visual indication of setting. For use with Telsen screened coils, an extra scale, marked in wavelengths, is supplied free. Illustration shows escutcheon, handsomely finished in oxidised silver. No. W.255.

8/6

TELSEN

RADIO COMPONENTS

BUY A COPY OF THE TELSEN RADIOMAG - PRICE 6d.

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

RECEIVERS OF RENOWN



No. 6 THE LOTUS ALL-ELECTRIC BAND-PASS THREE FOR A.C. MAINS

THERE is not the slightest doubt that the most popular set at the present time is the S.G. detector, and L.F. "three."

And the reasons for this are absolutely sound. The variable- μ S.G. valve provides us with ample selectivity and range, together with a convenient means of controlling volume before detection. This is the logical and only really satisfactory method in these days of high-power transmitters.

If you follow this by a power-grid detector and Pentode, the need for any intermediate L.F. amplification no longer exists, and you are left with a combination which will bring in a wealth of programmes at a strength adequate for all normal purposes.

TECHNICAL SPECIFICATION

GENERAL DESCRIPTION.—A.C. mains all-electric band-pass receiver incorporating moving-coil loudspeaker.

POWER CONSUMPTION.—Approximately 45 watts.

NUMBER OF VALVES.—Three.

CIRCUIT.—Variable- μ S.G., Detector, and Pentode.

ARRANGEMENT OF CONTROLS.—One for tuning, one for volume control, one for reaction, and one for waveband switching and "gramophone," with central "off" position.

PRICE.—16 guineas complete.

MAKERS.—Messrs. Lotus Radio Ltd., Old Swan, Liverpool.

We mention these facts because the Lotus Table Console which has been undergoing tests in our laboratory employs a circuit of this type, and we are able to say, without the least hesitation, that it is a remarkably good receiver.

The set in question is the A.C. mains version, retailing at 16 guineas, but two other versions viz., a D.C. mains and a battery model, are also available.

Overloading Avoided.

In taking over a receiver for test one's first impressions arising from a cursory inspection of the externals are often a reliable guide as to the efficiency of the design.

For instance, "shoddy" cabinet work, badly fitted and "sloppy" controls, and so forth, all tend to leave one with the feeling that the set is merely a haphazard

collection of parts which may, or may not, work satisfactorily.

There is nothing like this about the Lotus Table Console. Everywhere there is evidence that the receiver has been built up to a standard and not down to a price. The design has a pleasing solidity, and the cabinet is tastefully and nicely finished.

With regard to the circuit itself, as we mentioned previously, it consists of S.G., detector, and Pentode. Appreciating the vital need for selectivity, the makers have paid considerable attention to this point.

Thus we have a mixed filter band-pass aerial tuner and a tuned anode "ganged" together, and operable from a single tuning knob on the front of the cabinet.

The variable- μ S.G. valve has the usual potentiometer control, and there is no possibility whatever of overloading any of the valves even in those areas close to powerful Regional stations.

At this juncture we would say a few words about the selectivity of the receiver in practice.

Ample Volume.

We tested the set in Tallis House, using the larger of our two outdoor aerials. (This is a severe test, since the aerial is of high capacity) and had no difficulty in separating the Midland Regional transmission from the London Regional. There was also a definite gap between the two London programmes. Similarly, Radio Paris came through without the slightest trace of background from Daventry. These results were obtained using the least selective aerial tapping and there is, of course, a second aerial socket which provides still higher selectivity.

The triple gang condenser has a smooth movement, a trimmer being available for fine tuning and the illuminated tuning scales are calibrated directly in wavelengths. Reaction is applied to the detector-grid circuit, the moving vanes of the differential reaction condenser being joined to earth so as to eliminate hand-capacity effects.

Passing on to the detector, this is a grid-leak rectifier which, in the "gramophone" position, functions as an L.F. amplifier, the grid then being automatically biased in the conventional manner.

This is followed by a single stage of L.F. coupled by a transformer to a Pentode of the M.P.T.4 type, having an output (undistorted) of approximately 2 watts.

The output from the Pentode is fed into a Magnavox moving-coil speaker (mains energised) via a suitable output transformer.

Although the circuit of this Lotus

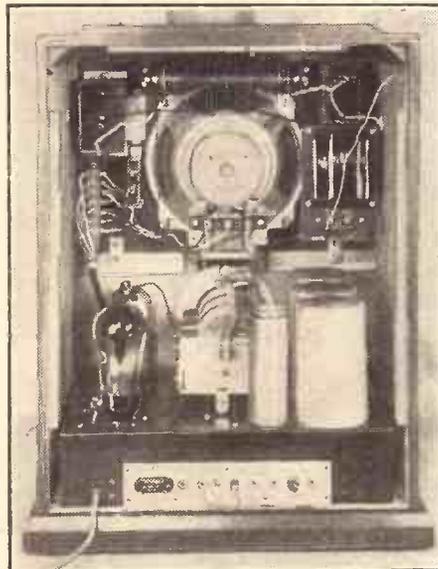
receiver is of a straightforward, well-tried type, there are certain refinements which are worth noting. For example, the tuning scales are independently illuminated by two lamps. That is to say, when the wave-change switch is rotated from the medium to the long-wave position, and vice versa, the appropriate scale lights up, and there is never any doubt as to which waveband the set is tuned to.

Excellent Reproduction.

There is also provision for both a mains aerial and an internal aerial. The former is particularly useful to those who cannot erect an ordinary aerial, and the latter is a boon to listeners who reside within the "swamp" area of a Regional transmitter. We have already dealt with the question of selectivity, but so far have said nothing about the range or reproduction. The range of the set is very good indeed. Such stations as Huizen, Radio Paris, Eiffel Tower, Northern Regional, and Brussels were receivable in daylight at excellent volume, and after dark most of the well-known Continentals on the medium waveband could be tuned in without difficulty. The tonal qualities of the set are above the average, and the combination of Pentode and Magnavox speaker gives just the right proportion of high to low notes, with an absence of "bass boom" or undesirable resonances.

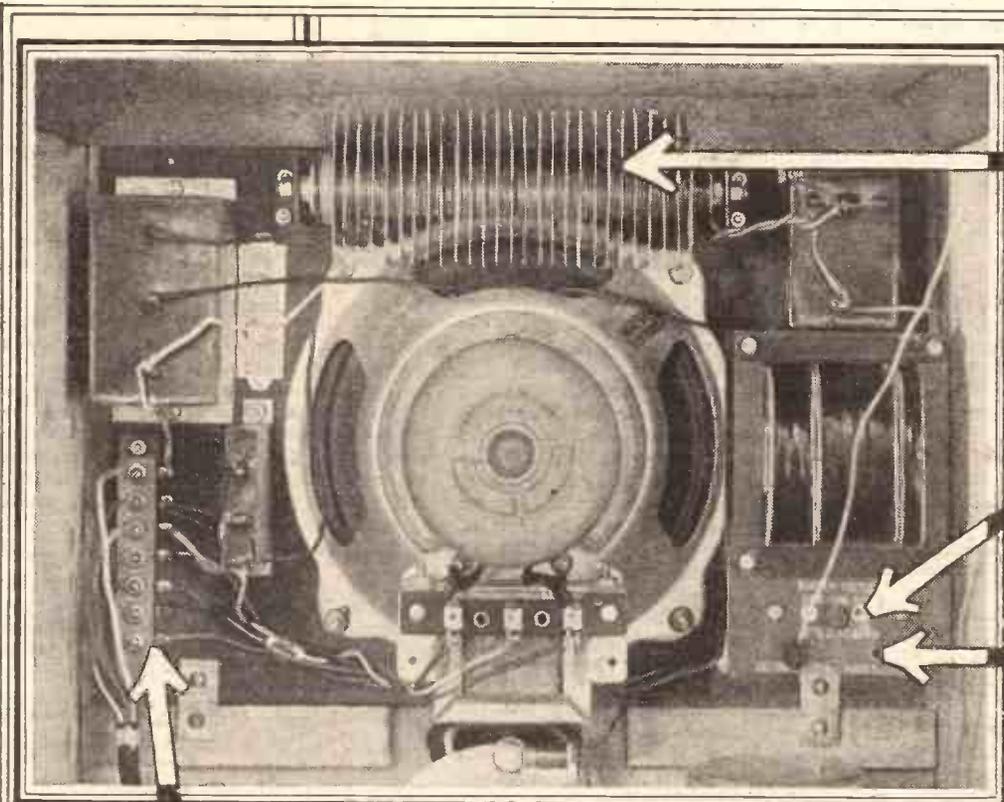
(Continued on next page.)

SOUNDLY DESIGNED



The tuning circuits are completely shielded by the three metal "cans" seen on the right of the triple "gang" condenser.

THE LOTUS ALL-ELECTRIC BAND-PASS THREE—(continued from previous page.)



A Westinghouse metal rectifier is employed for converting the A.C. voltages to D.C.

The receiver is designed for use on A.C. mains of 200 volts and over, and the adjustment for different voltages is a simple operation.

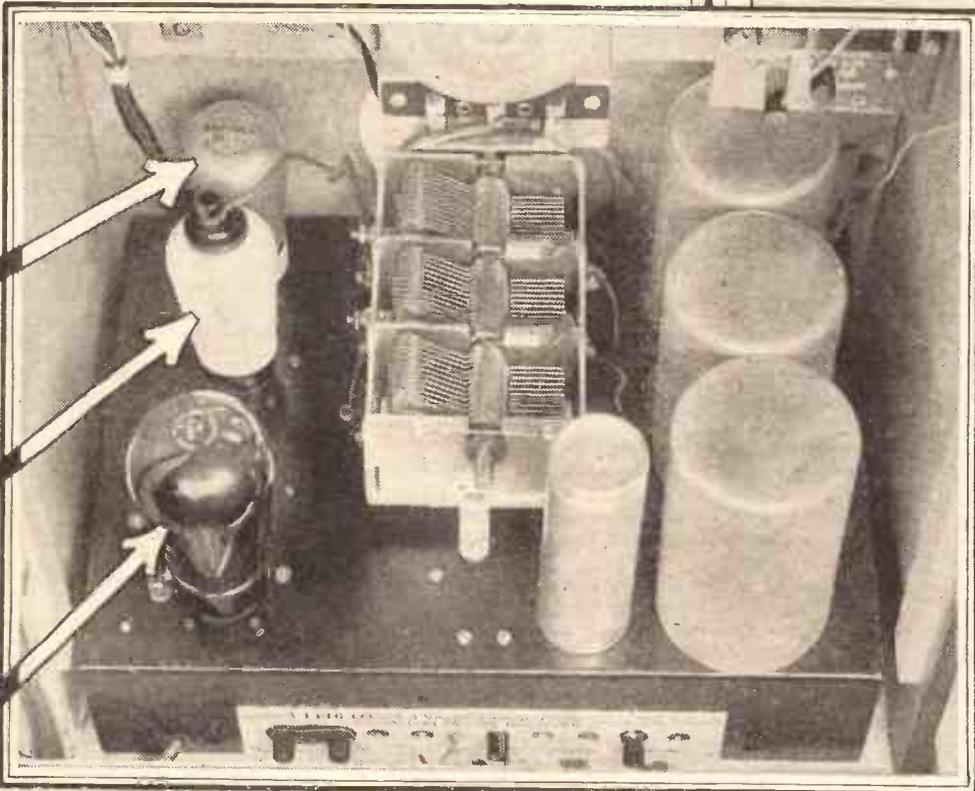
An Internal Aerial enables those listeners who reside within the "swamp" area of a Regional transmitter to obtain adequate separation of the twin programmes. Provision is also made for using the mains as an aerial

The various power leads are neatly arranged on a terminal strip, whence they are bunched together and taken to the underside of the chassis.

The Detector valve—a Mullard 904V.—is of the leaky-grid type. It functions as an L.F. valve when the switch is in the "Gram" position.

The use of a variable mu screened grid valve ensures high amplification combined with a pre-detector control of volume.

An Osram M.P.T.4, or similar type Pentode output valve, provides ample volume for all ordinary purposes and up to 2 watts can be handled without distortion.



“MOSCOW! Almost hear him take his breath. These Exide and Drydex Batteries certainly have pepped the old set up.”



Exide AND

Drydex

Exide Batteries for wireless low tension and high tension. Drydex Dry Batteries for wireless high tension and grid bias. Also for torches, cycle lamps and bells.

EXIDE WIRELESS BATTERIES ARE USED IN NINE OUT OF EVERY TEN BRITISH SHIPS

BATTERIES FOR WIRELESS

Obtainable from Exide Service Stations and all reputable dealers.

EXIDE BATTERIES, EXIDE WORKS, CLIFTON JUNCTION, NEAR MANCHESTER. BRANCHES: LONDON, MANCHESTER, BIRMINGHAM, BRISTOL, GLASGOW, DUBLIN, BELFAST

BRISTOLIANS held sway over the West Regional ether during the week ending September 24th, when Bristol Radio Week was held. The energetic co-operation of the B.B.C. was a token of their anxiety to serve listeners on the English side of the Bristol Channel.

The West Regional staff at Cardiff are in the unhappy position of having to serve two masters—the Welsh and the English. Welsh listeners are inclined to be jealous of such features as the Bristol Radio Week broadcasts; whilst “Welsh Interludes” and such-like don’t arouse enthusiasm in Somerset and Gloucestershire.

The B.B.C. did Bristol well. There was a special public broadcasting studio at the Colston Hall, where admiring crowds watched broadcasters in action—and the B.B.C. had not been stingy, for such noted artistes as Dennis Noble, Leonard Henry, the Victor Olof Sextet, and Marie Hall appeared.

A Serious Indictment.

That brings me to a remarkable statement about programme expenditure in the provinces, made by a Birmingham newspaper, as follows:

“Money, of course, is the stumbling-block. It can be spent like water in London, but provincial allowances have for some time now been cut almost to the bone, and not until the purse strings have been loosened a trifle will the provinces have that full chance of developing their local resources which once was declared to be the aim and intention of the regional system.”

Can this allegation be justified? The B.B.C. should reply to such a serious indictment.

**NOTES FROM THE
MIDLANDS AND THE
WEST**

Does the B.B.C. leave its provincial stations short of adequate financial support? This question is raised below by
Our SPECIAL CORRESPONDENT.

Landline charges must make a formidable figure in provincial expenditure, for relays are becoming increasingly numerous. During the autumn the Midland Regional programme will include broadcasts from far beyond Birmingham itself. From Coventry came the Journalists’ Concert on October 5th, and the Railway Concert on November 2nd will also be broadcast. From Nottingham on October 8th there was an interesting organ and choir programme of English music relayed from St. Mary’s Church, and on the previous evening the second act of “Don Giovanni,” was performed by the Carl Rosa Opera Company at Nottingham.

Derbyshire’s week will be that commencing October 31st; Herefordshire, November 21st; and Lincolnshire, December 12th.

County Programme Features.

Historical pageants will also be a feature of the county programmes, and West Regional carried out a similar idea in relation to Bristol during the Bristol Week—a programme called “The Time

Train,” a panorama of incidents in Bristol history from 1702 to the present day.

The New Droitwich Station.

Negotiations for the purchase of a site for the new Droitwich station are not yet completed, I hear, but B.B.C. engineers are busy designing the station and tenders will soon be coming in for parts of the equipment. A B.B.C. statement that the advent of Droitwich “May cause some modification to the existing scheme of distribution of alternative programmes” has caused some perplexity, and one Midland writer hazards the guess that this is something to do with the system of landlines.

To Be Closed Down.

Actually, what is in the back of the B.B.C.’s mind is that Droitwich may render some stations, such as London National and North National, redundant, and so permit them to be closed down.

Meanwhile there is not much of the “closing down” atmosphere about the new West Regional Station, Watchet.

The masts are now completed and the station buildings are in the busy hands of the bricklayers and carpenters.

Incidentally, it is thought that something in the way of a record has been achieved by the erecting of the second of the giant masts. Five hundred feet in height, this mast was actually erected, from base to summit, in twenty working days.

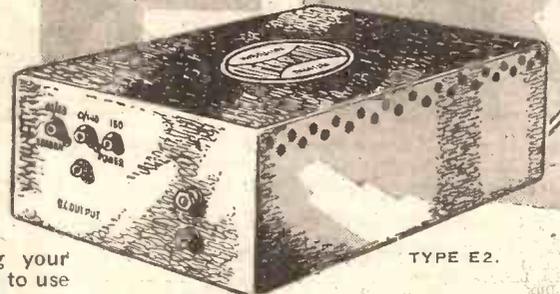
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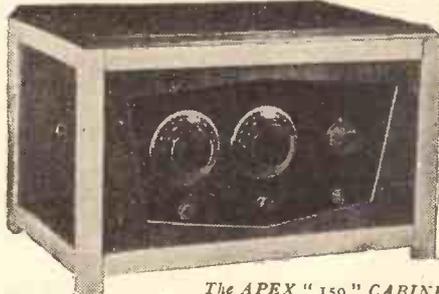
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1 Permeol panel, 14 ins. X 7 ins.	4	0	
2 Colvern screened coils, type T.D.	17	0	
1 Ready Radio "0003"-mfd. solid dielectric reaction condenser	2	3	
1 Ready Radio 3-pt. wave-change switch	1	6	
1 Ready Radio 2-pt. wave-change switch	10		
1 Bulgin on-off switch. Snap type S.80	1	6	
3 Valve-holders	1	6	
1 T.C.C. "0003"-mfd. fixed condenser "S"	1	3	
1 T.C.C. "0002"-mfd. fixed condenser "S"	1	3	
1 T.C.C. "0001"-mfd. fixed condenser "S"	1	3	
1 T.C.C. 2-mfd. condenser	3	10	
1 T.C.C. 1-mfd. condenser	2	10	
2 Ormond "0005"-mfd. s.m. variable condensers No. 6	13	0	
1 2-meg. grid leak, wire ends	10		
1 Dubilier 30,000-ohm resistance, wire ends, 1 watt	1	0	
1 Dubilier 200,000-ohm resistance, 1 watt	1	0	
1 Ready Radio H.F. choke	1	6	
1 R.I. "Dux" I.F. transformer	6	9	
4 Belling & Lee indicating terminals	10		
2 Terminal strips	1	0	
1 Coil Glazite	6		
1 Belling & Leo 5-way battery cord	2	0	
1 Piece copper foil, 10 ins. X 5 1/2 ins.	1	0	
Plugs, screws, etc.	7		
3 Mullard valves: PM12A, PM1HL, PM2A	1	12	3
1 "159" walnut cabinet	16	9	
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Total	£5:18:0		

KIT No. 1 (Less valves and cabinet)	£3:9:0
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Complete with "159" Walnut Console Cabinet, 8 1/2 in. x 6 in. Batteries, Oldham Accumulator, Epoch Twentieth Century Moving-Coil Speaker.	17/6
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SIEMENS 120-volts H.T. battery		13	6	
SIEMENS 9-volts G.B. battery			1	0
OLDHAM 0-50 L.T. accumulator			9	0
EPOCH Twentieth Century moving-coil speaker chassis	1	15	0	
or in Epoch oak cabinet	2	7	6	
ATLAS A.C. 244 H.T. unit	2	19	6	
ATLAS A.K. 260 H.T. unit with trickle charger	4	10	0	
R. & A. Type 50, magnetic type speaker chassis	16	6		
GRAHAM FARISH "Filt" earth			2	6

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for which (b) I will pay on delivery {Cross out line}
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P.W. 15/10/32

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1 Ormond "0005"-mfd. tuning condenser, slow motion	6	6
1 "0003"-mfd. reaction condenser	2	3
1 R.I. "Dux" I.F. transformer	6	9
3 Coil holders	2	0
1 T.C.C. "0003"-mfd. fixed condenser	1	3
1 Dubilier 2-meg. grid leak, 1 watt	1	0
2 4-pin valve holders	1	0
1 Ready Radio H.F. choke	1	6
1 Ready Radio 2-pt. push-pull switch	10	
5 Belling-Lee terminals	10	
1 Panel, 10" X 7", drilled	3	6
1 Baseboard 10" X 8" X 1/4"	1	0
2 Terminal strips 2" X 1 1/2"	6	
5 Wandler plugs	10	
2 Spades	4	
6 Coils, Lewcos Plug-in	1	4
2 Mullard valves: P.M.1H.L. & P.M.2A.	15	9
1 Cabinet	11	9
Flex, screws, etc.		11
Total	£4	2 6

KIT No. 1 (less valves and cabinet) **£2 15 0**

KIT No. 2 (less cabinet with valves) **£3 10 9**

KIT No. 3 (with valves and cabinet) **£4 2 6**

"PLUG-IN TWO" ACCESSORIES.

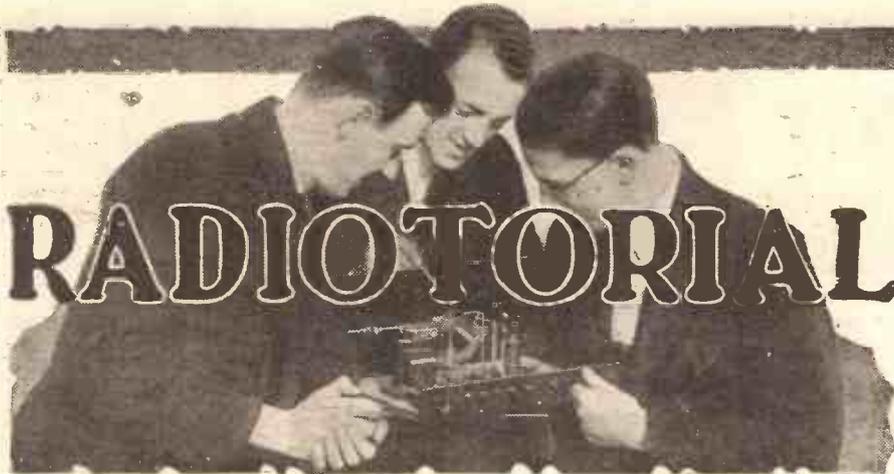
1 Siemens 120-volts Cadet H.T. battery	11	0
1 Oldham 0-25 accumulator	5	6
1 Siemens 9-volts G.B. battery		1 0
1 R. & A. type 50, loud-speaker chassis		16 6
1 "Filt" earth		2 6
50 feet rubber-covered aerial		1 6

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RADIOTORIAL

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

QUESTIONS AND ANSWERS

S.G. AMPLIFIER ON SHORT WAVES.

W. W. C. A. (Wolverhampton).—"My business frequently takes me abroad for uncertain periods, and so I am not a regular reader of your paper. But I get it when I can, being interested more especially in short-wave

reception, and having found your 'Magic' very good indeed for this.

"I have always rather mistrusted H.F. amplification on the short waves, but lately I was introduced to a circuit which is causing me to change my mind. It is an S.G. unit, with H.T. and L.T. leads to the set batteries, and aerial and output terminals.

"Its aerial terminal goes to a .0001 mfd. variable, which is joined to aerial coil (plug-in) grid and .0001-mfd. tuning condenser by its other terminal.

"The screening grid goes to a 2 mfd. and to two resistances (spaghetti), of 50,000 and 30,000 ohms. Both 50,000 and the 2 mfd. (other sides) go to filament, and also to other side of aerial coilholder and moving vanes of that condenser.

"In addition, there is a short-wave choke, joined to the H.T. plus and other side of the 30,000 ohm. The plate terminal goes to the other side of this choke, and also to a .0001 (or thereabouts) variable, which is fixed on its other side to the output terminal. And this condenser is worrying me a bit.

"The unit's output terminal goes to my detector's 'aerial,' so this .0001 would appear to govern the coupling from unit to main set. And I don't think I get it adjusted properly. I should greatly appreciate any hints you can

(Continued on page 298.)

IS YOUR SET BEHAVING ITSELF?

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

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

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

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

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

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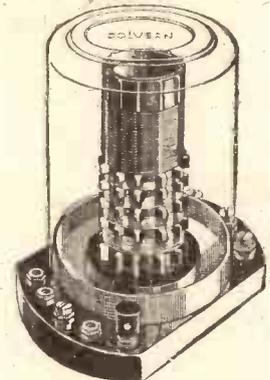
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RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 296.)

give me on this, as I have a feeling that results with this unit will be something to write home about when I can get it going as it should.

"One other trouble. A run-down H.T. battery unpleasantly informed me that the resistances are across H.T. plus and neg. all the time, unless the H.T. plug is taken right out of the battery all the time that the set is off. Could this be switched with the L.T. switch in any way?"

The last point can be dealt with in a few words, so we will cover that first. Unless your L.T. battery switching is of an unusual type you will not be able to do anything about switching off the "resistance" circuit with your L.T. switch. But all you need is an ordinary on-off switch connected in that (resistance) circuit, and operated whenever the main on-off switch is operated.

Incidentally, it is a good plan to use similar switches, and then one gets used to operating them simultaneously, especially if they are placed close together.

The unit which you describe is of a very successful type, and has been recommended in "P.W." as being suitable for use in front of almost any type of short-wave set. To operate, you should tune in your ordinary set in the usual way, and then rotate your new tuning control on the unit. Probably one of two things will happen—either the detector will stop oscillating, or else the signal tuned in will disappear or change in pitch.

If the former happens, probably your S.G. to detector coupling is too tight. So slacken off the coupling condenser to cure this.

Tune in carefully to Morse or a carrier-wave, with the detector oscillating, and then slowly rotate the S.G. tuning dial also, to see if this alters the pitch of the received note. If so, your S.G. tuning is too sharp, so damp the S.G. circuit by increasing the aerial coupling a little. (More capacity in the aerial series condenser.)

Correct and careful adjustment of these two condensers will enable you to find a setting at which the S.G. tuning condenser acts as a good volume control, bringing up the weak stations very noticeably when "in step."

There are other advantages in the method, but the key to correct operation is the balancing of the two condensers as detailed above.

Rebuilding for New Cabinet.

H. N. (Shadwell, London, E.).—"Knowing one of the chaps in the furniture and cabinet trade centred near me I came into possession, for next to nothing, of a beautiful walnut cabinet, which I am going to use for containing the wireless.

"Being plenty big enough for books as well, I am going to work in a shelf for these, and I am going to take my time on the job, which won't be done much before Christmas.

"I am re-building the set, of course, as the old set is not fit to be seen in the same room as the new cabinet. But I want to shift the parts round a bit, though sticking to the same circuit.

"And here is the snag. In almost every case I can read, or hear of, the mains unit, etc., is kept quite separate from the set, but I would

DO YOU KNOW—

The Answers to the following Questions?

There is no "catch" in them, they are just interesting points that crop up in discussions on radio topics. If you like to try to answer them, you can compare your own solutions with those that appear on a following page of this number of "P.W."

- (1) Which two stations are "radio neighbours" of the London Regional (occupying the adjacent wavelengths)?
- (2) What is the name of the Portuguese station on 431 metres (immediately below Stockholm)?
- (3) Is there any objection to undoing loudspeaker leads when the set is switched on?
- (4) Who is the present Chief Engineer of the B.B.C.?

like my mains wiring to be partly on a small shelf just below the main wireless baseboard, and partly on the actual baseboard.

"Is there any objection to combining and separating it in this way? I should, of course, keep to the same wiring as before, but some of the leads would be longer?"

You must proceed very carefully if you are to be successful in rebuilding.

The reason that the mains section is so generally a separate entity, removed from the baseboard and occupying a restricted portion of it, is that the set and the mains wiring do not "get on together" as

(Continued on page 300.)

"P.W." PANELS, No 93.—BERNE, SWITZERLAND.

The Berne station works on 246 metres, and a power of 5 kilowatt. Its programmes, however, are frequently heard in this country via Schweizerischer Landessender.

The latter is the powerful German-speaking Swiss station on 459 metres, which relays Basle, Berne, and Zurich programmes.

Berne is 463 miles from London. It closes down with the "Marche de Berne."

From the NEW

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BEFORE you start building any set get the NEW Wearite Booklet G.N.1! Whether it is Coils, Resistances, Chokes, Transformers, Switches, or components of special design, consult this illustrated booklet first. Every component listed in it is built up of years of experience of the needs of the constructor. Each and every product has the stamp of efficiency on it—'WEARITE.' Remember Wearite was the first name in Radio Components—and is still first to-day.

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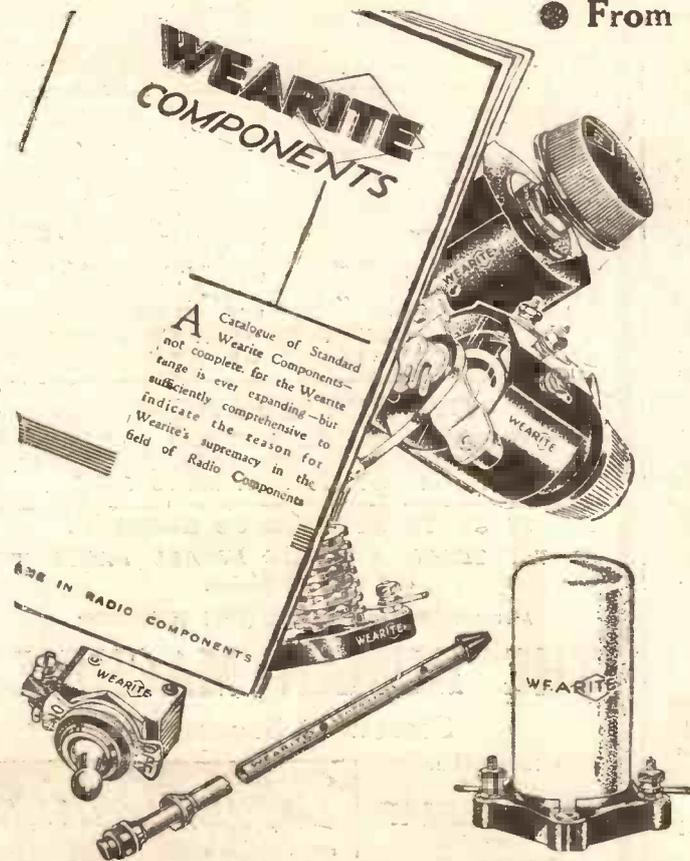
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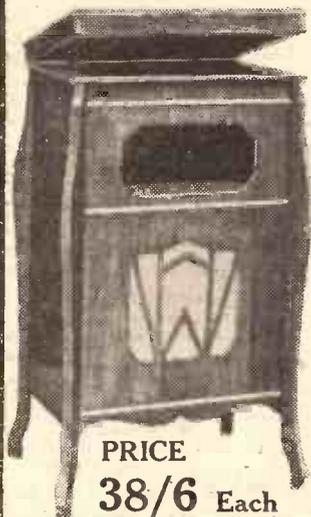
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Overall: 39 ins. high, by 22 ins. wide by 18 ins. deep.

Gramophone Compartment: Gives 5 ins. clearance for Pick-up and Turntable.

Wireless Compartment: To take a Panel up to 18 ins. by 8 ins. and ample space for Motor.

Speaker Compartment: 18 ins. Wide by 16 ins. High by 14 ins. Deep.

All are fitted with Hinged Lid and Stay, Heavy Motorboard and Baseboard. The whole of the back is removable so that all parts are easily accessible.

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R & A "VICTOR" PERMANENT MAGNET MOVING-COIL SPEAKER DE LUXE. With 6-ratio input transformer and protecting grill. Balance in 11 monthly payments of 6/5. Carriage paid. **With 6/5 order**

BLUE SPOT 99PM PERMANENT MAGNET MOVING-COIL SPEAKER with tapped input transformer. Balance in 11 monthly payments of 5/6. Carriage paid. **With 5/6 order**

ATLAS A.C. ELIMINATOR, TYPE A.C.244. Three tappings, S.G. detector and power. Output, 120 volts at 20 ma. Balance in 11 monthly payments of 5/6. Carriage paid. **With 5/6 order**

W.B. PERMANENT MAGNET MOVING-COIL SPEAKER, TYPE P.M.2. Complete with multi-ratio input transformer. Balance in 11 monthly payments of 7/10. Carriage paid. **With 7/10 order**

EPOCH "20 C" PERMANENT MAGNET MOVING-COIL SPEAKER. With 5-ratio transformer. Balance in 5 monthly payments of 6/6. Carriage paid. **With 6/6 order**

BLUE SPOT SPEAKER UNIT AND CHASSIS, TYPE 100U. Sensitive to remarkably small inputs. For power or pentode. Balance in 6 monthly payments of 5/2. Carriage paid. **With 5/2 order**

Any items advertised in this journal sent C.O.D. If value over 10/- sent all C.O.D. charges paid.

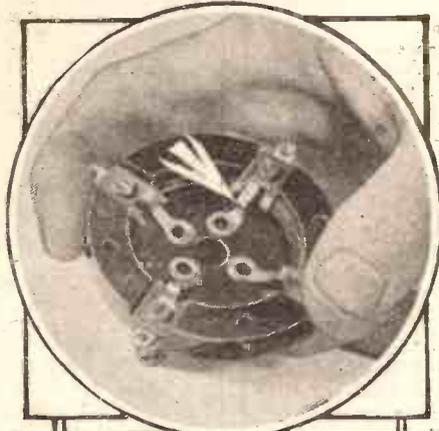
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Address
P.W. 15/10/32

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 298.)

a rule. Associated with the mains are stray electromagnetic fields and unsmoothed currents that can introduce hum into any set-wiring in close proximity. So, as a general rule, the further you can keep the "mains" wiring away from the set proper the better.

WHAT'S WRONG?



IS IT THE VALVEHOLDER?

Robust and reliable as the modern valveholder is, there are several points that need watching when mounting it, especially on a metal covered baseboard.

Misuse may break one of the spring contacts (see above). And if it becomes bent the spring may touch the metal on which the holder stands. For this reason it is advisable to insert cardboard or other insulator between the baseboard and the holders.

If you get trouble that you cannot clear up remember that for a small charge a suggested layout for your own particular needs will be drawn up by the Technical Query Department.

VISUAL TUNING WITH THE "APEX."

V. K. F. (Southampton).—"Having built the 'Apex' exactly to the blue print, my first evening with the set convinces me it is just what I have been looking for. All I want now is the biggest sheet of graph paper I can lay hands on, and a few undisturbed nights to draw up a log of everything I can tune in.

"There is one question I should like to ask, and that is about the use of a milliammeter for accurate tuning.

"As I understand it, the idea is that when a sensitive milliammeter is connected in the plate circuit of the detector valve it is possible to see the effect of tuning in a station by the movement of the needle. Is this really a better method than judging when you are tuned exactly right by ear?

"I have got an unused 0 to 5 milliammeter, and have, in fact, tried my luck, but without success. Not knowing the proper place to put it, I thought maybe any part of the detector plate wiring would do, and as the most convenient terminal was the 'fixed' on the reaction condenser I undid this and put

THE ANSWERS

TO THE QUESTIONS ON PAGE 298 ARE GIVEN BELOW.

(1) London Regional's "neighbours" are Graz, Austria, 352.1 metres, and Tiraspol, Russia, 356.3 metres, which is now sandwiched between London and Stuttgart (Mühlacker), who is on 360.5 metres.

(2) Parede.

(3) Yes, when a pentode is used, particularly if the set does not include a shunt circuit across the output impedance.

(4) Mr. Noel Ashbridge.

DID YOU KNOW THEM ALL?

the plus terminal of the milliammeter on the H.F. choke wire and its other terminal to 'F' on the reaction.

"There was no result when tuning, so I suppose I got it wrong somewhere.

"Please say what you think of this idea for tuning, and in the meantime I will get to know whereabouts most of the stations lie, ready for the final chart."

We unreservedly recommend the idea of a sensitive milliammeter in the detector's plate circuit, for accurate tuning.

The ear is easily deceived about volume, and really accurate adjustment of the dials on a loud programme is consequently impossible by this means. But with a milliammeter the uncertainty vanishes, and tuning can be carried out with hairbreadth accuracy.

Your attempt at getting your new milliammeter to work failed because you tried to insert it into the reaction circuit, in which no steady current flows, owing to the insulation of the reaction condenser. The milliammeter is operated by the H.T. current which flows via H.T. plus 2 lead, L.F. primary, and H.F. choke, and therefore it must be placed where this current will pass through it.

The top of the choke is a convenient place to cut in on this circuit. Undo the top terminal and join the milliammeter's plus terminal to the choke, and its negative terminal to the lead that goes via the 0002 mfd. to plate of V2.

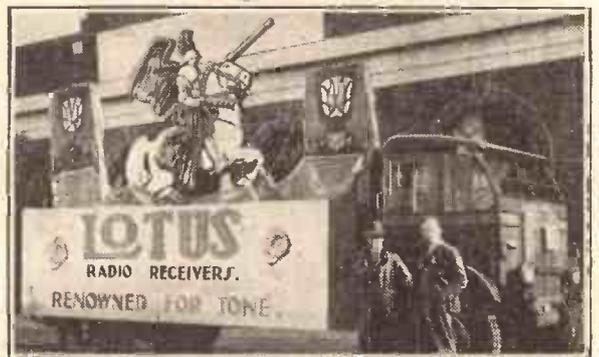
TRADE JOTTINGS

By G. T. KELSEY.

I HAVE just had a demonstration of the new Pix invisible aerial, and although I have not yet seen the Technical Editor's report on the efficiency of this new device, I must admit that it strikes me as being quite an ingenious idea.

This new aerial, which is 30 ft. long, is in the form of a narrow self-adhesive strip,

FIRST PRIZE AT MANCHESTER



The attractive "Lotus" van which took the judge's eye when viewing the Radio Convoy from London to the Northern Exhibition.

and the result is that it can be fixed anywhere in a few moments without tools or fixing screws of any description.

It will stick to the wall, it will stick to the door, and it will even stick to the

(Continued on page 302.)

"Have you heard this one"



"It's the sad story of a man who claimed that his moving-iron type loudspeaker can equal the performance of my moving coil."

"Yes, but—"

"In this enlightened age, with the passing of the moving-iron type and the obvious superiority of the moving coil, it's as good a joke as I've heard."

"How so obvious?"

"Why, technical experts unanimously agree—performance proves it. The moving iron has a limited frequency response. It lacks true bass, without which orchestral reproduction is in-

complete. It lacks the purity of reproduction, the power handling capabilities of the moving coil. It serves its purpose as a link in the chain of radio progress, but is definitely inferior to the moving coil."

"But Moving-Coil Speakers are expensive."

"Not at all. The R. & A. 'BANTAM' costs but 27/6, complete with Ferranti Transformer. Cheaper than many a moving-iron type. It gives moving-coil performance. Why buy a moving iron?"

"Why, indeed!"

The R. & A. "Bantam" is a Permanent-Magnet Moving-Coil Reproducer of thoughtful design and flawless construction, and has a performance which will satisfy the most critical ear. Speech and music are reproduced with remarkable fidelity and volume, and sensitivity is such as to recommend its use for small as well as large receivers. It is definitely superior to any moving-iron type at any price. Dimensions, 7½ in. dia. by 3¼ in. deep.

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27/6 Complete.

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WITH CLIP 2/9

CUT OUT JAMMING

and increase the range and selectivity of your set. Cut out those powerful stations that "swamp" your set, and tune in loud and clear those 1½ kw. programmes. A PIX is better than a pre-set aerial condenser as it has a minimum capacity of .000004, a range of 40-1 max. to min., and is cut out when closed. Send P.O. to-day, or from your local dealer.

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PIX



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All the leading radio experts give enthusiastic testimony of the great improvement over all other types of aerial wire. No lead-in wire or insulators necessary.

AVOID IMITATIONS.

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Prices:
50 ft. 1/3
75 ft. 1/10
100 ft. 2/5



Model No. 227.

OSBORN RADIO CABINETS

Model No. 227. Beautifully designed Radio-Gramophone Cabinet, 3' 4" high x 2' 2" wide x 1' 6" deep. Space for speaker, 24 x 16". Accommodation for set and any type of gramophone motor, 24" x 12" high. Baffle behind fret, 24" x 16". Special Silk Fabric included.

PRICES. Machined ready to assemble: Oak £3.0.0, Mahogany £3.5.0, Walnut £3.15.0. Assembled ready to polish: Oak £4.0.0, Mahogany £4.5.0, Walnut £4.15.0. Assembled and polished: Oak £5.0.0, Mahogany £5.15.0, Walnut £5.10.0.

Osborn Super Acoustic Baffle Board prevents 90% speaker worry. Guaranteed no vibration. Any size hole cut FREE. 18 x 18, 30 x 24, 24 x 30, 30 x 30, 8/-, 36 x 36, 11/3. Carriage paid U.K. Send for Free Sample.

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27/6 INCLUDING TRANSFORMER

This chassis is unique where economy of space is an important factor. Although small in size—the diameter is only 6 $\frac{5}{8}$ "—the volume and tone are truly remarkable. The "Soundex" gives amazing selectivity. A universal tapped transformer is built on to the chassis. Look where you will, at 27/6 greater value is unobtainable.

The P.P.M. Soundex can also be obtained housed in a handsome Walnut Cabinet, price 50/-. Size: 10 $\frac{1}{2}$ " high x 10 $\frac{1}{2}$ " wide x 5 $\frac{1}{2}$ " deep.

CELESTION

The Very Soul of Music

Celestion Ltd., London Road, KINGSTON-ON-THAMES. London Showrooms: 106 Victoria Street, S.W.1.

TRADE JOTTINGS

(Continued from page 300.)

curtains (various interests permitting!), and as far as I could see it leaves no mark when it is removed.

It is certainly a noble idea, and I shall be interested to see the technical report when it is through.

"Minimax" Now "Maximin."

It is apt to be a trifle irksome if, when you order a perfectly good wireless set, you are supplied with a fire-extinguisher instead. After all, even though there may be times when the programmes tend to make one burst into flames, that doesn't altogether justify the confusion on the part of the suppliers.

Messrs Ferranti, too, have been having a think about this little matter, and to do away with all possibility of confusion they have now changed the name of their popular cheap kit-set from "Minimax" to "Maximin." The set is exactly the same as before, and it is only the name that has been changed, so will interested readers kindly note.

A Book on Tuning Coils.

The popularity of the British Ebonite Company's handbook on wireless circuits, which was first published a year or so ago, has prompted the firm to bring out another handbook on up-to-date lines.

NEXT WEEK

POPULAR WIRELESS will contain details of A FINE ALL-ELECTRIC SET FOR CONSTRUCTORS.

Order a Copy To-day!

This time the Becol Book is all about Tuning Coils for Wireless Circuits, and it includes all manner of interesting dual-range, band-pass and super het. schemes. In my opinion, the book constitutes a most useful guide for the home constructor, and it is worth every penny of the sixpence that is charged for it.

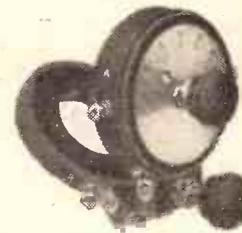
You can obtain a copy by applying to the British Ebonite Company Limited, Nightingale Road, Hanwell, London, W.7. The cost of the book includes postage.

Circuits for Mains Units.

I have just received a copy of a book entitled "Mains Power For Your Radio," which has recently been produced by Messrs. Heyberd & Co.

I have been carefully through the matter that is contained in it, and I must say that I am impressed with the way in which it has been prepared. There are, for instance, no less than 15 circuit diagrams, complete with lists of components, and voltage and current output ratings for mains units and charging apparatus. In fact, the book contains a mains unit circuit for almost every conceivable purpose, and this new Heyberd publication is, I feel, an effort that will be of interest to all home constructors.

You can obtain a copy for yourself free of charge by sending to Messrs. F. C. Heyberd & Co., 10, Finsbury Street, London, E.C.2.

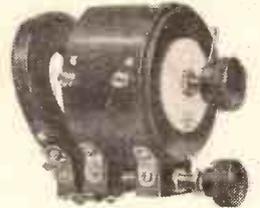


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Exact INDUPAS Aerial Tuner, 200-2,000 metres. Gives good selectivity when tuned with '0005 2-ganged condenser. No screen or special components required.

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WILL TELL YOU HOW GOOD THEY ARE

THE LISTENER'S NOTEBOOK

(Continued from page 262.)

English are supposed to be shockingly bad linguists; we need all the encouragement we can get, and Señorita Laguna would do well not to forget this.

All Alike.

Any musical play with Jan Van der Gucht and Bobbie Comber in the cast is worth listening to. As a rule I don't care a rap who the females are, for they are all so alike that it doesn't much matter.

I can't help feeling that broadcasting offers nothing like the chances to the musical comedy actress as does the stage. It seems to have killed all originality in her for one thing, fashioning her in such a way that she is indistinguishable from any other.

It is a pity, of course, that the good qualities, so essential for the stage, which she doubtless possesses, are wasted on listeners.

An actress suffers through not being seen more than the actor does, for most of the weapons she employs to captivate her seen audience have to be put away when she is in the studio, leaving her with a modicum which isn't always adequate for the job.

Less One-Sided.

One feels grateful to wireless in times of political crises. With opportunities given to the leading actors concerned to state their case we get an opportunity of hearing all the facts, or at any rate a more comprehensive and less one-sided picture of the situation than we were accustomed to get when we relied on one daily newspaper only for our information.

In this respect it was interesting to note the omissions in the reports the next morning of the Samuel-Simon broadcast.

Quota of Talks.

We haven't to wait now for the return of G.M.T. to tell us that summer has gone. Radio programmes with their weighty quota of Autumn Talks impart this information quite as effectively.

These have been so numerous and attractive that listening-in has made a sudden and heavy demand on our time.

Looking back on the Summer Season, I think we listeners will agree that there has been little cause for dissatisfaction. There was a time, of course, when our enthusiasm for wireless waned somewhat, but those of us who wisely gave it a miss for a time, or at any rate exercised a more moderate use of it, return to it once more with renewed zest.

Short-wave listening has been interesting throughout, and considering the unusually high temperatures we have enjoyed, the absence of any great atmospheric disturbances has been really remarkable.

Hardly Recognisable.

One interesting feature of the opening of the new term has been the obvious *joie de vivre* of the speakers. Mr. Desmond MacCarthy was hardly recognisable.

I always think him, with his heavy monotone, rather a depressing speaker. But in his new series on the Art of Reading, he is anything but depressing. For one thing, he seems thoroughly happy on this job, which wasn't always the case—or so it seemed—when he was reviewing books.

I could listen to him all night in his present mood.

NOW CONVERT YOUR SET TO A BEAUTIFUL RADIOGRAM

This 3 Guinea Cabinet makes your Set look worth 30 Guineas

NEVER before such a clever and conveniently designed Cabinet for converting your existing Set to a Radiogram. Comes to you with vignnetted front as illustrated and motor board, ready to take your own Set, Gramophone Motor and Pick-up. Transforms your Radio into a combination instrument, presenting the professionally finished appearance of the most luxurious Radio-Gramophone money can buy.

Suitable for all popular Sets such as the Apex, Olympus Four, S.T.300, etc., as described in all the leading technical journals. Dimensions: Height, 38½ in.; width, 21½ in.; depth, 15½ in.; panel, 18 x 8 in.; baseboard, 14 in. Speaker Compartment, 17 x 19½ in. Ready fitted with back. Baffle Board 3/6 extra if required.

Supplied without standard vignette for Set Panel but cut and drilled to customer's own specification 3/- extra.



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CASH or C.O.D. **63/-**
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Carriage and Packing 2/6 extra
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MODEL B SPRING MOTOR
Garrard Double Spring Motor ● 12-inch Turntable ● Automatic Stop ● B.T.H. Tone-arm with Pick-up, and Volume Control complete ● Automatic Needle Cup
Cash or C.O.D. **65/-**
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PRISMATIC MONOCULAR for range spotting. Cooke prism and lens with distance gauge. First Grade make in polished Mahogany Case. Worth £5.
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Why the Lively 'O' H.T. Accumulator gives constant voltage

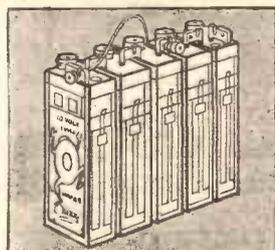
Because each 2-volt cell is "air-spaced" from its neighbours the Lively 'O' H.T. Accumulator is leak-proof. As a result it gives all its power to work your Set. Cell-to-cell leakage is eliminated. It is full of life and vitality right up to the time when it needs recharging (every 3 or 4 months). It gives your Set the constant voltage that it needs. Every Wireless Dealer sells the Lively 'O'.

TWO TYPES:

Standard 10 volt unit
capacity 2,750 **5/6**
milliamps.

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5,500 milliamps **6/9**
(10 volt unit).

BRITISH MADE by
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London, Glasgow,
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The Lively 'O'

H.T. ACCUMULATOR

PUT THE LIVELY 'O'
INTO YOUR RADIO

1375

TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio technique.

By Dr. J. H. T. ROBERTS, F. Inst. P.

Valves in Parallel.

SOME readers who use or contemplate using power valves in parallel for the output stage of the receiver are under the impression that a higher anode voltage must be used. This is not the case; the same voltage is used (assuming the valves to be approximately the same type, which they ought to be), but the anode current is increased.

If we assume for the sake of simplicity that two identical valves are used in parallel, then the same anode voltage will be employed but the anode current will be double and, of course, by the same token, the impedance of the stage will be halved.

When it comes to the question of grid bias, you will find it better to test the two valves separately and not to apply the same bias to them both because you cannot assume, even if the valves are specified as being identical, that they will operate best with identical grid-bias voltages.

Use Proper Output Circuit.

In order to get the increased volume which is the object of doubling or trebling the output stage in this way, it is essential to use a proper output circuit. If an output transformer is used, the ratio of this must be suited not only to the impedance of the loudspeaker in the usual way, but also to the resultant impedance of the valves which are paralleled. Generally speaking, it is not advisable to use more than two valves in parallel in this way.

Adjusting a Moving Coil.

If you have a moving-coil speaker which is giving you every satisfaction, the best thing you can do is to leave it alone; but my experience is that most moving-coil speakers, owing to the nature of the materials employed in connection with the cone diaphragm, require from time to time a certain amount of attention and adjustment.

You may find that the diaphragm has got slightly out of centre, and if the clearance between the moving coil and the pole piece is very small (as it should be), this out-of-centre may cause contact between the two and consequent jarring, especially on low notes of large amplitude.

Securing the Diaphragm.

The edge of the diaphragm is sometimes secured by fine chamois leather or by a thin rubber sheet or canvas. Any of these materials, especially the last two, tend to become perished in course of time, and they get stiff and unsatisfactory. Also, you will often find that for some curious reason the edging of the diaphragm gets all bulged so that it pulls the diaphragm out of its symmetrical position. I have many times examined moving-coil speakers in which the edging of the diaphragm was in a

(Continued on next page.)

TECHNICAL NOTES

(Continued from previous page.)

shocking condition, and it was really surprising that the speaker worked as well as it did.

If you find the edging has gone wrong the only thing to do is to remove it and replace it by a fresh strip, taking care always, as mentioned above, to keep the diaphragm in its central position. This precaution is particularly necessary with a moving-coil speaker owing to the very free or "floating" condition of the diaphragm and moving coil.

Locating Troubles.

It is surprising what a lot of trouble can be caused by a very little thing. I was using the other day a commercial radiogram and, having had this in use for many months, I thought I had become accustomed to its little idiosyncrasies. All of a sudden, during the playing of a record, the reproduction dropped off to about a quarter of its normal volume.

The instrument was carefully overhauled but the cause of the trouble could not be found and anyhow it went right of itself, so the search was abandoned for the time being. A little later the same thing occurred again, and this time, by a lucky chance, I tried the change-over switch from radio to gramophone.

* I should explain that as this particular instrument is never used for radio, but only for a special purpose in connection with radio-gram reproduction, this switch has never been touched for months.

It turned out that the switch had for some reason chosen to make bad contact and as soon as it was pulled in and out a few times, so as to clean the contacts, the instrument functioned perfectly; it was then left in the gramophone position and it has given no trouble since.

The Really All-Mains Receiver.

There are various types of set which are now "all-mains" in every sense of the word, since they use the mains not only for supplying the whole of the power, both H.T. and L.T., but also for bringing in the signals as well. Sets of this kind are eminently suited for flats and apartments and for all situations where the use of an outdoor aerial is impracticable, and the use of an indoor aerial is at any rate inconvenient.

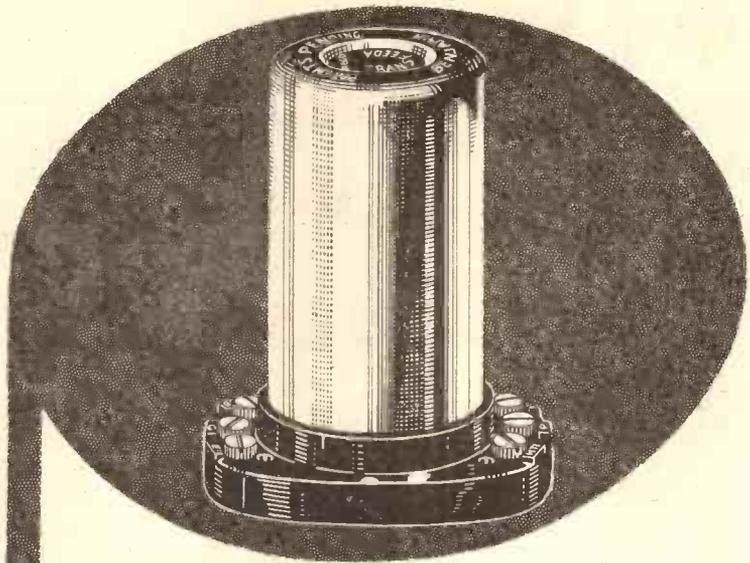
Super-hets. and Selectivity.

I have more than once been asked whether the super-heterodyne receiver, which is now coming back so strongly into popularity in view of the increasing congestion of the ether and of the specially selective features of the super-het., is likely to be of value for the purposes of receiving television.

At first sight you might think that the super-het. was "made to order" for television purposes, because the question of ether congestion and selectivity is and always has been one of the many problems connected with practical television.

One of the leading television experts in the United States said recently, however, that he thought there was a definite snag in the use of the super-het. for television, because of its very selectivity. The band which has to be received for television

(Continued on next page.)



Make a note of it!

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You can connect up the Transfeeda to suit any type of L.F. valve by using the appropriate terminals, as shown on the accompanying instruction leaflet. It is simple, it is inexpensive, it gives pure distortionless amplification and its name is the BENJAMIN TRANSFEEDA—make a note of it.

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11'6

BENJAMIN TRANSFEEDA

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GRIP

Here are some tests with various well-known types of wander plugs. Starting from a small socket, each plug was pushed into progressively larger sockets until no contact was made, the force needed to remove the plug from each size of socket being measured in ounces.

In each case the "Bowspring" showed itself the better plug. Here is an example.

Socket diameter.	Grip of Bowspring	Grip of typical "split-pin" Plug.
.127"	65 oz.	20 oz.
.133"	36 oz.	2 oz.
.134"	28 oz.	No contact

The "Bowspring" continued to make contact until a socket size of just over .144" was reached.

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TECHNICAL NOTES

(Continued from previous page.)

purposes is much wider than that which is generally sufficient for ordinary broadcast reception. Apparently if a very sharply selective receiver is used for television purposes it cuts off a good deal of detail. So the difficulty is to reconcile the divergent requirements as regards selectivity of the television and broadcast systems of reception.

Of course, like most other things in wireless, changes will no doubt take place very soon in the conditions and requirements of these two types of reception, but at the moment the above appears to be the answer to the question as to whether the super-het. is going to solve the television problem.

Pentode and Loudspeaker.

In the case where a loudspeaker has a transformer already fitted to it, you will find often enough that this transformer is intended to be used with an ordinary power output stage and not with a pentode. If, then, you happen to want to use a pentode output stage the question arises as to how this can be adapted to the speaker so as to get the best results.

One convenient way of doing this is to use a tapped choke, which is inserted in series with the H.T. supply to the anode of the pentode valve. The primary of the transformer of the loudspeaker is then connected to a tapping on this choke via a fixed condenser of, say, 2 microfarads capacity. In this way the transformer is choke-fed, and the primary does not carry any direct current.

You will notice that the introduction of the fixed condenser between the choke tapping and the primary of the transformer is an advantage from the point of view of keeping the direct current out of the transformer windings because, generally speaking, the transformer will work better without D.C. current.

Tapped Choke.

Now as regards adjusting the pentode output to the loudspeaker transformer, this is done by trying different taps on the choke. After experimenting for a bit, you will find one tapping which gives you the best power output.

I should point out that since the H.T. voltage is applied to the loudspeaker transformer primary via the 2-mfd. fixed condenser, this latter condenser should be of good quality so as to avoid any possibility of breakdown and shorting the high-tension to the low-tension circuit.

Choking the Detector.

I daresay some of you may have found, on fitting a screened-grid high-frequency amplifying stage, that the volume, particularly on a powerful station, is actually less than before the S.G. stage was fitted. In such a case you will probably also find the curious effect that the volume is increased by detuning.

This all seems very strange until you consider the cause—which is the overloading of the detector valve. If the screened-grid valve greatly increases the energy supplied to the detector, it may be that the detector is almost completely choked and

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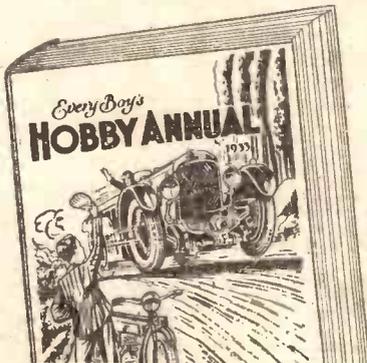
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TECHNICAL NOTES

(Continued from previous page.)

so you are thwarted in the very result you are seeking to achieve by the use of the S.G. valve.

Pre-Detector Control.

De-tuning the aerial is a poor sort of remedy and the real cure for the trouble is to use a pre-detector volume control.

A simple control of this type is a filament resistance introduced into the negative side of the filament circuit of the first valve. Alternatively, you can introduce a control to regulate the voltage of the screening grid.

Another arrangement which works quite well is to put in a variable condenser in the aerial lead to the receiver, this enabling you to adjust the strength of the signals supplied to the first valve. I should mention that if you use this arrangement in a circuit which uses ganged condensers, it will probably upset the gauging, which will have to be balanced up again separately.

Matching Valves.

I said something in these Notes the other day about matching up a pair of valves for use in a push-pull amplifier, and a reader writes to say that the usual method of comparing valves for this purpose, that is, by their mutual conductance, is not really satisfactory. He goes on to say that really the amplification and the impedance should be separately considered.

You will see why this is, because the mutual conductance, as you know, depends upon the impedance and the amplification factor and is, in fact, obtained by dividing the one by the other. The point, however, is not so much how the mutual conductance is arrived at as the fact that it is proportional to the product of one of the above-mentioned quantities and the reciprocal of the other.

This means that if you vary the one you can also vary the other and still keep the result the same, so long as you multiply the amplification factor and the impedance by the same quantity. For instance, if you double the one and also double the other you get the same result.

Mutual Conductance.

Now what you really want for a push-pull working is a pair of valves which, in fact, are identically the same—at any rate, this is the ideal. Clearly then you should have a pair of valves which have the same mutual conductance by reason of the fact that they have also the same impedance and the same amplification factor.

If you cannot get a pair which are identical in these respects it is sufficient for ordinary purposes if the mutual conductances are the same, provided the actual value of the impedance or amplification factor is not greatly different in the two. To be on the safe side, however, you should go in for two valves having the same impedance and the same amplification factor.

Split Transformers.

Talking about push-pull amplification, I also had something to say a little while back about the use of split transformers, that is to say, transformers with divided secondaries—or divided secondaries and primaries for that matter.

(Continued on next page.)



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TECHNICAL NOTES

(Continued from previous page.)

If the secondary of the transformer is divided, you can adjust matters to a fair balance, even though the valves are not identical, because you can adjust the grid bias applied to each valve so as to get the anode currents the same.

This should enable you to get the two valves working together pretty well but if the output transformer has a divided primary, then you can also adjust the H.T. as well as the grid bias, which will enable you to match up the working of the valves still better.

Some readers may not perhaps be aware that there are now excellent split transformers on the market.

Radio-gram Points.

When you are using a radio-gram, or an ordinary gramophone with an electrical pick-up for that matter, in conjunction with an additional pick-up, say, from a separate gramophone, it is a fairly simple matter to arrange a single volume control for the two pick-ups.

All you have to do is to fit a double-pole double-throw switch to the radio-gram at some convenient point and connect the pick-up leads of the original pick-up to one of the end pairs of terminals of the switch, the leads of the auxiliary pick-up being connected to the pair of terminals at the other end of the switch.

The centre pair of terminals are connected to the terminals inside the radio-gram to which the leads of the original pick-up were previously connected.

Across the Pick-Up.

If you use a volume control which consists of a variable high-resistance connected across the pick-up, this can be connected across the centre pair of terminals of the double-pole double-throw switch, in which case it operates when either of the pick-ups is in use.

In the same way, if you use a potentiometer connected across the pick-up and tap off from the slider for the voltage to be applied to the valve, this potentiometer can similarly be connected to the centre pair of terminals.

Single Control.

Talking about volume control for a radio-gram, sometimes a separate control knob is used for the radio and for the gramophone part of the instrument. This is, more particularly the case in home-made radio-gram sets. It is more convenient to have a single volume-control knob for use with either the radio or the gramophone, and this can quite easily be done by fitting the two controls mechanically together so that they are operated by the one knob.

The control for the radio part then consists, say, of a potentiometer which controls the potential applied to the screen grid of the S.G. valve or the grid bias of a variable-mu valve.

The volume control on the pick-up is generally a potentiometer—used in any one of a number of different ways. These two can quite easily be fitted together so that when you are using the set for wireless, the screen-grid potential control is in circuit, whilst when you are using it for gramophone the potentiometer is in circuit, notwithstanding that mechanically the two are always operated when the knob is used.



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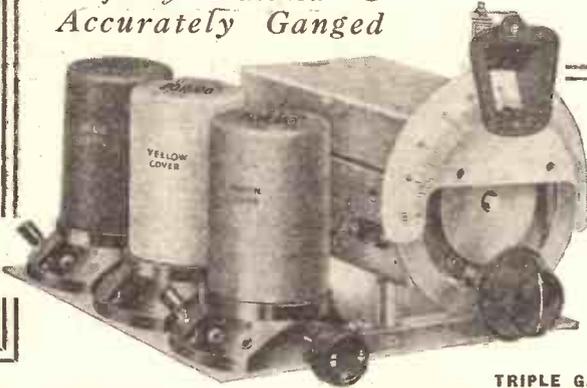
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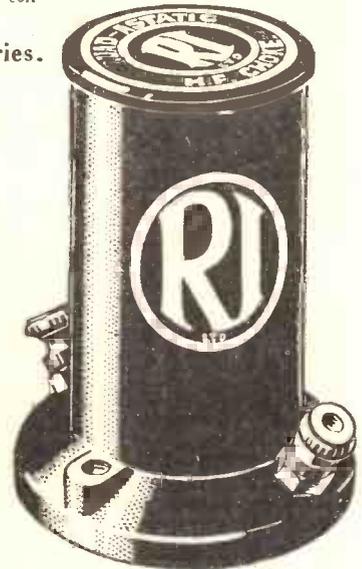
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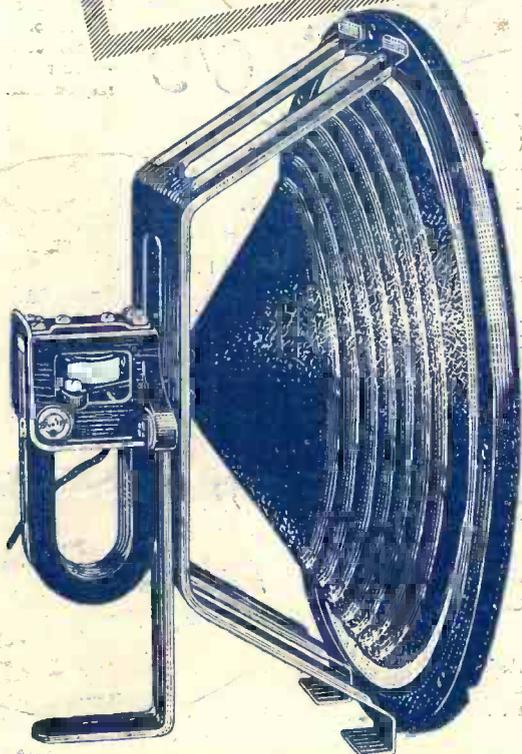
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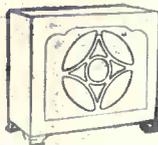
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