

THE "TEN-STATION TWO" — *Complete Details*

Amateur Wireless

and
Radiovision

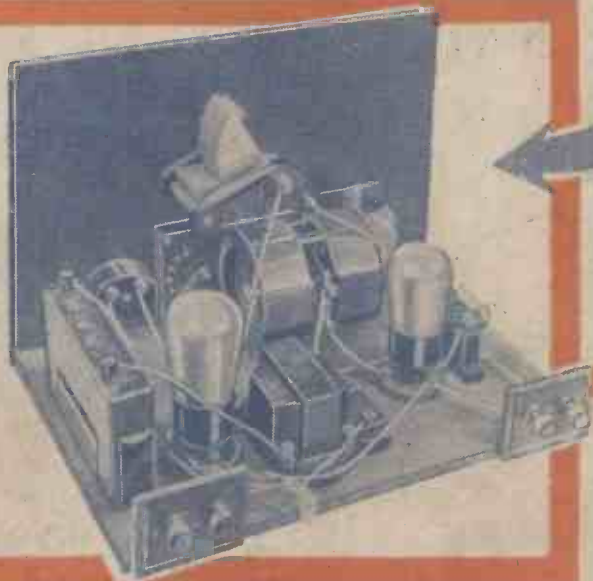
GREAT
NEWS
ON PAGE 484

Every
Thursday

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Vol. XX: No. 508

Saturday, March 5, 1932



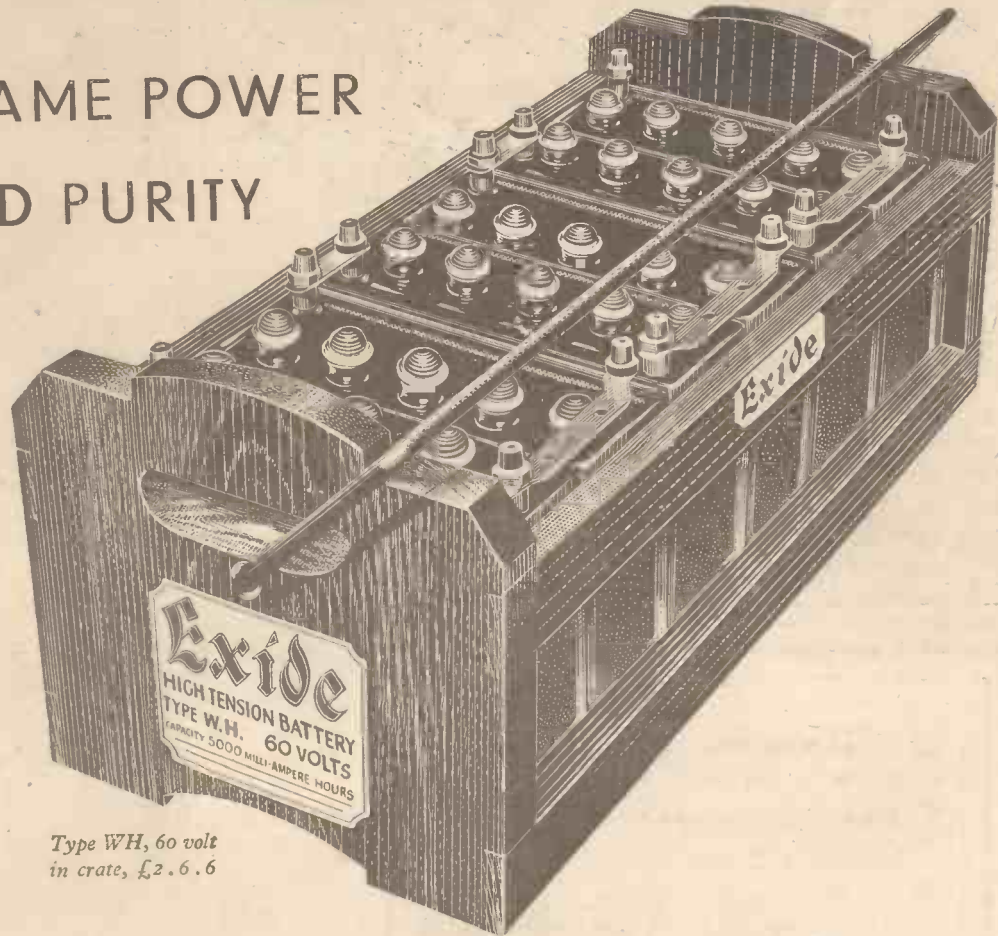
The
**TEN-STATION
TWO**
FULL DETAILS

The
**HOME-LOVER'S
ALL-ELECTRIC
THREE**
FULL DETAILS



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	2 0 6

BRITAIN'S NEW FAVOURITE 3

Polar 2-gang .0005 Uniknob Condenser	£ s. d.
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Set of Specified Valves	15 0
Specified Cabinet	1 7 6
	18 6

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1932 ETHER SEARCHER

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ATLAS A.G. ELIMINATOR, TYPE A.G. 244. Three tappings, S.G., detector, and power. Output, 120 volts at 20 m.a. **Send** Cash Price £2/19/6. **5/6**
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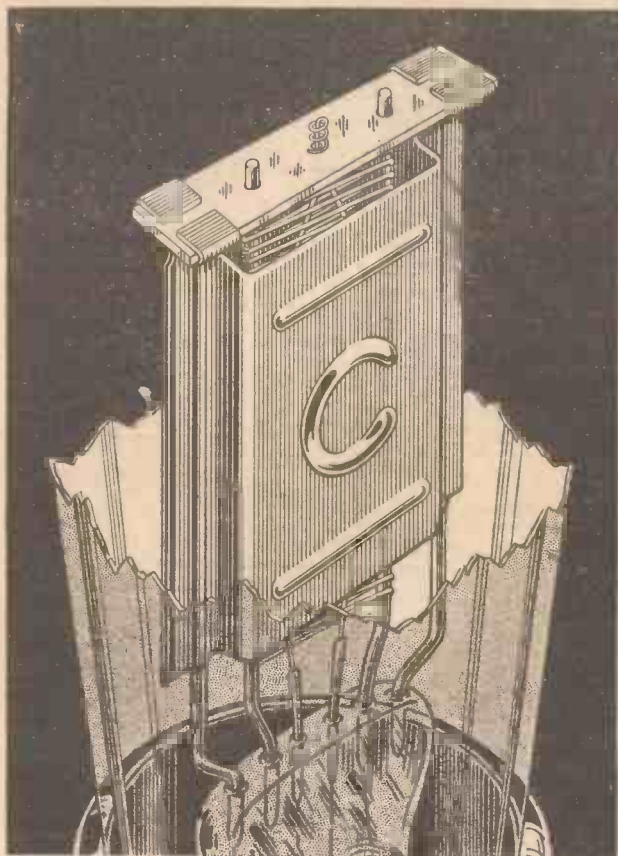
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A.W. 5/3/32

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THE Cossor Mica Bridge principle is to-day accepted as a notable contribution to the radio industry. By its use a much higher standard of valve efficiency is attained. Better radio is now available for all who fit Cossor Valves to their Receivers. In the assembly of every Cossor Valve, the elements are rigidly secured in

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Cossor Valves for "A.W." Sets

- 27th Feb.—"Home-lover's All-electric 3," M.V.S.G., 41 M.H.L., 41 M.P., 506 B.U.
- 13th Feb.—"Fifty Shilling Four," *220 S.G., *210 DET., 210 L.F., 220 P.
- 1st Feb.—"World Wide A.W.3," 210 DET., 210 L.F., 220 P.
- 30th Jan.—"Twenty-five Shilling Two," *210 H.F., 220 P.
- 16th Jan.—"1932 Ether Searcher," *215 S.G., 210 H.F., 230 P.T.
- 9th Jan.—"Baby Three," * 210 DET., 210 L.F., 220 P.
- 26th Dec.—"A.C. Britain's Super," 41 M.D.G., M.V.S.G., M.V.S.G., 41 M.H., M.P. PEN.
- 5th Dec.—"Four Star 4," *220 S.G., *210 DET., 210 L.F., 230 X.P.
- 5th Dec.—"A.W. Record Player," 210 DET., 220 P.

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

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NEWS & GOSSIP OF THE WEEK

A "P.W.H." SET

AS we hinted in last week's issue, a "P.W.H." set is on the stocks. It is something really out of the ordinary, and if you turn to page 492 you will see what he has to say about it.

JACK'S LATEST

JACK PAYNE'S farewell to listeners under the title of "Jack Payne and his B.B.C. Dance Orchestra," takes place on March 9, when he and his "boys" link items in a vaudeville programme which contains the names of Harry Hemsley, Max and Harry Nesbitt, Peggy Cochrane and Patrick Waddington, "Stainless Stephen," Mamie Soutar and Ashmoor Burch. As exclusively announced in last week's issue, Jack has *not* signed a renewal contract with the B.B.C., but he will, every month or so, give a Studio performance, and may be heard at occasional outside broadcasts.

HENRY HALL'S FIRST BROADCAST

HENRY HALL'S first broadcast on March 15 is now almost certain to be made from Studio 8A at Broadcasting House, so the new dance-band leader will have the distinction of broadcasting the very first programme from the new headquarters at Portland Place.

NORTHERN AUDITIONS

FOLLOWING the London station's lead in suspending all musical auditions for six months, the Northern stations have decided on a similar move, and no more auditions of this type are wanted for three months.

THAT OPERA SUBSIDY

SO the annual opera subsidy of £1,750, paid by the Government out of B.B.C. revenue, is to be withdrawn—and we are not sorry. There are more popular uses for such money. The B.B.C. emphasises

that it is still willing to do everything possible to popularise opera, and to this end it is now working with Sir Thomas Beecham, who is once again friendly with the B.B.C.

MORE RESIGNATIONS

IT is a curious thing how resignations from the B.B.C. seem to come in well-defined spasms. First Jack Payne, then Gambier Parry; and now Uncle Columbus and Aunt Belinda have resigned from the B.B.C. Mr. Parry has been a very popular figure at Savoy Hill and has done great work for the B.B.C.'s Sports Club. Uncle Columbus and Aunt Belinda have been great favourites with the London kiddies, all of whom will be sorry to hear about their resignations.

THE BOAT RACE

JOHN SNAGGE, the young London announcer, has been asked to take on single-handed the broadcast commentary on this year's Boat Race. It is felt that two commentators tend to confuse listeners. John Snagge has the two essential qualifications for the job—he knows something about rowing and, of course, his microphone technique is beyond reproach.

RUSSIAN VISITORS?

THE B.B.C. will probably soon be visited by five Russian specialists who are making a tour of European stations to study studio construction. They are working on the new thirty-six-studio building which is planned for Moscow and which the Soviet Government hopes to have ready by the time the Five Year Plan is finished.

MORE TELEVISION

THE little Radio-Normandie station at Fécamp, which on account of its sponsored programmes is becoming very well known, has started regular television transmissions. Scanning apparatus has been rigged up in the studio and test transmissions are generally given in the mornings.



A radio sidelight in the Far East trouble. The Chinese army has a section equipped with modern portable transmitters which are mounted on mules

NEWS & GOSSIP OF THE WEEK —Continued

THE "GHOST" TO GO

FROM next Saturday onwards the so-called "Ghost in Goloshes," the electric clock interval signal is to be heard less frequently. Gaps that usually mean silent periods between noon and 2.30 p.m. will be filled by gramophone music.



5XX FOR DROITWICH

SO 5XX is to be moved to Droitwich, thus leaving the Daventry site clear for the erection of the Empire broadcasting stations. You will find that Droitwich is 20 miles to the south-west of Birmingham and 42 miles west of Daventry. This brings the new site 36 miles nearer to Wales—a useful point when we remember that there is likely to be some trouble in giving Wales a good national service from the medium-wave West Regional outlet.



MORE HIGH POWER

WITH the new 5XX going up to 100 kilowatts comes the news that Midland Regional's power is to be increased to 50 kilowatts, thus bringing it in line with other regional stations. The B.B.C. evidently does not intend to be left behind in the European race for power.

WANTED—AN ENCORE!



"This Wireless Set's an utter fraud, William. I've been trying to get an encore all the afternoon, and it won't."

THE NEW BUILDINGS

WE understand that the new Midland Regional and 5XX stations will be built along regional lines, so that these two stations will be housed in one building, on a site yet to be decided in Droitwich.



B.B.C.'s REASONS

THE B.B.C. gives several reasons for moving its stations from Daventry. Firstly, Birmingham listeners will be much better covered by a 50-kilowatt station at Droitwich. The increase in power and the decrease in distance should, to some extent, overcome the drawback of a short medium wavelength. Secondly, 5XX will need high masts to give a nation-wide service on its high power—and Droitwich is off the air routes, so there will be no trouble with the Air Ministry. Thirdly, there would be the difficulty in finding room on the Daventry site for the Empire stations with the existing Daventry and Midland Regional stations and the two new stations.



THE EMPIRE TRANSMITTERS

AT Daventry the B.B.C. has fifty acres over which to spread the seventeen aerials needed for the two Empire transmitters. We are told that the aerials will be erected on wooden poles, that they will not be very high, and that beam reflectors will be fitted. The directional aerials will be grouped according to the zones they are destined to cover.



EMPIRE TESTS

FIRST tests of the two 20-kilowatt Empire transmitters may be made much sooner than is generally expected. We may confidently anticipate that one or both of the short-wave stations will be "on the air" by August or September of this year. A contract has already been placed for the building to house the stations.



7-METRE TRANSMISSIONS

ENGINEERS of the Gramophone Company have stolen a march on the B.B.C. by their recent radiations on 7 metres from the special transmitter erected at Hayes, Middlesex. The B.B.C. tells us that its 7-metre transmitter will be delivered this month, and will then be installed under the roof at Broadcasting House.



"VOICES OF THE PAST"

FOLLOWING our note on the recording of

prominent "voices of the past" for the last programme to be broadcast from Savoy Hill, several more voices have now been recorded at the H.M.V. studio in north London. Sir John Reith was among those recently recorded. Incidentally, Sir John

RADIO AT THE ARCTIC



On the second visit to the Arctic Circle to be made by Mr. John Eric Smith, a radio type of sea-level recorder developed by Marconiphone will be used. This device, known as the Echometer, is here being tested out on the new P. & O. liner *Strathnaver*

Reith was very much impressed with the wonderful design of the Abbey Road studio, which is certainly the finest in the country.



SCOTTISH REGIONAL

WE are interested to see that the B.B.C. proposes to recommend flat-dwellers in and around the areas covered by the Scottish stations that will close down when Falkirk takes over the regional service, to use one-valve sets for reliable headphone reception, instead of the crystal sponsored by the B.B.C. for previous regional stations. Tenement dwellers in Glasgow, for example, may find it difficult to get good headphone reception from Scottish Regional stations when the near-by Glasgow station shuts down. It is for such listeners that B.B.C. engineers favour the one-valve headphone type of set.



AMERICAN STYLE

BURLESQUE announcements, after the style of those which accompany transatlantic broadcasts, will introduce the items in a National vaudeville programme on March 7. The programme will be sponsored by Leonard Henry, who will appear as an American announcer!

The TEN-STATION TWO



If you want a simple and inexpensive two-valver which covers medium and long-wave tuning bands continuously by rotating a switch, then these constructional details of a simple outfit, designed to give this performance, will interest you.

COMMERCIAL dual-range coils are generally satisfactory in covering the whole of the medium and long-wave band ranges. A number of home-made coils have too few turns on one or other of the windings, so that there is an exceptionally big gap missed when changing from medium to long; or the reaction winding is not satisfactory so that although the set tunes over a wide range, very poor results are obtained except between about 230-450 and 1,400-1,800 metres.

Wide-range Tuning

There is a demand, especially in simple easily operated sets, for a tuning system which covers the medium and long waves continuously, and which will receive nine or ten main stations really well. That is what this new straightforward "two" is designed for.

It incorporates a special type of coil unit on which wavechanging is achieved by turning a small knob which controls tappings on the main coil winding. The coil also incorporates a small adjustable condenser for balancing up and a variable reaction rotor. This does away with the

need for a separate reaction condenser, and so there is only one tuning condenser in this set.

The panel layout is very straightforward. The main dial at the top is that of the aerial tuning condenser, while the smaller knob below on the extreme left is the adjustable condenser of the coil unit. Next, in order from left to right, are the reaction control, the wavechange switch and the on off switch. The baseboard layout is equally simple.

There are only eight parts to be mounted, including the two terminal blocks and the clip for the grid-bias battery. The other parts include the two valveholders, the inter-valve transformer, by-pass fixed condenser and grid condenser and leak.

Provided all the materials are at hand when the construction is started, it should be possible to make the set up and have it properly working and adjusted in an evening's easy work.

The photographs give you an idea of the simplicity of the layout and this is further obvious from the wiring plan given here. A full-size version of this is obtainable, price one shilling, post free, from the Blueprint Department, AMATEUR WIRELESS 58-61 Fetter Lane, London, E.C.4.

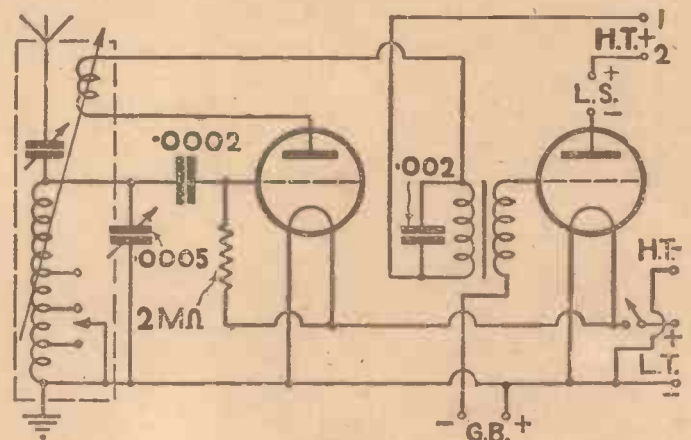


By the use of the special coil unit the construction of the set is made very simple

does not tune down to the ultra-short waves.

Construction is simplified by having the point-to-point system of wiring. There is no need to solder. All you have to do is to put the wire leads in insulated sleeving, cut about 1/2-in. less than the length of each lead, so that there is room to form a wire loop to go under the terminal heads.

There are less than a couple of dozen wires in the whole set, so you see it will not take very long to complete the wiring. The internal leads are tinned-copper wire, enclosed in insulated sleeving, while the five leads to the high-tension and low-tension battery are rubber-covered flex. The grid battery is held in clips on the baseboard, two short flex leads connect



The circuit of the "Ten-station Two" is simple and straightforward

All the components needed for the construction of this simple "two" are given in an accompanying panel. Probably you will have many of the parts on hand, except the special coil unit, so it may not cost you very much to make up the set and see what an advantage it is to have a continuous wavechanging system.

It should be noted that this coil covers the medium and long-wave broadcasting bands, and

up to this from the low-tension wiring and from the G.B. terminal of the inter-valve transformer.

There are two high-tension tappings, one for the detector and one for the power valve. Not only does this enable you to work both valves at their proper characteristics, the detector having an appreciably lower anode voltage than the power valve, of course, but it obviates the need for decoupling in the set.

The panel can be drilled direct from the full-size blueprint which shows the positions for the holes for the shafts of the coil unit. It is important to get these right, because any misalignment will make it difficult to fit the coil and will make the operation stiff.

(Continued on next page)

The first job after drilling the panel should be to mount the coil unit and then fit the panel to the baseboard. If the centres are not quite right for the unit, then ream out the holes a little so that the coil is an easy fit before fixing the panel.



The "Ten-station Two" in a Clarion Cabinet

The baseboard parts can next be mounted, their correct positions being gauged from the blueprint. Get the transformer and valve holders the right way round, for otherwise the wiring will appear unduly complicated.

The grid leak, you see, is held in clips, only one of which is in contact with the grid condenser. The "free" end of the grid leak (electrically speaking) is connected to the low-tension side of the wiring. These clips are provided with

terminals, so that even here there is no need to make soldered connections.

Ordinary detector and power valves are suitable, but the accompanying table will serve as a guide to those who are buying new valves and are not sure of the latest type markings for both positions.

Nothing very elaborate is needed in the way of high-tension supply. A medium-capacity dry battery or a 15-20 milli-ampere mains unit will be suitable. The H.T. + 2 tapping is taken to the point of maximum voltage, that being the power valve lead.

The detector lead, H.T. + 1, should be taken to 60 or 80 volts on the battery, or to the variable control (unless it is a screen-grid control) on the mains eliminator. Some modern detector valves will stand 80-90 volts and will give correspondingly greater volume. Others tend to become unstable when the voltage is increased, and there is no gain in volume.

When working from a battery, keep the detector voltage as low as possible, consistent with good strength because there is otherwise a waste of high-tension current.

There is no special point to note about the operation of the coil. The rotary switch is set at any desired tapping and the reaction rotor turned until the set is on the point of oscillation. Tuning is carried out in the ordinary way, and the variable condenser of the coil unit will be found handy in controlling selectivity.

The set can be seen this week in the

Radio Department windows of Messrs. Selfridge & Co., of Oxford Street, London, W.

SUITABLE VALVES FOR THE "TEN-STATION TWO"

Make	Det.	Power
Mazda	HL210	P220
Mullard	PM1HL	PM2A
Marconi	HL2	P215
Osram		
Cossor	210Det.	220P
Six-Sixty	210HL	220P
Lissen	HL2	P220
Triotron	HD2	2D2
Tungram	H210	P215
Fotos	BC18	BD5
Eta	BY2023	BX604
Dario	HF	SP

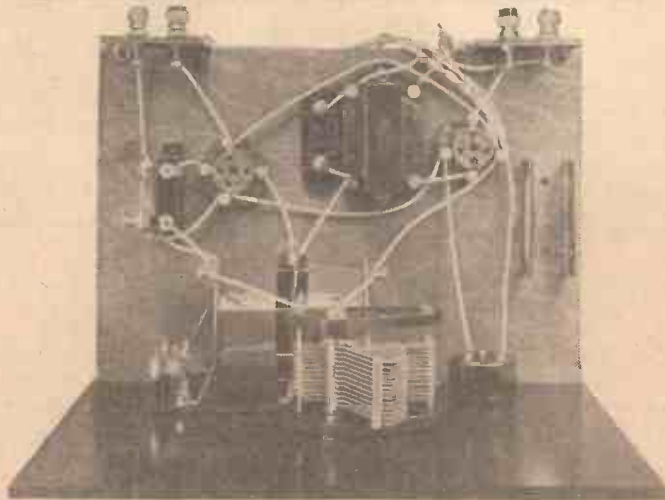
A Passion Tide Cantata by Bernard Johnson, entitled "Ecce Homo" will be broadcast from the Albert Hall, Nottingham, in the Midland Regional programme on March 13.

The Central Band of H.M. Royal Air Force, which is appearing at the National Trades and Industrial Exhibition at Bingley Hall, Birmingham, will be broadcast by special permission of the Air Council on March 14.

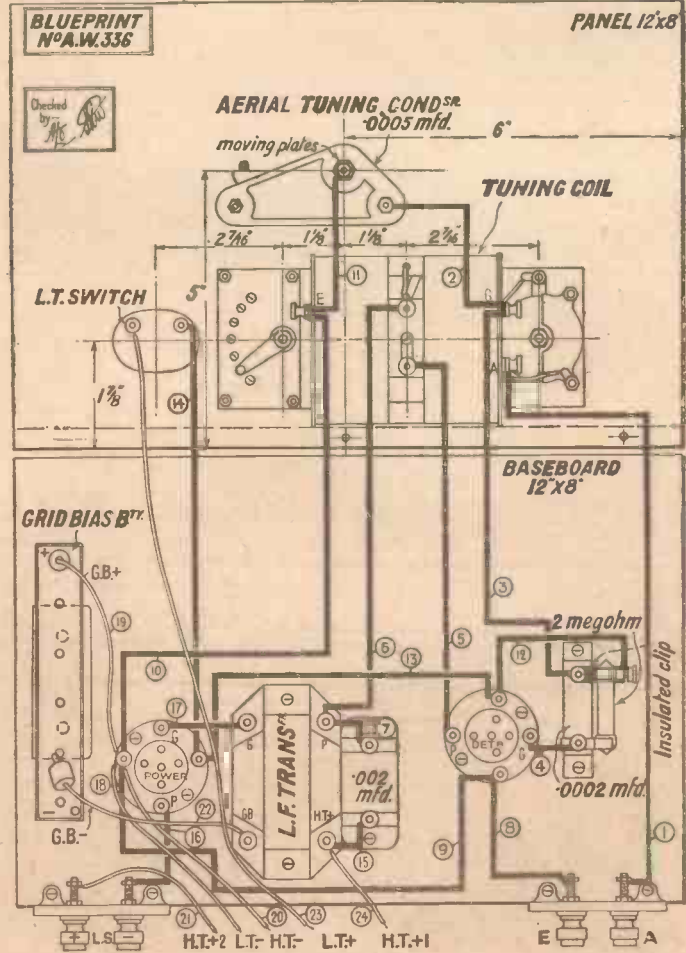
The City of Birmingham Police Band gives a concert from the Town Hall, Birmingham, on March 16, conducted by Richard Wassell.

COMPONENTS REQUIRED

- Ebonite panel, 12 in. by 8 in. (Beccol, Peto-Scott, Readi-Rad).
 - Baseboard, 12 in. by 8 in. (Camco, Peto-Scott, Readi-Rad).
 - .0005-mfd. variable condenser (Lotus, Lissen, Telsen, Formo, J.B., Utility, Polar).
 - All-wave tuner (Autokoil).
 - Rotary filament switch (Readi-Rad, Bulgin).
 - Two 4-pin valve holders (Telsen, Lissen, Wearite, Junit, Bulgin, Lotus, Benjamin, Clix).
 - Low-frequency transformer (Lissen "Torex," Telsen, Lotus, R.L., Ferranti, Varley, Lewcos, Igranic).
 - .0002-mfd. fixed condenser (Dubilier, type 620, with series clip, Telsen, Lissen, T.C.C., Graham-Farish, Ormond, Formo).
 - .002-mfd. fixed condenser (Dubilier, type 610, Telsen, Lissen, T.C.C., Graham-Farish, Ormond, Formo).
 - 2-megohm grid leak (Dubilier).
 - G.B. battery clip (Gripso, Bulgin).
 - Two terminal blocks (Sovereign, Junit, Belling-Lee).
 - Four terminals, Aerial, Earth, L.S.+, L.S.- (Belling-Lee, Clix, Burton, Bulgin, Igranic, Ealex).
 - Five wander plugs, G.B.+, G.B.-, H.T.-, H.T.+1, H.T.+2 (Belling-Lee, Clix, Ealex).
 - Two spade terminals, L.T.+, L.T.- (Belling-Lee, Clix, Ealex).
 - Two yards flex (Lewcoflex).
 - Connecting wire and sleeving (Lewcos, Jiffilix, Quickwyre).
- ACCESSORIES**
- Cabinet (Clarion, Camco, Peto-Scott, Readi-Rad).
 - Low-speaker (Sovereign, Celestion, Blue Spot, Amplion, W.B., H.M.V.).
 - 120-volt H.T. battery (Pertrix, Lissen, Ever-Ready, Fuller, C.A.V., Drydex).
 - 9-volt G.B. battery (Pertrix, Lissen, Ever-Ready, Fuller, C.A.V., Drydex).
 - Accumulator (C.A.V., Lissen, Exide, Fuller, Ever-Ready, Pertrix).



This plan view and the accompanying layout and wiring diagram show clearly the construction of the set. A full size blueprint is available, price 1/-



PERCY W. HARRIS ASKS: "ARE YOU USING YOUR SPEAKER CORRECTLY?"



LAST week I mentioned the case of a friend of mine whose experiences with a loud-speaker had rather misled him. We found, you will remember, that back coupling in the receiver was the real trouble, although the indications seemed otherwise. This reminds me that my experience of the last twelve months, in connection with high quality reproduction, has led me to question, at one time or another, almost everything about a loud-speaker.

Loud-speaker Tests

If you leave New York in the evening, by breakfast time you can be in Rochester—a city of big industrial plants, including the huge Kodak factory, the Bausch and Lomb Optical Company, and the Stromberg Carlson Company. This last makes telephone apparatus and high-grade radio sets and I had the opportunity of visiting the plant on more than one occasion.

The Stromberg Carlson Company has spent large sums of money in equipping a special sound laboratory for the investigation of loud-speakers. They have special rooms so lined and draped that there is no reflection whatever from the walls, while out in a field they have a kind of elevated platform suspended between masts so that measurements can be made of loud-speakers acting in free space. Experiments are made with loud-speakers with every shape and kind of diaphragm, and curves taken for all of them. As is practically always the case when genuine investigation

is made and first-hand tests conducted, many of the speakers which look most promising on paper turn out to be the most hopeless in practice.

One of the first things you notice when testing out a loud-speaker in a room devoid of echo or reflection is the strongly directional radiation of the average moving-coil speaker with regard to the high notes. Stand in front of it and you get good reproduction; stand to the left or right of it, and while there does not seem to be much decrease in strength, the reproduction noticeably loses its brilliance and "snap" with the higher speech frequencies definitely weak. Turn your back to it and it sounds different again.

Directional Effects

"Now what," you may ask impatiently, "is the connection between this you are telling me and my own loud-speaker in the dining-room? I grant you it is all very interesting, but how will it help me to get better results?" It is *very much* to do with you, particularly if you are using a speaker which gives a considerable volume—the way many people like to use it. When you consider that a speaker used in the abnormal conditions of no reflection gives a strongly directional effect to the high frequencies, it follows that in an ordinary living room with sound-absorbing and non-absorbing materials, un-uniformly dis-

tributed, you may be getting all kinds of weird effects. The soft-carpet on the floor absorbs sound waves, the high ceiling will probably reflect them. If your speaker is placed in the corner between two walls which are smooth and hard, your high notes may come out well, while if the speaker is placed beneath the table and therefore at a low level, the reproduction may sound exceedingly woolly. This reminds me that I went to dinner the other night with a friend who had taken extraordinary pains to build a good amplifier and had had an overall curve taken showing practically uniform amplification up to about 6,500 or 7,000 cycles. Very few amplifiers are as

NEXT WEEK:
PERCY HARRIS'S "MASCOT"

good as this. Connected to it he had a high grade moving-coil loud-speaker. When he asked me my opinion of the reproduction, I could only say that it was very deficient in the upper register and I would be prepared to swear that the reproduction above 3,500 cycles was illegible. The fact that you could hear high notes from the piano or violin is no proof, for the highest notes normally played on a violin are about 3,000 to 3,500, and the highest note on the piano is not above 3,500. It is the upper harmonics which give the true character of musical reproduction and these were obviously missing. I think he had become used to the reproduction and did not notice the lack of quality so much as I did. I also think investigation will show that the cause of the trouble is not a single one.

Speaker Position

Firstly, the speaker was badly placed for high-note reproduction, and secondly, the output from his detector was badly distorted. Remember the curve he had was that of the *amplifier alone*. True, it was a straight-line amplifier, but even the best straight-line amplifier cannot turn a *curve* into a straight line!

In a surprising number of cases I have found experimenters very ready to assume that a perfect or nearly perfect amplifier when connected to the detector will give perfect or nearly perfect radio reproduction.
(Continued at foot of next page)



A glimpse into the studio of the Nagoya broadcasting station. The microphone is put low down to suit the orchestra on the low stools. The vocalists are provided with music which is on the stands in front, but the instrumentalists have no music!



The Editor Requests the Honour

of your keen attention to Percy Harris's announcement (page 492), of his first set designed for "A.W." — a set that will immediately take the radio world by storm.

Delightfully Simple—but highly efficient.

Cheap—but amazing quality and selectivity.

Band-pass Circuit—but no ganged condensers and no matched coils.

Real Quality—but sharp tuning (plain or band-pass at your will).

First-rate Coils—but home-made if you like.

**SEE NEXT WEEK'S "A.W." for
Percy Harris's "Mascot"**

"ARE YOU USING YOUR SPEAKER CORRECTLY?"

(Continued from preceding page)

tion. A good amplifier faithfully magnifies what is fed into it, making, so to speak, a "Chinese copy" on an enlarged scale. It cannot do more than this and you must not ask it to do so.

Now radio engineers are fast coming to the conclusion that a straight-line or a "faithful" amplifier is about the last thing you want on a modern radio set. The sharper the tuning on the radio end, the more the high notes will be attenuated and the more the curve of the amplifier needs to be tilted to compensate for it. Where scientists have been mistaken in the past, however, is in assuming that a very sharply tuned circuit with a correcting amplifier would give no different results in so far as selectivity is concerned than a flatly tuned circuit with a flat amplifier.

Restoring High Notes

It has recently been shown that restoring the high notes in a correcting amplifier does not bring back again to normal or even affect the great reduction of interference brought about by a very sharply tuned circuit. In the Stenode the sharpening of the tuning to get rid of interference is carried to the farthest possible limits and it has been found that no matter how sharp you make this tuning, an amplifier designed to have a characteristic directly proportional to the frequency (that is to say, with notes of a thousand frequency magnified just twice as much as those of five hundred and so on) not only restores the quality, but gives virtual straight-line output. We shall hear a great deal more about ultra-selectivity with subsequent tone correction in the future, for some of the best brains in the world are now working on it.

If you find out any new facts as the result of applying my pet phrase, "That seems all

right, but is it really so," write and tell me, care of the Editor. But, above all, do not just put yourself into an inquiring state of mind and do nothing else about it. Keep a notebook—any notebook will do, provided you keep it regularly. Do not go in for elaborate notes which are boring to take after the first evening or two, when the novelty wears off, but make it something like this. "Thursday night, March 3. Set used: detector with two note mags. Experiment tried: Effect of substituting 8s. 6d. transformer for 17s. 6d. one previously used. Results of first test: 8s. 6d.

NEAT L.F. ARRANGEMENT

If you are making up a set of your own design, then keep the L.F. stage neat and compact so that this can remain set, no matter what changes are made later in the detector and



high-frequency stages. It is seldom that a good power stage need be altered. Keep the grid-bias battery on the baseboard, so that easy variation can be made, and group the transformer and speaker output terminals close to the power valve holder.

transformer gives better signals and higher quality. Used Harris test question before scrapping expensive transformer in favour of cheap one and found on series of further trials that while cheap transformer worked best with the one particular valve then in use, a new valve gave very much better results with more expensive transformer, both in quality and strength. Valve used in first test —. Valve used in second test —. Result of experiment: Decided to keep old transformer in position and change valve preceding it."

This is, of course, just an imaginary example, but you will find that the mere keeping of notes of this kind and the effort to make them clear, will not only assist your memory for future occasions, but will of itself suggest many new tests.

BROADCASTING SAVOY OPERA

Strange Advantage of Foreign Stations

THERE are tens of thousands of Gilbert and Sullivan opera "fans" in Great Britain, and it is not surprising that the demand is often voiced for the broadcasting of *The Mikado*, *The Gondoliers*, and others of the famous series, by the B.B.C. Savoy Operas are broadcast from time to time by foreign stations, and the ordinary listener attributes their absence from British programmes to want of enterprise by the B.B.C.

The B.B.C. would perhaps be well advised to take the public into its confidence in these matters. The fact is that the B.B.C. is in no way to blame for Savoy opera being kept off the British ether. In fact Savoy Hill has frequently sought permission, but those who guard the performing rights in Great Britain are adamant. There appears to be no hope at present of any change in their puzzling attitude.

The copyright-holders allow the broadcasting by the B.B.C. of:—

Any published extracts from Gilbert and Sullivan operas, provided that they are not vocal; The original overtures, in manuscript.

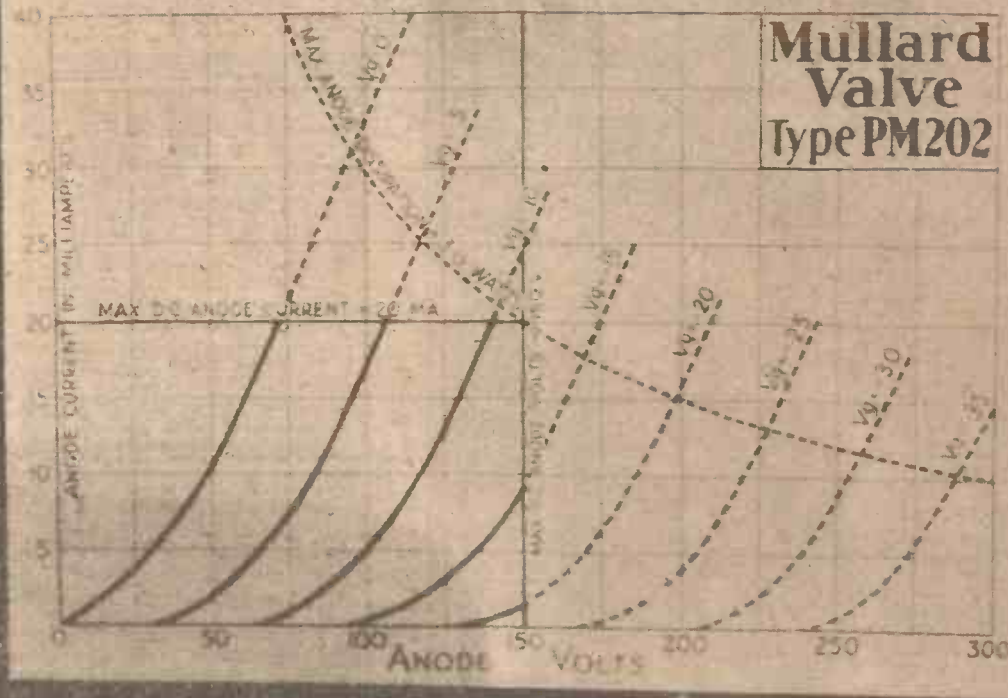
Sullivan's original overtures are in the possession of D'Oyley Carte, and the B.B.C. is permitted to make use of these. But the B.B.C. cannot go further than the overture. The rest of each opera is a closed book as far as broadcasting is concerned. And under no circumstances may songs taken from any of these popular operas be broadcast.

Such are the limitations laid down by the holders of the copyright, but for some mysterious reason the same rigorous control is not exercised abroad. Consequently British radio listeners have been able to listen to Savoy opera sung in foreign broadcasting studios and transmitted from foreign stations, but they are unable to hear the same operas from British studios.

The B.B.C. has been permitted to give occasional relays from theatres, but the production of Gilbert and Sullivan in the British broadcasting studios is absolutely vetoed.

I wonder why?

L. B.



**Mullard
Valve
Type PM202**



**P.M.
202**

SUPER POWER OUTPUT
with **ECONOMICAL CONSUMPTION**

A super power valve consuming a filament current of only 0.2 amp. It is designed for use as an output valve in battery operated receivers where considerable volume is required and where the available signals are greater than can be handled without distortion by a valve of the power class.

OPERATING DATA

- Max. Filament Voltage 2.0 volts
- Filament Current ... 0.2 amp.
- Max. Anode Voltage 150 volts

CHARACTERISTICS

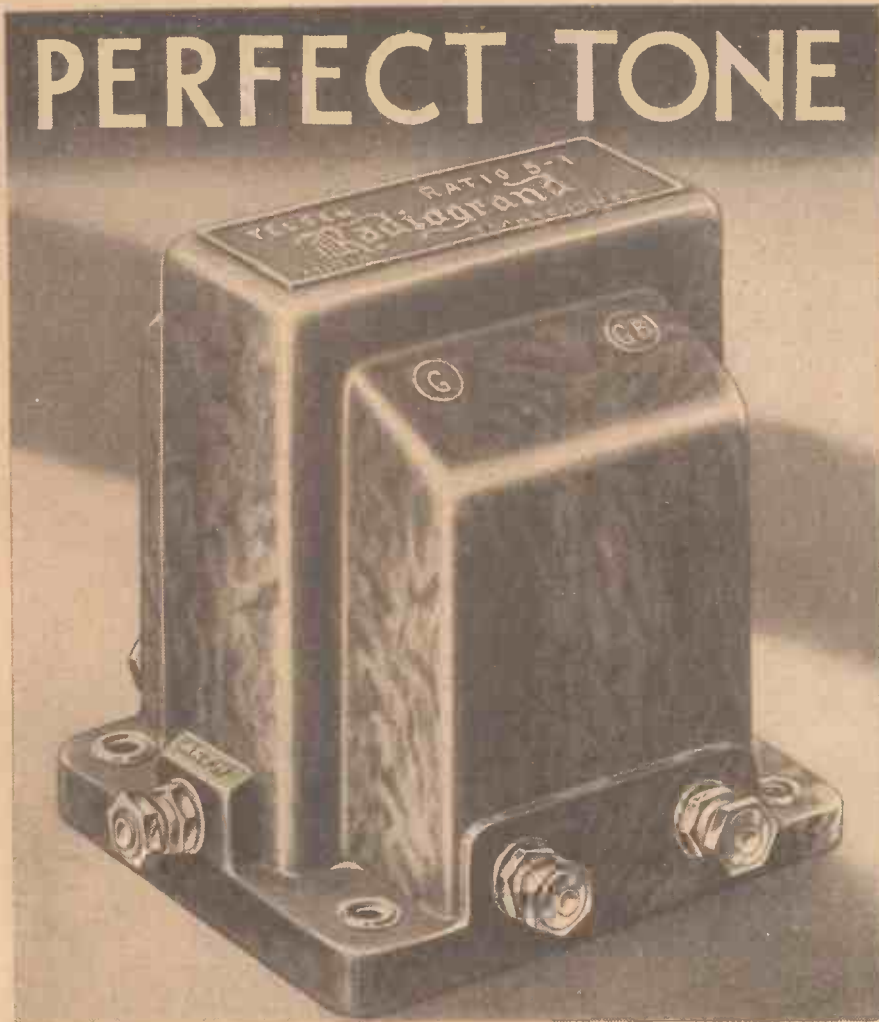
- (At Anode Volts 100 : Grid Volts Zero)
- Anode Impedance 2,000 ohms
 - Amplification Factor ... 7.0
 - Mutual Conductance 3.5 mA/v.

MADE IN ENGLAND

Price - 13/6

Mullard
THE · MASTER · VALVE

PERFECT TONE



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

L.F. TRANSFORMERS

"Ace," Ratios 3-1, 5-1 ...	5/6
"Radiogrand," Ratios 3-1, 5-1 ...	8/6
"Radiogrand," Ratio 7-1 ...	12/6
"Radiogrand," Ratio 1.75-1 ...	12/6

OUTPUT TRANSFORMERS

Multi-Ratio Output Transformer, giving three ratios of 9-1, 15-1, 22.5-1 ...	12/6
Output Transformer, Ratio 1-1 ...	12/6

L.F. CHOKES

L.F. Intervalve Coupling Choke, 40 and 100 henrys ...	5/-
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OUTPUT CHOKES

Output Choke, 20 henrys ...	8/-
Tapped Pentode Output Choke ...	8/6
Power Pentode Output Choke ...	12/6

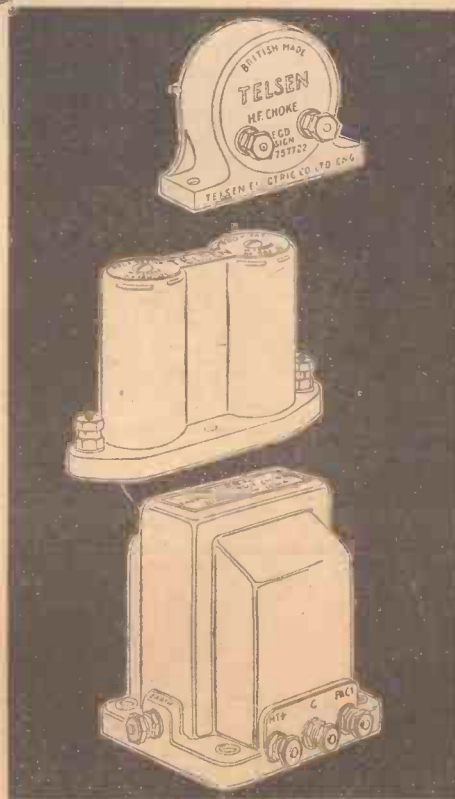
BINOCULAR H.F. CHOKES

It is the function of an H.F. Choke to present the highest possible impedance to H.F. currents at all wavelengths. Particularly does this apply to the popular tuned-grid arrangement of screen-grid amplification, where the performance of the whole set is limited by the value of the impedance in the anode circuit of the screened-grid valve. It is equally important that this high efficiency should be maintained over the whole broadcast band. **Price 5/-**

STANDARD H.F. CHOKE

The Telsen Standard H.F. Choke utilises the minimum baseboard space. It is designed to cover the whole broadcast band and has an extremely low self-capacity. The inductance is 150,000 microhenries and the resistance 400 ohms. It has proved very popular and has been incorporated by set designers in many of the leading circuits. **Price 2/-**

TELSEN
THE SECRET OF PERFECT
RADIO RECEPTION



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

**TELSEN
181 LOUD-SPEAKER**

An inexpensive combined loud-speaker cone chassis and unit, which gives a pleasing and natural balance of tone, and will handle all the output necessary for ordinary reception. Fitted with a fully floating cone of damp-resisting material and mounted in a rigid pressed frame of 11 in. diameter.

Price 10/6

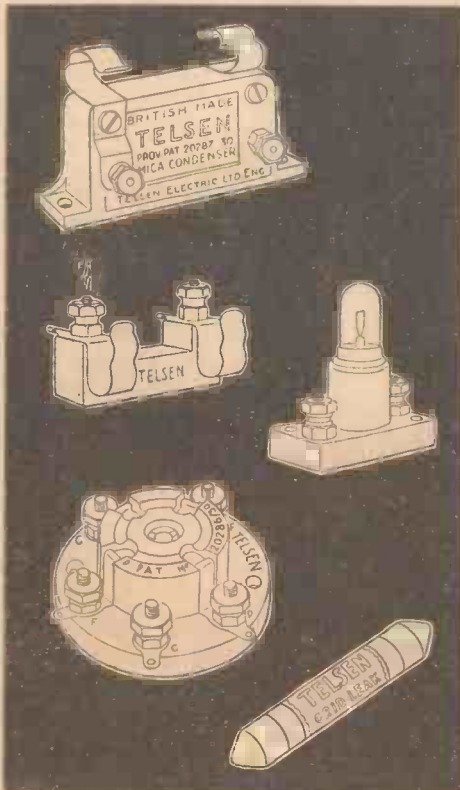
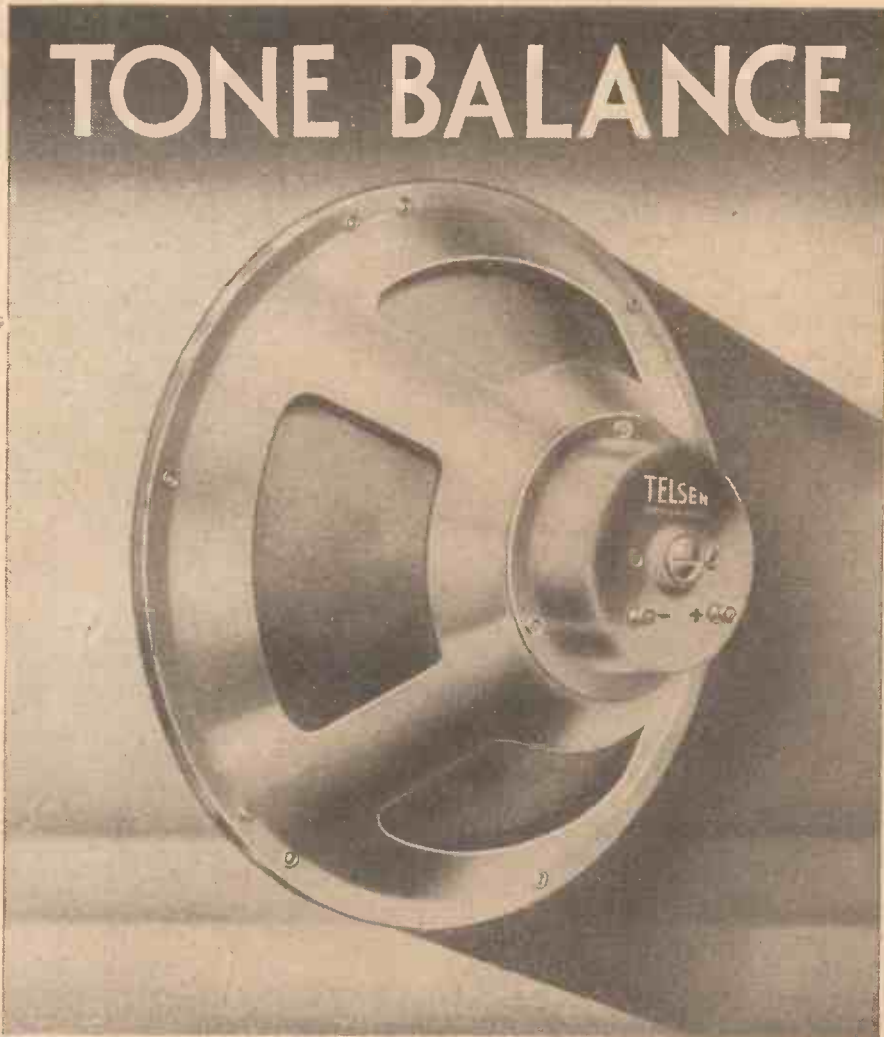
FIXED CONDENSERS

(Prov. Pat. No. 20287/30).

Made in capacities from .0001 mfd. to .002 mfd. They can be mounted upright or flat, and the .0003 mfd. fixed condenser is supplied complete with patent grid leak clips to facilitate series or parallel connections.

Price 6d.

PHONE BALANCE



VALVE HOLDERS (Prov. Pat. No. 20286/30). The Telsens four- and five-pin valve holders embody patent metal spring contacts, which are designed to provide the most efficient contact with split and non-split valve legs, and are extended in one piece to form soldering tags. Low capacity and self-locating.

- 4-Pin Price 6d.
- 5-Pin Price 8d.

GRID LEAKS. Telsens Grid Leaks are absolutely silent and non-microphonic, and practically unbreakable. They cannot be burnt out and are unaffected by atmospheric changes. Telsens Grid Leaks are not wire wound, and therefore there are no capacity effects. Their value is not affected by variation in the applied voltage. Made in values ranging from 1/5 megohms.

Price 9d.

GRID LEAK HOLDER. Will hold firmly any standard size or type of Grid Leak. Ample clearance is provided between the terminal screw leads and the baseboard (underneath) preventing any surface leakage upsetting the value of the Grid Leak. The terminals and fixing holes are accessible without removing the Grid Leak.

Price 6d.

FUSE HOLDER. This is a neat and inexpensive device which should be incorporated in every set as a precaution against burnt-out valves. The Telsens Fuse Holder firmly grips the standard radio fuse, giving a perfect contact.

Price 6d.

TELSEN SCREENS

Price 2/- and 2/6



**100% BRITISH
RADIO COMPONENTS**

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

CVS-120

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

HARMONICS ON THE BANJO



HEAR THEM DISTINCTLY

Broadcast banjo music can be very beautiful, if you have the right kind of H.T. current in your set—the pure, noiseless, smooth-flowing current of the Lissen Battery. Then you will hear characteristic tone from the banjo—tone built up by harmonics—twanging strings softened by a fabric of overtones.

There is a lot of enjoyment to the ear in the plaintive melody of banjo music. You will hear it at its best if you have a Lissen H.T. battery in your set.

LONGER BATTERY LIFE FOR LESS MONEY

The LIFE of the Lissen Battery has been increased—PRICES have been reduced. A specific LIFE GUARANTEE is printed on the side of every battery.



The secret of the Test Tubes

There is a Process used in the Lissen Battery which increases the actual life of the cells, offers resistance to volt-drop, deepens power capacity. So much so that A PRINTED LIFE GUARANTEE is given with every Lissen H.T. Battery sold. See this guarantee on the side of the battery when you buy—it means extra useful battery life in your set

H-T BATTERY

60 VOLT	100 VOLT	120 VOLT
WAS 74	WAS 124	WAS 1510
NOW 56	NOW 93	NOW 11

On Your Wavelength!

GREAT WORK

THE entrance of Percy W. Harris into the ranks of the AMATEUR WIRELESS staff sees one of my dearest wishes realised. I have been associated with AMATEUR WIRELESS myself since its earliest days, and my friendship with him dates back just about as long. That's why I have always hoped that he would one day grace the columns of the best of wireless papers.

AS CLEAR AS DAYLIGHT

YOU don't need to read more than a few paragraphs of Percy Harris's writing to realise that he has the gift of dealing with any subject, no matter how complicated it may be, in such a simple and clear way that you cannot help understanding. I remember being very struck the first time that I took a problem to him by his saying: "Well, first of all, let's make quite sure that we know exactly what the problem is, and then we ought to be able to find a solution." So many people rush in to deliver answers to questions without fully comprehending what the question is. Not so Harris; he gets right down to bedrock at the very outset. It is just because he has himself so clear an idea of any problem that he tackles that he is able to give such straightforward and such interesting explanations. And he knows his job, for he has been a practical wireless man during the whole of his career.

A GOOD STORY

PERCY HARRIS has some amusing stories to tell of his early days as a wireless operator on shipboard. Long before the War, ships used to pick up (if they were lucky) a daily news bulletin which was posted up for the passengers to read. On one occasion atmospherics were so appalling and the receiving apparatus so elementary that Harris could not succeed in recording more than about one word in ten of the bulletin. However, even in those days he had the seeds of the journalist in him; from the odd scraps that he had picked up he evolved quite a lengthy bulletin, which, with a smart salute, he handed to the captain for approval. "Quite good, my boy," remarked the captain, "quite good; but what you must learn is to *expand* these bulletins a little." Expand!!

ALL RIGHT THIS TIME

THOUGH the relay of the American concert "Hullo, Europe!" was much marred by atmospherics, the B.B.C. scored a real success in their recent transmission of President Hoover's speech on the occasion of the George Washington Bicentenary celebrations. Those who heard this speech will realise how extraordinarily good long-distance wireless

relaying can be if only Dame Nature gives things a chance. It is a comparatively rare event for there to be much atmospheric interference with the transatlantic telephone service which is used for relaying, and it was sheer bad luck that a particularly bad outburst should have occurred on the night when the "Hullo, Europe!" concert was relayed.

EMPIRE BROADCASTS

I WONDER when the first Empire concert will be given. Anyhow, it cannot be so far away now that the short-wave Empire broadcasting station is under way. What a wonderful event it will be in the history of wireless—every part of the greatest empire that the world has ever seen linked up and Britons in every part of the world enjoying a concert from the Homeland. Meantime, the programme arrangements from G5SW, the present short-wave station at Chelmsford, are much more satisfactory than they were.

There used, if you remember, to be no news bulletins, but this defect has now been remedied and citizens of the Empire no longer have to depend for their news upon stations in foreign countries. The bulletins actually go out at 12.30 p.m., 6.15 p.m., and 12 midnight; so that one or other of them is pretty sure to fit in with local time conditions in any part of the Empire. The whole of the evening programme from one or other of the London stations is now relayed between 6.45 p.m. and midnight, and there is a short daily programme between 12.30 and 1.30 p.m. When the new station comes into operation, one hopes that there will be a pretty well continuous 24-hour programme. There should then be no place, however remote, at which reception cannot be obtained. Thanks to the programme "bottling" device which the B.B.C. already possesses, there should be no difficulty about conducting transmissions for twenty-four hours out of the twenty-four.

A SCREW LOOSE

THE other day I came across an amusing, though at the time highly exasperating, defect in a wireless set which had just been constructed. It was a perfectly simple affair, consisting, as it did, of a detector plus a couple of notemags. The wiring having been checked over, the proud builder switched on, only to be rewarded by loud and prolonged howls. No matter what he did, the set just went on howling. Valves, valve holders, fixed condensers, resistances, and even coils and transformers were changed one at a time without result. The howling continued.

At last, in desperation, the victim, who is an old friend of mine, telephoned to ask if he could bring the thing round for me to

have a look at it. A quarter of an hour later the set, yoked up to my aerial and earth and using my valves and batteries, was howling to beat the band. And then suddenly light dawned on me. "The coke hammer?" queried my friend. "No," I said. "Let's try a screwdriver. We did," and we very soon scotched that howl. Now can you see what had taken place? Well, here you are. The vanes of the reaction condenser, which was of the solid-dielectric type, had become jammed in the maximum position, whilst the actuating knob was loose on its spindle. The condenser itself was hidden away behind another panel component, so that the fact that its vanes were not moving did not leap to the eye.

ANOTHER ONE

ONE of the most dreadful evenings that I can ever remember occurred when I was giving a final testing out to a set designed and finished a week or two previously. It absolutely would not work—it wouldn't even howl. The wiring was a little complicated, but I checked it over carefully about half a dozen times. Then I made every conceivable test of circuits and components, but could find nothing amiss anywhere. This was absolutely uncanny, for, when I had spent a couple of hours with the set two or three evenings before, it had shown itself to be a wonderful performer.

Between the previous tests and this one nothing had happened to the set, except that it had been photographed. Surely the photographer could not have cast the evil eye upon it? He hadn't, but he *had* done something else. Wanting to take a close-up of one part of the set, he had found a spaghetti resistance in the way. He therefore removed it temporarily, but forgot afterwards exactly where it went. This particular resistance was in the grid circuit of the high-frequency valve, but he had replaced it in such a way that it put the valve completely out of action. Of course, I ought to have spotted it at once, but one never thought of suspecting anything of the kind and the resistance appeared to be in its proper place, for the terminals the photographer had chosen were very close to the proper ones.

ABSOLUTELY BAFFLING

SOMETIMES, though, one does come across genuine wireless mysteries. One of our most eminent set designers, for instance, was completely baffled at the end of last year by the behaviour of an amplifier that he had built with his own hands, and he has never yet found out what was wrong with it. It was a two-stage note-magnifier intended to give high quality reproduction with great volume. Carefully designed and made of the best components, it refused to

On Your Wavelength! (continued)

work properly. The quality was poor and it was clear that oscillation was taking place at something rather above audio-frequency. Though every component in the set was changed one at a time, though the whole thing was rewired, though a variety of different valves made their appearance in the holders, though decoupling was applied up to the hilt, it absolutely refused to work. It was pulled to pieces and re-built with the same circuit, the same layout, and the same component. It then functioned perfectly and has continued to do so ever since.

DON'T NEGLECT US

I KNEW that the number of homes in this country equipped with electric light was well under 40 per cent. of the total, but recently published figures show that it is actually not more than 25 per cent., and there is no immediate likelihood of any big increase. I hope that set manufacturers will take these figures to heart, for there has lately been some risk of their concentrating too much on the all-mains set and devoting too little attention to its battery-operated brother.

The amount spent in this country on high-tension batteries alone each year shows a substantial increase. There is, therefore, a huge potential market for battery sets. Manufacturers made a big mistake in America two or three years ago when many of the biggest firms ceased to make battery sets and concentrated on those of the mains-driven order. They are now realising that it was an error, and some remarkably good battery sets are being turned out.

It is sheer nonsense to say that the battery set cannot be a thoroughly good performer without using any extravagant amount of either high-tension or low-tension current. *AMATEUR WIRELESS* and *Wireless Magazine* have always realised that the battery user was important. Though they have catered amply for the mains user, they have never gone "mains mad." I hope that both our valve manufacturers and our set manufacturers will realise the importance of the battery-set market and that they will lay themselves out to produce noteworthy developments in their apparatus.

SOME IDEAS

AFTER all, there is no reason, really, why the battery user should not have some of the benefits which are now confined entirely to the man who has mains in his house. Everyone knows that the indirectly-heated valve, at present made for A.C. and D.C. mains only, is much more efficient than its battery counterpart. I cannot myself see any real reason why we should not have, at any rate, screen-grid valves of the indirectly-heated cathode type for use with batteries. Mains valves all require one ampere at 4 volts. This is rather a lot for the batteries to supply, but it should be

possible to cut down the current requirements a little and to bring such valves within the scope of 4-volt or 6-volt accumulators. Here is an idea for some enterprising valve maker. In these days of super dry batteries and of accumulator H.T.B.'s, high-tension supply is not nearly such a problem as it was. Also, you can use all your available volts from the H.T.B. in the plate circuits, since there is no need to bother about free grid bias. Grid batteries are cheap and pretty well trouble-free.

ADVERTISING FROM ABROAD

A GOOD many British firms seem to make use of the nearer Continental stations to advertise their wares in this country nowadays. In fact, one or two of the French stations seem to be in the process of turning into British advertising mediums. There cannot be any objection to this from our point of view, at any rate, for if you don't want to listen to the voice of publicity you can always go on to something else. And you must not forget that it is all to the good of British trade abroad, for the number of people living on the Continent who understand English is surprisingly large. I must say, though, that I am rather surprised that so many advertisers make use of the short-wave stations, for fading is often so bad that the volume comes down to nothing at all just when the announcer is about to give out the name of the firm responsible for the wonderful things that he has been describing. I suppose that we shall have a real taste of wireless advertising when the new Luxembourg station gets going, for it is being erected primarily for that purpose. Apparently it is not going to elbow its way into the broadcast band, but is to use a wavelength a little below 300 metres.

PLENTY OF BIAS

In a large power or push-pull stage it is essential to have plenty of grid bias. Two batteries can conveniently be mounted side by side in clips as



shown, the negative terminal of one battery being connected to the positive terminal of the other and tappings taken on either battery according to the voltage required.

"RE-SHAPING" THE L.F.

THE special circuits now being used on the low-frequency side of a set to restore notes lost or "cut" in the H.F. circuits are comparatively new in wireless practice, though they date back a long way in the art of cable telegraphy and line telephony. Incidentally, they will play a big part in the new telephone cable which it is proposed to lay across the Atlantic. The amount of leakage in the first submarine telegraph cable was so great that the most sensitive instrument could barely distinguish the dots from the dashes in the morse code. "Shaping" circuits were first devised to overcome this difficulty, and now it is possible with their help to restore speech currents even after they have passed through more than two thousand miles of cable. The transatlantic telephony cable will cost several million pounds to make and lay, but it will probably pay its way, because it offers greater secrecy than the wireless service.

DON'T DO IT

SOMEONE who is apparently trying to pull my leg writes to inquire what would happen if he plugged an A.C. mains set across a D.C. supply. Well, although I'm all in favour of intelligent research, I must confess I've never tried this particular experiment. The best thing that could happen would be for the fuse to blow, and thus save any more serious damage; but more probably the transformer primary would go first, and then there would be a nice little bill for repairs. This kind of curiosity is misplaced—like that which killed the cat. Of course, if you insist upon acquiring first-hand knowledge at all costs—go ahead. But my advice is—don't!

THE GOLDEN RULE

IT was Newton, I think, who laid down three universal laws relating to the behaviour of matter in general, to which some equally profound—though unknown—philosopher added a fourth which he labelled "sheer cussedness." This operates to make all sorts of things go wrong when it is particularly important that they shouldn't. Scientifically it may be all "bally hoo," but ordinary people learn to treat it as the "golden rule." The other evening, for instance, I was invited to witness the performance of a new wireless set—a perfectly good portable, spick and span in every respect, except for the L.T. battery, which had been overworked by the proud owner. It "fell down" on him just as I arrived, full of carefully prepared congratulations. For the first ten minutes the atmosphere was certainly "electric"—full of high-tension and "discharges" of language that occasionally dipped below the level of the L.T. voltage. Finally, I had to listen to a long account of all the station; I could have heard had I called round any other night. Very human, of course, but also rather pathetic. THERMION.

AT THE B.B.C.

SOME IMPORTANT O.B.'S and HOW THEY WILL BE DONE



In an interview with an O.B. official, our Special Commissioner deals with leading events during the month, and tells how they will be done

MARCH is a busy month for the Outside Broadcast Engineers.

I have just been having a chat with a Savoy Hill official who is in charge of all Outside Broadcast events and he has explained to me how the programme will be arranged for the next three weeks.

"We here are proud of the fact that last week we carried out the 10,000th relay," he said, "that is, of course, relays conducted by the Outside Broadcast Department.

Is it a Record?

"I am not prepared to say whether this is a world's record. Perhaps one of the big American combines, which handles so much O.B. material in the programmes,

has beaten our figures, but in all probability it stands as a European record!"

"Why is March such a busy month?" I asked.

"Chiefly because of the number of sporting events which fall just at this time of the year," said the O.B. man.

Many Big Events

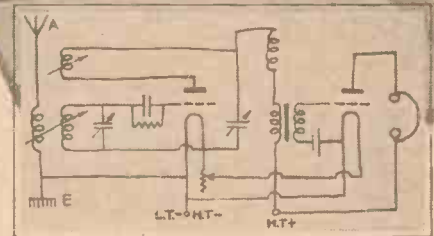
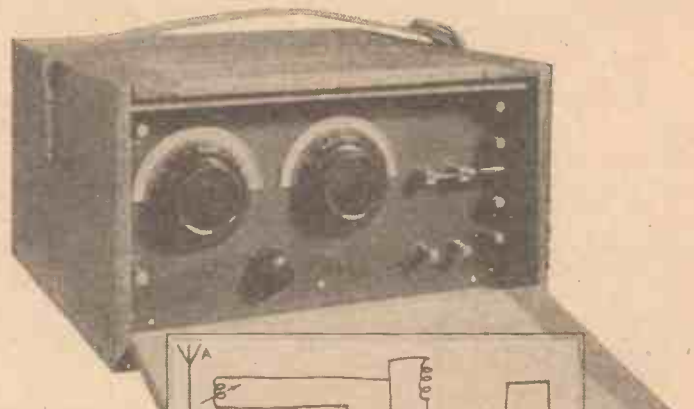
"Not every big sporting event is the subject of an Outside Broadcast, but it just happens that most of the items this month are events which have generally come to be regarded as part of the programmes.

"Big events include the Boat Race relay, the broadcast of the running commentary on the Grand National, and the eye witness commentary on the England - versus - Scotland

for receiving the signals from the launch. These replace the six-valve super-hets which have been used on other occasions. They are easier to work and provide all the signal energy required.

The Receivers

"These little receivers are made up in sturdy wooden boxes and do not look a bit like ordinary short-wave sets. Everything is enclosed and weatherproof. Loose-coupled aerial tuning is used to get freedom



One of the short-wave detector outfits used by the B.B.C. engineers for relaying, and (inset) the theoretical circuit diagram

CONTROLLING A BROADCAST



B.B.C. engineers at the balance and control point during a broadcast. The dual sets of panels control the volume, the number of microphones in circuit and the microphone amplifiers

Rugby match at Twickenham."

"What new arrangements are you making in connection with these three broadcasts?" I asked.

"The Boat Race will, it is fairly certain, be given through the portable transmitter on the old Magician launch.

"The gear on this remains largely the same as last year. We are not disclosing the wavelength used till after the events.

"This year plain Reinartz - type detectors will be used

from heterodyne interference and only the grid side of the coil coupling is tuned.

"Capacity-controlled reaction adjustable from the little front panel of the set ensures that the operator can tune in without undue hand capacity. The detector circuit is direct coupled to one stage of low-frequency amplification in the same box and the output of this goes to the line amplifier.

New Apparatus

"These sets will be used at a number of points along the course and the Post Office has arranged for a number of special 'phone lines through to the Control Room where the inputs from each link set are controlled."

"What about the Grand National and Rugger broadcasts?" I inquired.

"We are using the new O.B. fade units at all these field broadcasts," he explained. "These are an improvement on old O.B.

(Continued at foot of next page)

PERCY W. HARRIS TALKS ABOUT HIS FIRST SET FOR "AW" READERS



just as you will be amazed at its range and the fact that it has **no ganged condensers, no matched coils, no screening, no expensive screen-grid valve, and no tricky adjustments** of any kind. These features will, I am sure, appeal to you. If you so desire you can wind the coils

yourself with nothing more than two cardboard tubes and three cardboard rings and less than a quarter of a pound of No. 28 d.s.c. wire. Even this

little trouble, however, can be avoided, for I have arranged with several firms to supply ready wound tuning coils if you want them so made. As to the overall cost, this is very small.

All the Features You Want

What do you want in performance? This set will give you a **selectivity which, hitherto, you have only associated with receivers with a carefully designed high-frequency stage.** Real selectivity, mark you, for claims of selectivity have been badly overstated in some cases—a selectivity which is generally associated with a super-heterodyne, making it possible to receive distant stations a division or two away from the most powerful local.

Do you want quality? **The quality of reproduction is as exceptional as the selectivity** and that is saying a great deal. Do you occasionally want the maximum signal strength you can squeeze out of your receiver without going to extremes in selectivity? In a second you

can change this receiver from a simply handled set with tremendous sharpness of tuning down to one of medium selectivity but of much greater strength. In a word from band-pass to ordinary tuning or back again in a second.

Do you want **simplicity of control?** Here are two tuning dials and a reaction knob which is remarkably constant in its setting; a wave-change and an on-off knob complete the controls. Do you like a smart appearance? My new receiver has a neatness and symmetrical dignity in panel layout which will make your friends say: "That looks like a *real set*," and, of course, **you want simplicity of construction.** Lay the parts on the baseboard, screw them down and wire them up with soldered or screwed-down connections, just as you please. Every part is fitted with terminals, and the panel mounting parts are few and simple.

The whole receiver, now it is finished, looks so simple and easy that you have no idea how many times I re-built it and how many changes and combinations I tried before I got just that balance and performance I aimed for. For this had to be a "New Days" set with no sacrifice of quality in getting the selectivity. Believe me, **this set does justice to any loud-speaker** you connect to it.

Next week I shall give you full particulars of how to build it and when you have built it I am sure you will agree that I have not exaggerated my claims for it.

Having written these preliminary notes at the Editor's request, I am now going back to the set to get a few more stations, and to prepare a calibration chart to help you tune it.

IF you think I have lost the thrill which comes from handling a brand new set of exceptional performance, you are quite mistaken! As I write this, my new set stands on the laboratory bench in front of me. I have been running over its dials for the last hour or more, finally checking up its performance, making sure that it performs equally well over the whole range of both wavelengths; that the reaction is delicate and smooth everywhere; that the quality of reproduction is first-class; and, in fact, making sure that it is really worthy to be my first set for AMATEUR WIRELESS.

I am more than pleased with it because I feel that in these days of rigid economy, when the shillings we spend on wireless components have to be carefully spent, and when there is little justification for making a new set just because it is a new set and nothing more, that this receiver is something really new giving a performance which is in wide demand at the lowest possible cost.

You will be amazed at its selectivity

"SOME IMPORTANT O.B.'s"

(Continued from preceding page)

control gear because they comprise two entirely separate control panels. Let me explain this.

"On one Outside Broadcast four or five microphones are used. Let us assume there are five microphones for the Grand National this year. On previous occasions these would have been connected all to one board, carrying five potentiometers.

"The man at the O.B. point on the field would have listened-in with 'phones and 'opened the throttle' on each one according to the continuity of the race or the positions of the commentators.

O.B. Fade Units

"With the new O.B. equipment, in a similar event, three of the microphones would be connected to one of the fade units, and, say, two to the other.

"Four days before the Boat Race, on Wednesday, March 16, to be exact, we have planned a test cruise over the race-course with the *Magician* to see that all the link receivers are working properly.

"We must have the *Magician* plant in proper working order by the end of the

afternoon, for on the following day—the Thursday—we have to be off to Aintree to try the microphone and circuits to be used for the Grand National commentary, which is given on the following day.

"Another section will have to get the microphone lines ready for the Rugger match on the same Saturday as the Boat Race, but the actual control people will, in all probability, handle both events.

"Immediately the Boat Race broadcast is through a party will motor off to Twickenham where the commentators will be at the microphone all ready for the O.B. control.

New Commentators' Huts

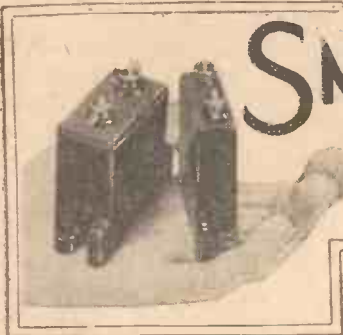
"We are using the new commentators' huts this year, which are permanently fixed up with microphone wiring. On past occasions we have had complaints of crackling noises and occasional speech interference on the lines. This has more often been proved to be a lack of screening on the microphone lines, rather than incorrect switching on the Post Office circuits. We are now taking particular care to screen all the microphone leads and the first-stage amplifiers."

The Grand National

The Grand National will be described in two parts during the race. Mr. R. C. Lyle, who will be in Messrs. Topham's private stand, will deal with the race over that portion of the course on the Grand Stand side of Becher's and Valentine's Brooks and Mr. W. Hobbiss, at the Canal Turn, will describe events over the remainder of the course, including Becher's Brook, the Canal Turn, and Valentine's Brook.

The broadcast will open with a description of the general scene, the names of the runners and jockeys, together with crowd effects. Then will follow an account of the Parade of horses to the starting post. Next the running commentary will be opened by Mr. Lyle and an announcement will be given at the moment of the change-over to Mr. Hobbiss, who at the conclusion of his part of the commentary, will announce the change back to Mr. Lyle. The final result will be repeated several times at the conclusion of the race.

Mr. J. D. M. Snagge will give a running commentary on the Oxford and Cambridge Boat Race. Mr. Snagge will speak from the *Magician*. The race will probably start at 10.30 a.m.



SMALL CIRCUIT CHANGES THAT MAKE A BIG DIFFERENCE

An informative Article by ALAN HUNTER, illustrated with simple pictorial diagrams that every reader can understand.

YOU may not be very keen on the theory of wireless, but it is long odds that you are keen on making your set go well. A little theory will help you to get better results. This axiom is very true of circuit values. Most constructors take capacity and resistance values for granted—and lose efficiency because the best possible values have not been chosen.

Let me give you a few of the more important circuit values, and then you will be able to check up on most of the vulner-

though this resistance might be lowered to ½ megohm without any trouble.

If the grid condenser is made smaller than .0001 microfarad there is a risk of signal loss, for the impedance of the condenser to the incoming signal will then be appreciable, and some of the voltage will be dropped across the condenser.

This and many similar capacity values depend on the fact that a condenser's impedance to alternating current alters as the frequency is altered. Thus a given con-

denser capacity offers a greater impedance to a low frequency than to high frequency. You should bear this fact in mind when considering the capacity of the anode by-pass condenser—the small condenser now fitted in almost every set between the anode of the detector and earth.

The usual capacity specified for this condenser is .0001 microfarad—do you know why? Because with a fairly high-impedance detector this

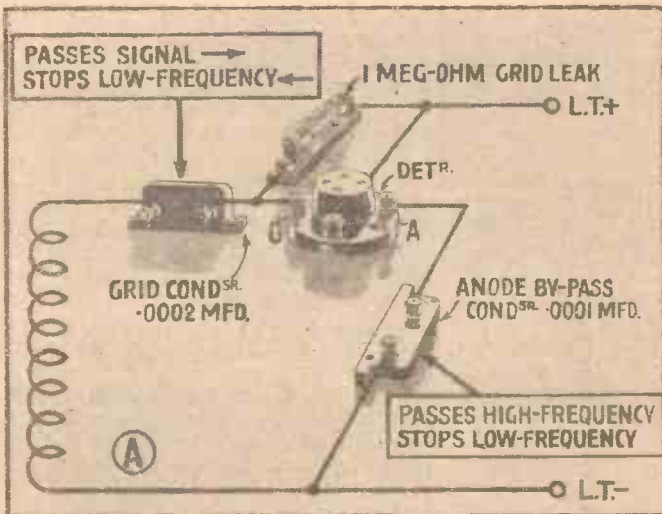
them to get to earth, so they proceed as required into the low-frequency amplifier. You can easily prove how the detector anode by-pass affects the audible frequencies by putting in a much larger capacity. Try a .001-microfarad by-pass—you will probably find that the output tone or pitch is lowered, showing that the by-pass condenser in the anode circuit has by-passed not only the high frequency, but also some of the audible frequencies.

Tone Compensation

Much depends on the impedance of the detector; with the detector used in the "Home-Lover's" set described elsewhere in this issue, for example, the usual .0001 has been changed to .001-microfarad, because the detector has such a low impedance that a .0001 microfarad would be high in comparison.

A rough-and-ready test can be made by increasing the capacity until the output tone begins to suffer; choose a capacity just below this point, unless your object is to compensate for subsequent high-note compensation. With a medium-impedance valve you can obtain a sort of tone control by putting in a pre-set for the anode by-pass condenser.

Now what about some of the low-frequency component values? Consider the decoupling of the detector, for example.



Two fixed condensers in the detector circuit are shown in this pictorial diagram—the grid condenser and the anode by-pass. The grid condenser must be large enough to pass the signal without loss of voltage, but small enough to prevent loss of high notes. The anode by-pass condenser must be large enough to pass the high-frequency current in the detector anode circuit, but small enough to prevent by-passing of the higher audible frequencies

able points of the set. Shall we start with the detector? That is a fruitful source of inefficiency, because quite often wrong circuit values have been adopted.

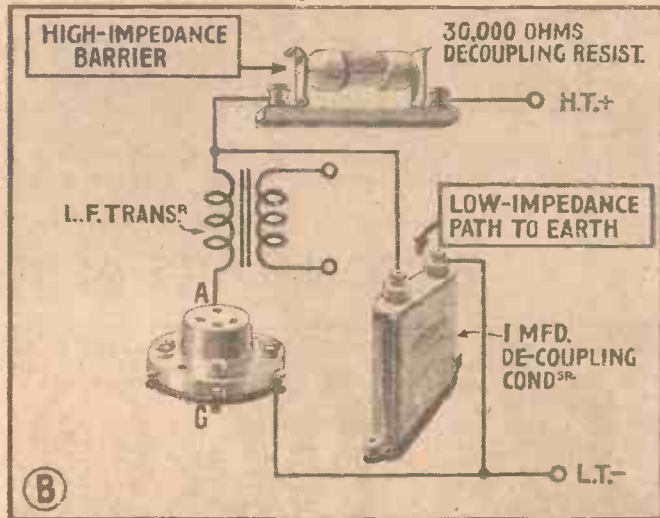
Detector Grid Condenser

What should be the capacity of the grid condenser? You have a choice, depending mainly on the type of detection wanted. For ordinary grid detection a .0002-microfarad condenser will usually be the best. If it is made any bigger, say .0003 microfarad, there is a risk of frequency distortion—some of the higher audible frequencies, contained in the low-frequency component of the signal applied and detected at the grid of the detector, will be cut off.

Much depends on the value of the grid leak how the grid condenser behaves; it is best to have a grid leak of about 1 megohm with the .0002-microfarad grid condenser,

capacity will, bypass the unwanted high-frequency current, but will not by-pass the high audible frequencies, which are, of course, of much lower frequency than the signal or carrier frequency.

Here we have a good example of the use of a condenser to discriminate between high and low frequencies. The .0001-microfarad capacity, assuming detector, effectively detector, but its lower frequencies, such as the highest audible frequencies, is too great to allow



The decoupling condenser shown in this diagram has a capacity largely determined by the value of the decoupling resistance in series with the primary of the transformer, as is fully explained in the text

a high-impedance by-passes the high impedance to the lower frequencies, such as the highest audible frequencies, is too great to allow

What should be the value of the decoupling resistance, and the capacity of the decoupling condenser?

Well, the first point is—why decouple? The answer is that, unless we decouple, the

HAVE YOU READ THE SPECIAL ANNOUNCEMENT ON PAGE 484?

impedance of the high-tension power supply, common to all the valve anodes, will pass energy developed in the later stages, back into the earlier stages, with resulting "motor-boating" and distortion.

The decoupling resistance must be made high compared with the battery or mains-unit resistance, and to do its work properly this resistance must also be high compared with the impedance of the decoupling condenser.

It will be remembered that the impedance of the condenser varies according to the frequency; this has to be borne in mind when considering decoupling. We choose a capacity that will effectively pass the lowest frequency with which the amplifier is capable of dealing. Then we make the value of the decoupling resistance in the anode circuit at least ten times as great as the impedance in ohms of the condenser chosen.

For example, a 1-microfarad condenser has an impedance of 3,200 ohms at a frequency of 50 cycles (the lowest frequency we are likely to encounter), so if this were used for the decoupling condenser the resistance would need to be just over 30,000 ohms.

The larger the condenser the less the impedance offered for a given frequency; so a 2-microfarad fixed condenser has an impedance of only 1,600 ohms at 50 cycles. With this condenser the decoupling resistance would not need to be more than 20,000 ohms.

There is another consideration when choosing decoupling values, and that is the anode voltage wanted on the detector or other valve whose anode circuit is being decoupled. The more voltage wanted on the anode, the less voltage drop can you spare across the resistance in the anode circuit.

With power-grid detection, or with any valve needing the maximum anode voltage,

it pays to use a large decoupling condenser, for then a lower decoupling resistance can be used, and so less voltage is dropped.

Another source of worry to many amateurs is the value of the "stopper" resistance sometimes used in the grid circuit of the last valve. The function of this resistance is to drop across it any residual high frequency that may, in spite of earlier filtering, have got through to the last valve.

Unless you know how this resistance acts, it is not easy to see why one particular value will give better results than any

has a much higher impedance to low frequency, so for the audible frequencies the greatest voltage will be developed across the valve, since this has the greater impedance at these frequencies.

Stopper Action

Now it is clear that for a satisfactory "stopper" action, the resistance value must be chosen so that the resistance is small compared with the valve impedance at low frequencies, yet high enough to drop most of the high frequencies. Such a value is 100,000 ohms. If this is greatly exceeded, some of the higher audible frequencies will be lost, as well as the actual high frequency it is desired to eliminate.

Sometimes this high-note cutting action of the grid stopper can be utilised to good advantage. Suppose you have a pentode output valve, which happens to be accentuating the high notes; the use of a .25-megohm or even a .5-megohm grid leak for the grid stopper would then be a good way of cutting down the high notes to produce a rounder tone from the loud-speaker.

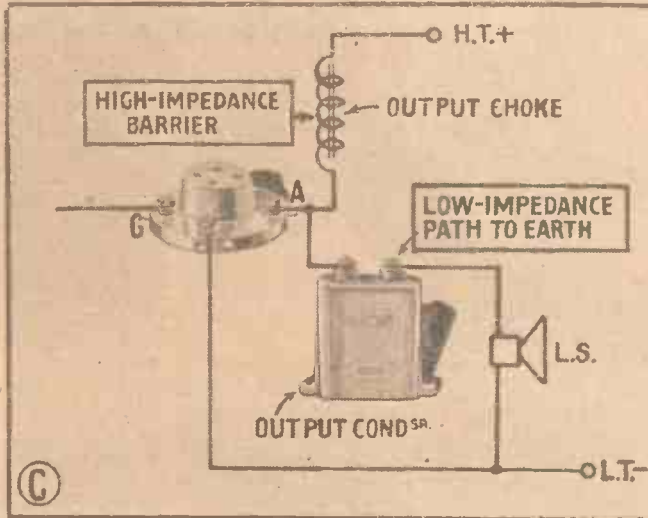
Output Condenser Value

Some amateurs are still in doubt about the right value for the condenser in a choke capacity loud-speaker filter—should this be 2 or 4 microfarads? Well, you may take it that the larger the condenser the better will the low notes be reproduced.

The requirement is that the condenser, which is in series with the loud-speaker, shall have a low impedance compared with the impedance of the loud-speaker. As this condenser impedance is greatest for low frequencies, and as you may be dealing with frequencies so low as 50 cycles, it is clear that a large capacity will be needed to conform with the low-impedance requirement.

Actually, if you are dealing with such a low frequency—not many sets will amplify down to this—a 6-microfarad condenser would be an advantage, at least with the average type of loud-speaker. But a good compromise is 4 microfarads, or 2 microfarads for a set that does not handle frequencies below, say, 100 or 150 cycles.

The above are just a few of the many debatable circuit values found in the average set. Perhaps you know of others—if so, I shall be glad to hear your views.



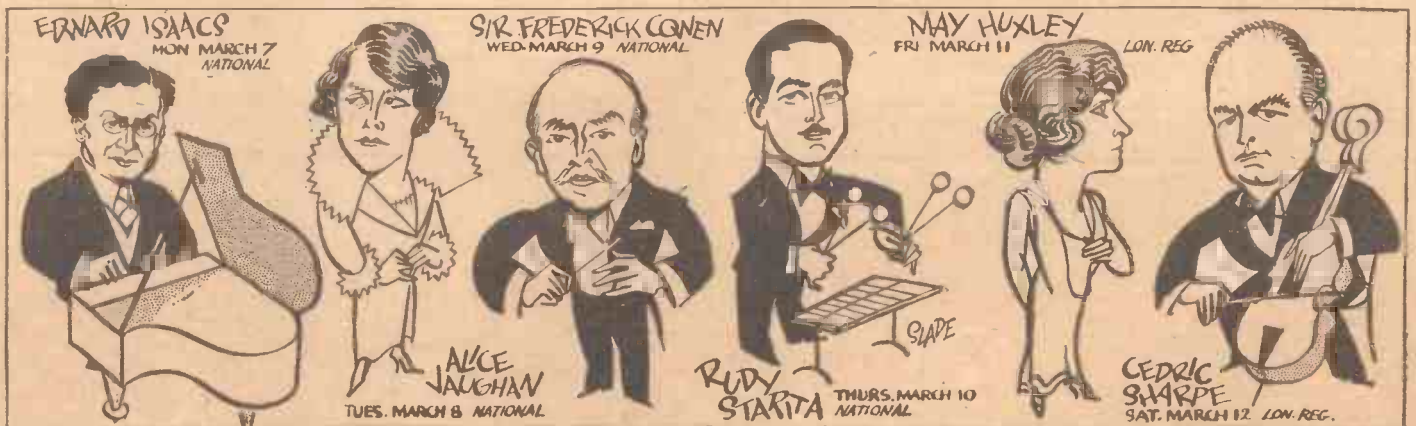
The fixed condenser of a choke-capacity output must have a low impedance compared with that of the loud-speaker. In general, the larger the condenser the better will the very low notes be passed. 2 microfarads is the minimum, and 4 or 6 microfarads is recommended for very good amplifiers

other. The whole action depends on our rule that a condenser has a lower impedance to high frequency than to low frequency. The condenser in this arrangement is the capacity formed between the grid and filament of the valve.

The grid stopper is in series with this capacity impedance, but the grid resistance's impedance to the applied signal is constant, whereas the valve capacity's impedance is low for high frequency. Thus, if there is any high frequency left when the signal arrives at the last grid, most of it is lost across the greater impedance, which is the resistance.

But remember that this valve capacity

PERSONALITIES IN THE WEEK'S PROGRAMMES



Our Broadcast Critic

TALKS ABOUT

Revue Songs



JEANNE DE CASALIS

THERE was a very good show of revue songs in "Songs from the Shows." I must say I listened interestedly to them and, all the good John Watt (with his nice Oxford accent) had to tell me about them.

The production, as a whole, seemed to me to be very suitable for the microphone; it required no effort to listen to the music, nor was the listener expected to visualise scenery or situations of any kind. A distinct advantage.

With that thought in my mind—that I was *not* expected to visualise—I found myself visualising all the King's horses, and all the King's men, very vividly. That tune is quite the best light tune recently written, in my opinion.

For one thing it is very *well* written. I have not examined a score, but I imagine that it would pass any test in the matter of musicianship. We can do with some more like it. Altogether, the "Songs from the Shows" are well worth hearing.

Did you hear the film burlesque called *Carnival, or Fun on a Venetian Balcony*? If so, was it good? I ask because I could not understand what it meant.

What I did understand, and appreciate the cleverness of, was Reginald Gardiner's amazing imitations of various kinds of cars. He must possess a cast-iron throat as well as a perfect imitative faculty. Could he be persuaded to imitate the noises at Shanghai for a future programme? I am sure he is capable of it.

I am no lover of syncopated songs or syncopated anything, for that matter; all the same, Eddie and Rex interested me greatly. The songs were original, and by no means the clap-trap I have so often heard under the dreaded description "syncopated."

The little sketch *French as She is Learnt* is a good example of a failure for want of atmosphere. There were no real *telling* phrases in it. To be successful, the French construction should have been laid on with a trowel. Those sorts of things, which might be good fun, are not always easy to get over.

A word to John Charlton. Sir, your matter is excellent, but your speed is much too fast for the microphone. I heard precisely five of your schoolboy howlers and guessed at a sixth which I happened to have heard before. Go a little slower, please.

How did you like "Hello, Europe"? Although I detest negro spirituals, believing them to be neither negro nor spiritual, I listened as a matter of duty. I was so glad that all those funny noises that came, along with the spiritual efforts made it impossible to hear what was being sung. I waited for Mr. Majs, whom I found charming—as ever.

The wind instrument concert was not too good, chiefly owing to the fact that the intonation of the wind instruments in the B.B.C. Orchestra is so uncertain. I doubt if many listeners heard that concert throughout. I listened for a while to what the announcer called "chanson et *dawnse*," by d'Indy. Of the two, I liked the *chanson* better than the *dawnse*.

I was told that Maggie Teyte sang beautifully in the symphony concert; unfortunately I could not be at home in time to hear her. I did hear Marcel Dupré, however, and enjoyed his rendering of a familiar Handel concerto. He is one of the very few organists for whose technique I have respect.

I listened to the Hallé concert, of course; I hope everyone else did. *The Mass of Life* is a stupendous piece of writing. I think we should regard Delius as "the greatest ever"—for England, that is to say. In this instance, the Hallé Chorus and Orchestra showed what they were made of; there were some immense moments.

The Wireless Singers improve. I should like them weekly. I was interested in Armstrong Gibbs' "Fol dol do," which the male portion of the choir sang very well. The harmonies were so strange that they had the peculiar effect of making the whole thing sound slightly out of tune. That presented a little acoustical problem that I was unable to solve. A very enjoyable broadcast, though.

**PERCY HARRIS'S "MASCOT"
NEXT WEEK!**

A really good comedian is our Hebrew friend, Julian Rose. His account of the wedding ceremony and reception was cleverly put together. I hope he will be asked again soon.

Norman Long is another for whom I want to ask. He amused me greatly when he described the damsel who played with feeling—*feeling for the next note*. I know those sort of players! May it not be Long before Norman broadcasts again.

Mr. Farjeon praised H. G. Harrison's concertina-playing. He said he made a concertina sound better than he thought a concertina could sound. I agree there. Partly it was because he played better music than one expects where that particular instrument is concerned. I cannot say, though, that I admired the imitation of bells.

It is with the profoundest respect for Clapham and Dwyer that I venture to say I did not think they were *quite* up to their usual brilliance. It seems a sin to grumble at them because their excellence is so regularly maintained. On the other hand, if people *will* be so good they must expect someone to grumble if they are—well, just *good*.

In many ways I prefer the Sunday symphony concerts to those relayed from Queen's Hall on Wednesday evenings. I think the one devoted to English music and relayed to the Continent was a broadcast of which we need not be ashamed.

I enjoyed the Ireland concerto particularly, but Helen Perkin must now learn to play a new piece, surely? She has "done that one in"—for a while, at any rate. Delius' "Brigg Fair" was the very thing to give the Continent; *it is so English*.

Did you hear *Nothing Serious*? I was not *too* thrilled, but I thought there was nothing serious the matter with it.

The Tuesday-night vauvauville had some very good points, one of which was the cleverness of the imitations, especially as they were so varied.

Jeanne de Casalis was excellent; but in my opinion one or two of her remarks were near the line.

I should like to add a word of appreciation of the splendid playing of Marius Winter's Band.

WHITAKER WILSON.

FOR less than half the cost of a factory-built console you can build the "Home-lover's All-electric Three," which has three valves working entirely from the A.C. mains, and driving a self-contained cone loud-speaker. The only external connections are for the aerial and earth and the mains plug, although terminals are also provided for the connection of a gramophone pick-up if you want to use the set as an amplifier.

As might be expected, the three valves of this console are arranged in the sequence of high-frequency, detector, and power. Such a combination meets average needs, giving a great variety of stations at full loud-speaker strength.

Circuit Features

There are outstanding points about every stage of the "Home-lover's" set. The high-frequency stage employs the new variable- μ type of screen-grid valve, and this provides an excellent control of volume without introducing any distortion.

The detector valve works on the power-grid system, handling large signal inputs without creating distortion. The power valve hands on to the loud-speaker, when fully loaded, at least 600 milliwatts, or more than twice the power available with the average battery-operated power valve.

In addition to these three valves there is a fourth valve for converting the A.C. into direct-current, used for the high-tension and grid bias supplies.

The filament supply is obtained from the mains by using indirectly-heated valves throughout. The filaments are heated with "raw" A.C., which is stepped down from the supply voltage to four



Designed by S. RUTHERFORD WILKINS

volts by means of a separate secondary winding on the transformer used for the mains rectifying valve.

Such is the circuit in its barest outline. A fuller explanation was given on pages 437 and 438 in last week's issue. Those who missed this are advised to turn it up.

In the middle pages of the same issue were given constructional details, so here it will not be necessary to do more than outline the main layout scheme.

In the console cabinet are

THAT CAN BE BUILT AS A RECEIVER, MAINS UNIT

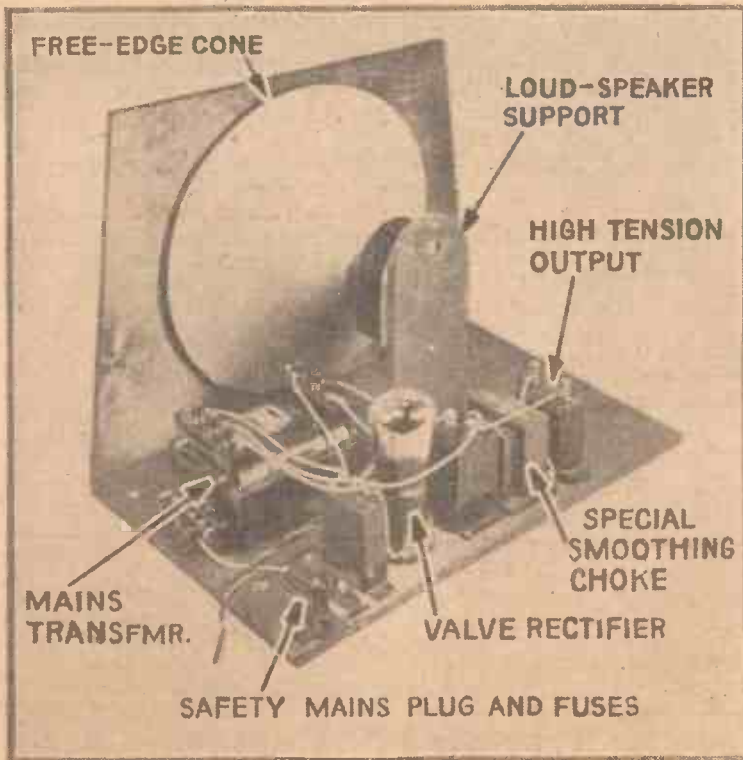
fitted two distinct sections. The bottom of the cabinet is taken up with the three-valve set, which follows the usual baseboard and panel idea, with simple screening and straightforward wiring. Then in the top part of the cabinet is fitted a shelf, on which are mounted all the mains components, and also the home-assembled loud-speaker.

Simple Assembly

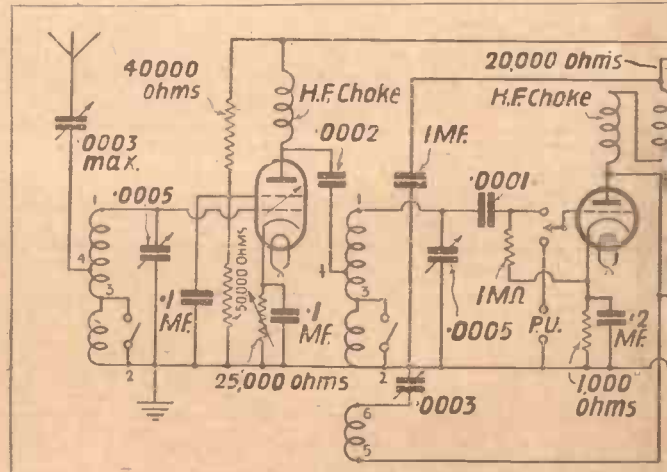
The unit of the loud-speaker is supported

57 STATIONS AT FULL L

on a wooden batten erected at the centre of the shelf, as is very clearly shown in the blueprint and other drawings. Incidentally, this home-made loud-speaker gives very clear reproduction, especially of speech, but you must take care to keep the cone diaphragm clear of the front of



The complete mains unit with the principal features indicated



The circuit diagram of the "Home-lover's All-electric"

THE HOME-LOVERS' ALL-ELECTRIC THREE



THE ALL-ELECTRIC SET KIT FOR £7 17s. 6d. INCLUDING UNIT, SPEAKER AND CABINET

the cabinet, or an unpleasant resonance may be set up.

Of course, there is nothing to prevent you using a ready-made loud-speaker chassis, such as one of the many permanent-magnet moving-coils. There is plenty of room in the cabinet.

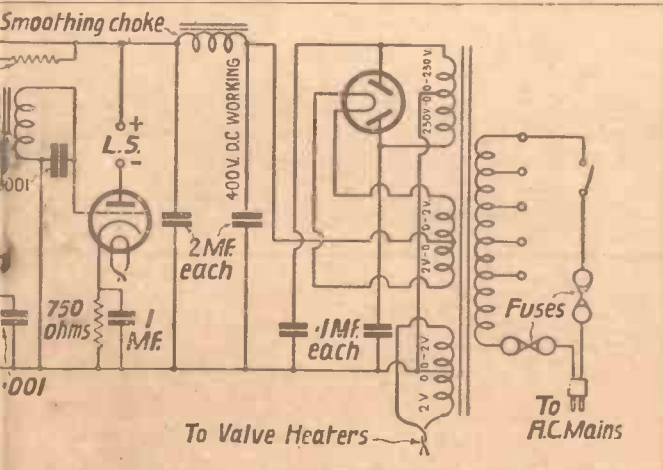
So far as connections are concerned there are three constituent parts to the console; the set, the power supply, and the loud-speaker. Nothing could be sim-

LOUD-SPEAKER STRENGTH!

pler than the method adopted for connecting these three constituents together.

Connections

Two terminals on the left-hand terminal strip of the set (looking from the back) provide connection for the loud-



Three" which includes the mains unit shown at the right

speaker leads coming down through the platform to the unit.

Two flexible wires come from the output terminals of the mains

unit condenser to the set for the high-tension supply; looking from the back it is the outer terminal of the mains condenser that forms high-tension negative, and this goes to the right-hand side of the two fixed condensers near the power valve.

The twisted flexible wires from the filament circuit of the set—coming out eventually from the power valve—go straight to the low-tension terminals on the mains transformer. With the mains-switch flexible leads are completed the inter-connections of the three parts of the set—simple enough, surely?

It was mentioned last week that the cabinet has a

"safety back." This means that when the back of the cabinet is taken off, the mains are automatically disconnected from the set. It is therefore impossible to get a shock when examining the internals for any reason.

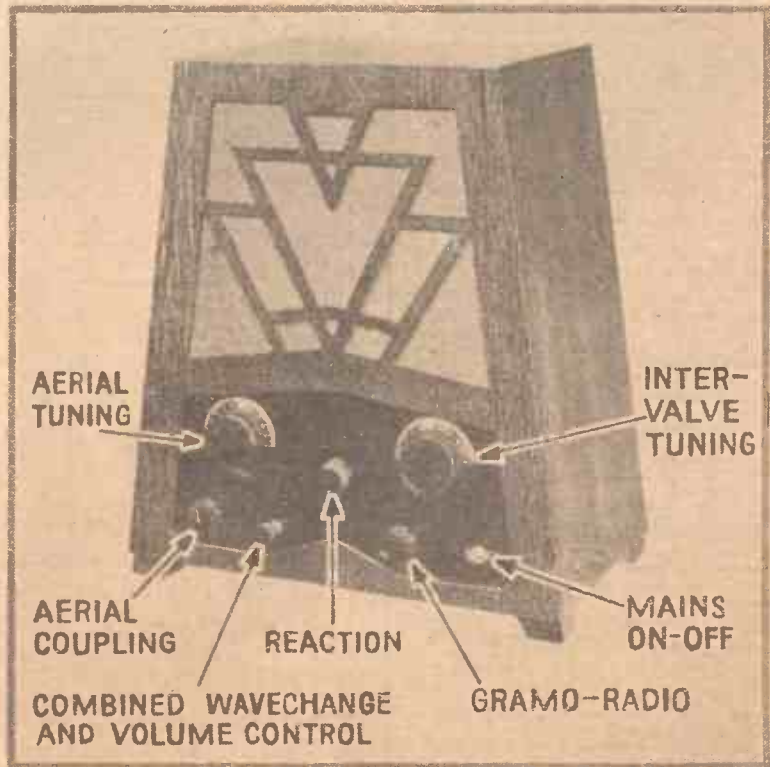
This admirable device is really very simple, as can be seen from the illustrations. A hole is cut in the cabinet to allow the plugs of the safety connector to project through far enough to fit into the sockets of the mains-lead connector. The only way to take off the back is therefore to remove the mains-lead connector—and as the sockets are insulated there is no risk of the mains flex shorting on to anything, even if it is left lying on the table during the inspection of the internals of the set.

Operating

The only other connections are for the aerial and earth, and, if wanted, the gramophone pick-up. With these in position you can plug in—and listen! But make quite sure first that the mains lead to the power transformer is on the right terminal. Provision is made for all A.C. supplies between 200 and 250 volts, so see that your particular supply is connected to the terminal that most nearly corresponds.

There is so much inherent selectivity in this set that you may safely use the maximum aerial length allowed, namely 100 feet. This is indeed an advantage if you live more than 20 miles from a regional station. For those living closer, perhaps a total of 70 feet is better, so as not to swamp the dials with the locals.

As a matter of fact there is a special



The uses of the controls will be understood by reference to this picture

"MORE ABOUT THE 'HOME-LOVER'S ALL-ELECTRIC 3'" (Continued from preceding page)

control on this set to adjust your aerial to the best, working compromise between volume and selectivity.

You may take it that, with two tuned circuits tapped in the way shown by the circuit diagram (page 496), there is a good measure of selectivity available. This can be turned into "special" selectivity to suit special conditions, such as the reception of Muhlacker in London, while the London Regional is working. The test reports certainly show you what can

be done with a little patience—and a knowledge of the particular function of the several controls on the front of the set.

To assist you to understand the instructions now to be given on operating, we have prepared a special lettered photograph of the controls, to which you are referred.

The Controls

Altogether there are seven controls. Too many? No! Every control is pulling its weight. The omission of any one of the controls on the "Home Lover's" set would, without question, detract from either the efficiency of operation, or from the convenience of control, or from both.

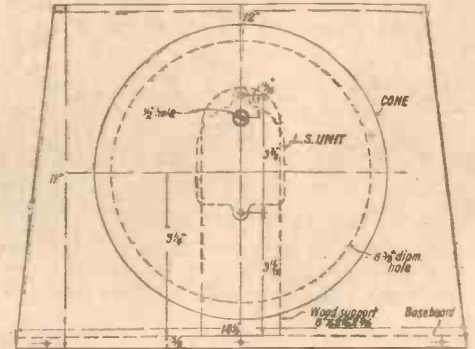
Take the main controls first; the two large dials at the top left and right for tuning. True, these controls could have been ganged, but only at greater expense and complication of the layout. And remember, these two dials keep "in step" over the greater part of the tuning range.

Tuning

This means that if you find London Regional coming in at, say, 40 degrees on the right-hand tuning dial, it is long odds that the setting for the left-hand dial will be between 40 and 45 degrees. There is bound to be some variation on the aerial-tuning (left-hand) dial, owing to the capacity effect of the aerial system varying over the wavelength range.

As Mr. Percy Harris noticed in his test, the dials "track well"—which means you will find tuning a delightfully simple process. If you should be in doubt about the accuracy of the dial settings, particularly on a distant station, use the reaction as a check.

Reaction is controlled by the knob coming between the two tuning dials. As the reaction requirement is least when the two circuits are in tune you can readily use reaction to get the two circuits



This diagram gives the principal dimensions of the speaker cone and baffle

into tune. Increase reaction to about half way, and then, when the two circuits are in tune oscillation will be produced.

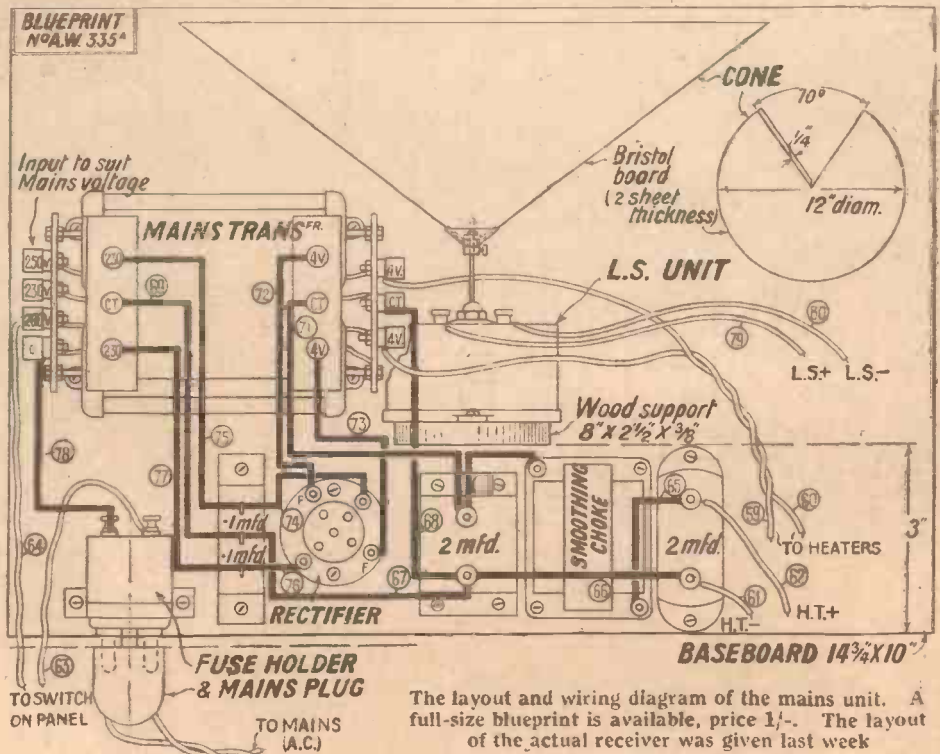
Actually, there are so many "signposts" of the ether these days, such as our regionals and some of the foreigners, like Langenberg, Rome, Beromunster and Huizen, that there will never be much doubt about the accuracy of the tuning.

Selectivity

For most of the powerful foreigners very little reaction will be needed—so far as signal strength is concerned. But in the interests of selectivity you may need to reduce the setting of the aerial-coupling condenser—which is the knob on the extreme left of the set—and this will

THE COMPONENTS FOR "THE ALL-ELECTRIC 3"

- Three-ply panel, 14 in. by 7 in. (Peto-Scott, Camco, Clarion).
- Baseboard, 14 in. by 10 in. (Peto-Scott, Camco, Clarion).
- Sheet of aluminium foil, 14 in. by 19 in. (Peto-Scott, Readi-Rad).
- Two .0005-mfd. variable condensers (Polar "No. 4," Lissen, Lotus, Telsen, Dubilier, Utility).
- Two 3-in. dials (Polar).
- .0003-mfd. reaction condenser (Polar "Camipax," Lissen, Lotus, Readi-Rad, Telsen, Ormond).
- .0003-mfd. variable series aerial condenser (Telsen, Polar, Lotus, Lissen, Readi-Rad, Formo, Ormond).
- Two screened dual-range tuning coils (Lissen).
- Combined three-point shorting switch and 25,000-ohm variable resistance (Wearite).
- Gramo-radio change-over switch (Readi-Rad, Lissen, Bulglin).
- Single-pole toggle switch (Bulglin, Igranic, Claude Lyons).
- Four-pin valve holder (Telsen, Lissen, Lotus, Benjamin, Wearite, Clix, Bulglin, Junit).
- Two five-pin valve holders (Telsen, Lissen, Lotus, Benjamin, Wearite, Clix, Bulglin, Junit).
- Horizontal mounting valve holder (Lissen, W.B., Junit).
- Two 1-mfd. fixed condensers (Lissen, T.C.C., Dubilier, Formo).
- .2-mfd. fixed condenser (Lissen, Telsen, T.C.C., Dubilier).
- Two .1-mfd. fixed condensers (Telsen, Lissen, T.C.C., Dubilier, Igranic).
- Two .0001, one .0002, and one .001-mfd. fixed condensers (Telsen, Lissen, T.C.C., Dubilier, Graham-Farish, Sovereign, Ormond, Formo).
- 2-mfd. fixed condenser, 400-volt D.C. working (Formo, Ferranti, Dubilier, T.C.C.).
- 2-mfd. fixed condenser (Lissen, Telsen, T.C.C., Dubilier, Formo, Ferranti).
- 2-mfd. centre-tapped fixed condenser, 1,000 volt, A.C. test (Dubilier, type BE31L).
- 1-megohm grid leak (Telsen, Lissen, Dubilier, Sovereign, Graham-Farish).
- Grid-leak holder (Readi-Rad, Lissen, Telsen, Bulglin).
- High-frequency choke (Telsen, Lissen, Lotus, Lewcos, R.I., Climax, Varley, Readi-Rad, Wearite, Igranic, Atlas, Watmel).
- High-frequency choke (Lissen, Telsen, Lotus, Lewcos, R.I., Climax, Varley, Readi-Rad, Wearite, Igranic, Atlas, Watmel).
- Four spaghetti resistances, values 50,000, 40,000, 20,000, and 1,000 ohms (Lissen, Telsen, Lewcos, Varley, Sovereign, Graham-Farish, Tunewell, Igranic).
- One 750-ohm spaghetti resistance (Lewcos, Telsen, Varley, Sovereign, Graham-Farish, Tunewell).
- Partition screen, 10 in. by 6 in. with hole for S.G. valve (Peto-Scott, Readi-Rad, Parex).
- Low-frequency transformer (Lissen "Torex," Telsen, Lotus, R.I., Ferranti, Lotus, Lewcos, Varley, Igranic).
- Mains transformer, with the following secondary windings: 230-0-230 volts, 2-0-2 volts 1 amp., 2-0-2 volts 4 amps. (Hayberd, Atlas, Junit, R.I.).
- Smoothing choke (R.I. "Dux Audirad," Lissen, Ferranti, Lotus, Atlas, Lewcos, Varley, Igranic).
- Six terminals, marked Aerial, Earth, Pick-up (2), L.S.—, L.S.+ (Belling-Lee, Clix, Elex).
- Combined mains plug and fuse (Bulglin).
- Terminal strip, 7 in. by 2 in. (Becol, Peto-Scott).
- Two yards thin flex (Lewcosflex).
- One foot single shielded flex (Lewcos).
- Connecting wire and sleeving (Lewcos).
- Cabinet, with chassis for loud-speaker and mains unit (Peto-Scott).
- Loud-speaker unit (Lissen four-pole balanced armature, Telsen, Blue Spot, Ormond, Brown).
- Piece of cone paper (thin Bristol board from any art shop).



The layout and wiring diagram of the mains unit. A full-size blueprint is available, price 1/-. The layout of the actual receiver was given last week

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With this beautiful cabinet you can convert your present set to a Radio-gram of the most modern and artistic design. This cabinet is of highly polished walnut with lift up lid, automatic support and a needle cup. Overall size 3 ft. 3 in. x 22 in. x 17 in. Suitable for any receiver having a panel not exceeding 12 in. x 7 in. and a baseboard 16 in. x 10 in.

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THE HON. SEC. OF C. AND G. COLLEGE RADIO SOCIETY TESTS "THE HOME-LOVER'S ALL-ELECTRIC 3"

I HAVE no hesitation whatever in stating that this receiver is, from all points of view, outstandingly good. Having been told in advance of its extremely low cost, a good average performance was expected, but from the outset of the tests it was obvious that results were far superior to those given by three-valve A.C. receivers costing double the amount.

Preliminary trials were carried out in Southend at Sunday lunch time, five stations being well received on the long-wave band, including Radio Paris, Huizen, and Eiffel Tower; tuning through the whole range with the receiver oscillating showed these to be the only stations working. On the medium-wave band, five stations were again received, all at fair loud-speaker strength, Hilversum being especially good. Incidentally, the receiver passed what I consider to be the conclusive test of a "distance-getter" with flying colours, namely, daylight reception at good loud-speaker strength of Langenberg in my own district (some thirty-five miles east of London), on a very moderate aerial.

Between 6.15 and 7 p.m., a rather more extended trial was made. First on the long waves, nine stations were found to be working, and of these eight were received at good loud-speaker strength, one or two—

Radio Paris in particular—needing drastic use of the volume control.

On the medium waveband, forty-one stations were received in little over half an hour, most of them being really worth while from the point of view of signal strength; a very good "bag" indeed, in view of known local conditions and the early hour. Outstandingly good stations were Gleiwitz, Wilno, Leipzig, Turin (received with but a trace of Heilsberg), Heilsberg, Hilversum, Brussels No. 2, Strasbourg, Graz, Mühlacker, Hamburg, Radio Paris, Söttens, Rome, Beromuenster, Langenberg, and Prague. Sensitivity proved to be well maintained right to the top end of the band.

Mühlacker and London

While nearly all tests had been carried out with the selectivity control half in, some additional check of selectivity was made later in the evening when the British stations were working, making full use of this control. No trouble was experienced on London National from Leipzig, while with care North National could be received clear of the far louder Hilversum transmission. Midland Regional and North Regional were also received practically clear of interference, and as a crowning feat, Mühlacker was tuned in with London

Regional working, the latter causing very little interference.

Altogether during the evening, of which only part was spent in searching, forty-nine stations were logged on the medium-wave band, including five British stations and two Spanish heard during a last twirl of the knobs late at night. On the long waves, eight stations were logged.

Throughout, control was found to be extremely easy and pleasant, while the smoothness of rotation of all control knobs gave a plain hint of the care taken in choice of components. Reaction control was unusually smooth, while the volume control (used very extensively, in spite of the modest number of valves) gave even variation from zero to maximum without introduction of change of tuning or instability.

To sum up, the receiver is thoroughly sound technically. In spite of the unusually low cost, not only has nothing essential been omitted, but the most modern developments have been effectively incorporated. Complete freedom from hum and good quality, extreme selectivity, and unusually good distance getting properties with easy control, are all outstanding features.

G. P. BRITTON, A.C.G.I., B.Sc. (Eng.).
(Hon. Sec. C. & G. (Eng.) College Radio Society).

CONTROLLING AT THE N.B.C.



American control-room practice differs from ours and here engineers are seen at one of the switchboards in the National Broadcasting Company's main control room in Fifth Avenue

"MORE ABOUT THE HOME-LOVER'S ALL-ELECTRIC THREE"

(Continued from page 498)

reduce signal strength. It can be made good with the reaction, which works very smoothly.

One of the most useful controls on the set has not been mentioned yet—the volume control, worked by the knob just a little to the right of the aerial-coupling control. As mentioned last week volume and wave-changing have been combined in a dual control. This is simple enough, for a coupler provides a mechanical link for the push-pull coil switch and variable resistance, while keeping these two components electrically insulated.

You have to pull out this knob for medium waves, thus shorting the long-wave portion of both tuning coils, and push in for long waves, thus bringing the long-wave windings in series with the medium-wave windings. The wavelength position of this switch is immaterial to the working of the variable resistance giving the volume control.

You will very quickly find that the maximum strength is obtained when the volume-cum-wave

change knob is turned to the fullest extent.

A full list of suitable valves is given below. The valves used in testing the set were Marconi and Osram V.M.S.4, Mullard 354V, 104V and D.W.2. The biasing resistances in the set are designed for these valves and many need altering if valves with different characteristics are used.

If you use a pick-up—and few sets so far described are more suitable for this fitting—remember that an external volume control will be needed, unless the output of the pick-up is known to be very small.

VALVES TO USE

Make	Variable-mu	Detector	Power	Rectifier
Mullard	MM4V	354V	104V	DW2
Marconi Osram	VMS4	MHL4	ML4	U10
Cossor	MVSG	41MHL	41MP	506BU
Six-Sixty	4MMAC	4GPAC	4PAC	W432
Mazda	—	ACHL	AGP	UU30/250
Triotron	—	AN4	YN4	GA24
Tungsram	—	ARA100	—	PV475
Lissen	—	ACHL	—	UT44

Tests have been made with the H.M.V. playing desk, which consists of an electric motor, pick-up and volume control. With this the "Home Lover's" set has reproduced records with admirable realism.

This set does, in fact, form a very satisfactory nucleus for a radio-gramophone. So look out for early details of the "Home-lover's All-electric Radio-gramophone"—it will be worth waiting for.

Exclusively Specified for the Home Lovers 3

NEW

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DUAL RANGE SHIELDED COIL

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"The newest thing in Shielded Coils"—the last word in dual-range coil efficiency—the coil chosen by "Amateur Wireless" for their star all-electric set, the "Home-Lover's 3"—the new Lissen Dual Range Shielded Coil.

Lissen have embodied all the specialised experience of the Lissen laboratories in the new Lissen Shielded Coil—the high efficiency, the low screen losses, the even reaction over both wave bands, exact matching, absence of inductance variations owing to temperature, humidity or tune—all these points have been observed as Lissen have learnt to observe them in making commercial receivers. The result is a coil setting an entirely new standard of efficiency for home constructors—a coil which will be made the basis for many fine set designs in the future—a coil which is so universally useful that every constructor must have it.

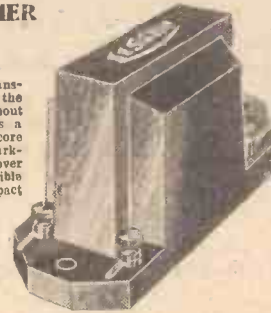
No longer is it necessary to buy new coils for every new set you build. Here are coils which you can use as aerial tuning coils, as tuned anode coils, as tuned grid coils—they are all laboratory matched if you want to use them for band-pass tuning. The selectivity is of the very highest order and "break through" on the long-wave band has been almost entirely eliminated. Shielding is particularly complete with shielding cover and shielding disc supplied. Full diagrams are enclosed with every coil, together with instructions for the use of the new coil in many different ways.
PRICE, COMPLETE WITH SHIELD, each 6/6



Also Specified for Home Lovers 3

LISSEN TOREX TRANSFORMER

This Lissen Torex Transformer makes a big cut in the cost of any set without sacrifice of quality. It is a high-grade silicon steel core transformer, giving remarkably even amplification over the whole band of audible frequencies. A neat, compact component; its moulded bakelite case is hermetically sealed and completely insulates the windings. Proof against shorting, leakage, or moisture. **PRICE 5/6**



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A disc-type H.F. Choke of outstanding merit in very compact form. Will operate perfectly in any capacity reaction circuit wherever an H.F. choke is specified. Suitable for both long and medium wavelengths. Will give perfect results in receivers employing dual-wave coils. **PRICE 2/-**



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THE HOW AND WHY OF TUNING—XXV

WHY MODERN TUNING CIRCUITS ARE SHIELDED

"Hotspot," in this his twenty-fifth article of a comprehensive series on tuning, explains in simple language the reasons for employing shielding arrangements in modern receivers

NO account of the "how and why" of tuning would be complete without some reference to shielding, because in all but the very simplest of tuning circuits, shielding, either complete or partial, is now universally practised by radio set designers.

So let us discuss this question of shielding. We are, fortunately, at a stage in the series where a broad view can be taken of shielding, for we have now dealt with both kinds of tuning circuits—*aerial tuning* and *intervalve tuning*.

Shielding must be considered, though not necessarily adopted, whenever there is more than one tuning circuit. For as readers must already know, a coil, and for

amplification. It is to prevent these troubles that shielding is introduced.

What we shield is the magnetic field of one coil from another. That is the main function of shielding, but it also helps in other directions.

Let us get clear about the "mechanics" of shielding. A shield may consist of almost any material that is a good conductor of electricity. Shields are usually made of copper, aluminium, or brass sheet. You might at first think that an insulating material would be better stuff for shielding, but that thought is quickly abandoned when you know what a shield actually does.

Well, what does it do? The answer is

this: the shield, when placed in an electric field, as near a coil, prevents the further progress of the lines of force emanating from the coil.

The shield does this by using up the energy of the lines of force in the creation of minute electric currents within itself. These are known as eddy currents, and they represent the energy dissipated in the shield by the lines of force of the electric field impinging upon it.

As the shield is earthed, these eddy currents go straight to earth, and so the shield acts as a drain for unwanted couplings. Right now you should appreciate that shielding involves *loss of energy*, for the simple reason that the only way to prevent the lines of force making unwanted couplings with near-by apparatus is to convert the lines of force into eddy currents—and the eddy currents comprise so much wasted energy.

Effective Shielding

If the shield does not produce eddy currents it cannot be acting as an efficient shield. And as soon as it does produce eddy currents it is wasting energy!

What we have to decide in considering the application of shielding to the tuning circuits of the set is how far shielding will improve stability and selectivity. If shielding will not appreciably improve either, the inevitable losses arising from its application are obviously not justified.

Because of this, simple sets with, say, one stage of high-frequency amplification, with the amplifier valve coming between two tuning circuits whose fields it is desired to keep separate, often as not employ partial screening, which has the effect of keeping the set stable without

greatly diminishing the overall high-frequency amplification.

Such an application of the principle of shielding is shown by the accompanying pictorial diagram. Here the need is to shield the two tuning coils and condensers from each other, so that the coupling between the anode tuning and the grid or aerial tuning is reduced to a minimum, to ensure that "feed-back" and instability generally are prevented.

The first step is to arrange the screen-grid valve in a horizontal position, so that the screen internally fitted between its grid and anode can be continued externally, thus making a complete shield between the grid circuit and the anode circuit.

Practical Arrangements

Such a shield can readily be made with a vertical sheet of aluminium or copper, which need not be more than .01-inch thick. A hole should be cut in this shield, so that the screen-grid valve can be slipped into it, care being taken that the external shield is in line with the internal screening grid or shield.

Another point—see that the bulb of the valve completely clears the shield, for if it is a metal-coated A.C.-mains valve it is essential that this metal coating should be kept out of contact with the earthed metal shield. The rest of the shielding consists of a layer of good-quality tin-foil, or better still, copper foil, tacked to the baseboard, and the thicker the better. Usually there is no need to provide any further screening between the tuning circuits.

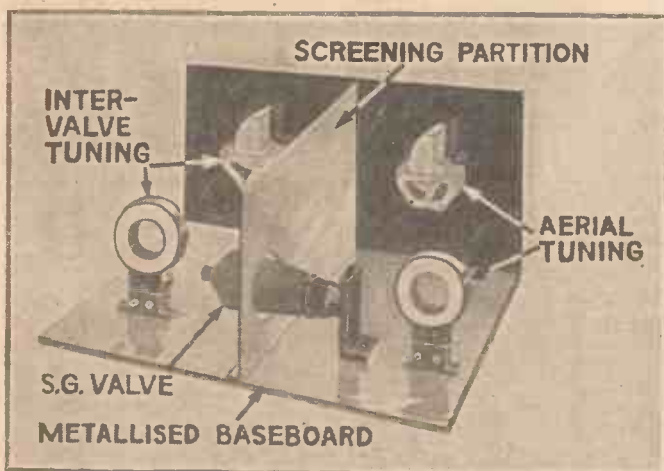
Of course, such shielding is not complete, and in the arrangement shown there would undoubtedly be some interaction. But it would not be enough to cause instability. In fact, some designers count on a certain amount of interaction to make the set "lively."

An advantage of the baseboard screen, in addition to its main object of absorbing stray electric fields, is that component terminals that go to earth can often be made much shorter, by taking a lead from the terminal to the near-by earthed screen.

The relative positions of the tuning coils have a considerable bearing on the question of interaction, particularly if the coils are fairly close together. In general, it is the practice to mount the coils so that their axes are at right angles. But this rule does not necessarily apply when shielding is introduced. In fact, it is quite possible for two coils so placed for minimum coupling to interact solely on account of the interposition of a shield!

What happens is that the electric fields are displaced by the intervening screen, and the new paths taken by the stray lines of force may easily act as links between the two circuits, thus setting up coupling that the shield was intended to remove.

(Continued on page 504)



Simple screening used to shield two tuning circuits from each other

that matter a tuning condenser also, has what is called an electric field around it whenever a wireless signal is being handled. This electric field consists of lines of force.

Fields of Force

It so happens that the higher the frequency of the current flowing through the coil the greater is the field of force, and the greater the sphere of influence of the field on near-by objects. Every part of the wireless set carrying a wireless signal must create a field of force, and often this is quite considerable, since the signal is an oscillation of very high frequency.

Sometimes this effect is utilised to link together two coils, and when the lines of force of one coil cut the turns of another coil, as explained last week, these coils are said to be coupled. Energy flowing in one coil will then be transferred to the other.

This coupling is, of course, an advantage when using a coupled tuning circuit, where two tuning systems are linked together, as in some form of band-pass tuning, and in loose-coupled aerial-tuning circuits.

But there are many other conditions where coupling of any sort will destroy the selectivity of the set, and will often cause great instability in the high-frequency

All the VOLUME you want from 2 and 3 valve sets!



THE LIVELY DETECTOR

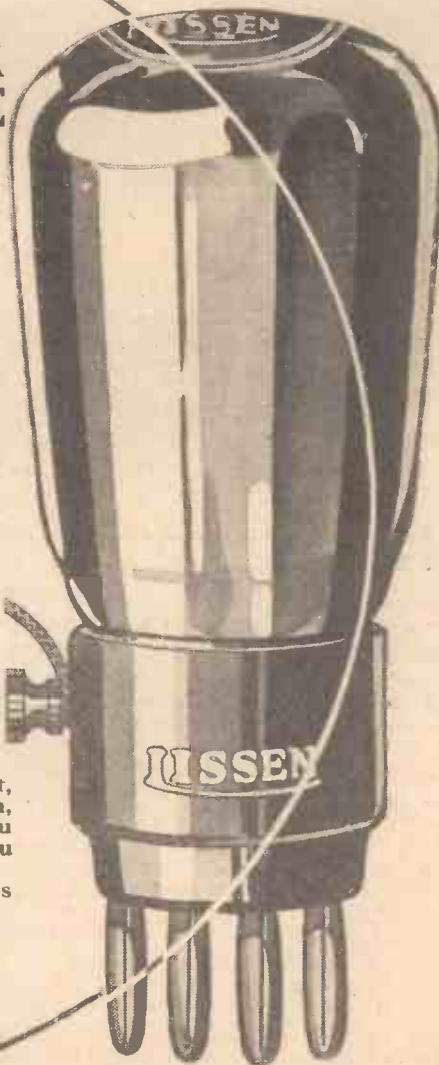
The Lissen Detector Valve—H.L. 210—liven up your tuning, gives you extra range, greater sensitivity. It is so responsive that it brings the foreign stations in like magic. Not only this, but it passes a crisper, more powerful signal on to the L.F. stage of your receiver, and you get louder, clearer radio altogether.

Ask for Lissen H.L. 210. Price ... **5'6**

THE POWER PENTODE

The Lissen Power Pentode Valve—P.T. 225—converts any set with one stage of L.F. amplification into a fine, full-volume "Pentode-output" receiver. This valve puts new power into your loud-speaker, and new brilliance of tone, too. Use it instead of a power valve and at once you get an amazing step-up in volume. Where before you got a whisper, now you get a torrent of pure sound. And it takes no more current than the power valve it replaces—its H.T. consumption is only 7 m.A.

Ask for Lissen P.T. 225. Price ... **12'6**



Put these two valves into any two-valve set, or any set with one stage of L.F. amplification, and you will be amazed at the results you get, the mighty loud-speaker volume you enjoy, the distance-searching you can do. Ask for Lissen Valves and insist that no others will do.

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Four- and six-volt types also available



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

New Ferranti Transformer

FERRANTI low-frequency transformers are amongst the best known on the market, and it was thus with considerable interest that we received for test one of the new AF10 models. This transformer has been designed with the idea of producing a component at a popular price figure, having at the same time a good performance characteristic.

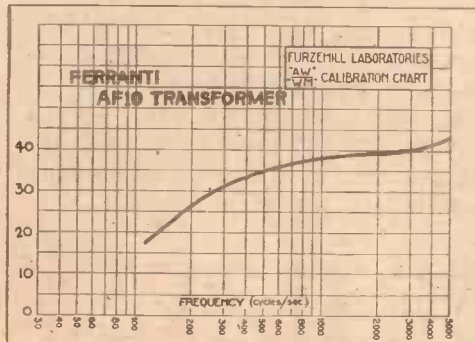


A low-priced Ferranti transformer—the new AF10

The transformer is housed in a moulded bakelite casing shaped to the windings and core, and extended at the bottom to form a base for the terminals. The windings are located side by side on the central arm of the laminated core.

The transformer was tested by wiring it in to a normal amplifying circuit and measuring the overall amplification obtained. The valve employed was an L210 type, the steady anode current being 2 milliamperes. The amplification factor of the valve was 15.6.

The results obtained are reproduced on the curve accompanying this report. It will be seen that the amplification rises



Characteristic curve of the Ferranti AF10

rapidly up to 256 cycles and more slowly up to 4,000 cycles. This rising characteristic is interesting, and enables some

degree of tone correction to be obtained, thus automatically compensating for the attenuation of the higher audio frequencies brought about in the tuning circuits of the receiver. The inductance of the primary winding of the transformer was approximately 34 henries with no direct current, and 20 henries with 5 milliamperes direct current. These last figures were obtained with .25 milliamperes A.C. superimposed on the direct current.

The transformer retails at 5/6, which is very good value; it can be recommended.

Leclanché-type H.T. Battery

THERE are still a great number of people who are unfortunate enough to be without an electric supply to their houses, and who have no great prospect of obtaining such in the near future. The problem of adequate high-tension supply to their receivers is a very real one, especially if the current demand is high.

We received for test some time ago a sample cell of a wet Leclanché-type high-tension battery, manufactured by Scottish

discharge test was applied, the initial discharge current being 21 milliamperes. The internal resistance of the cell was also measured at various points in the discharge period. The results are plotted on the accompanying curve, and it will be seen that the voltage falls slowly over the whole discharge period. The internal resistance, however, is very low for the first two hundred hours, then rising sharply for a further period of about a hundred hours, after which it increases much more slowly. Even at this higher value the resistance is not excessive and should cause no trouble in actual use. The initial voltage of the cell, as can be seen from the accompanying curve, was approximately 1½ volts, so that an initial batch of a hundred cells would give approximately 150 volts, which would still be giving in the neighbourhood of 80 volts at the end of 500 hours life—a very good performance.

"WHY MODERN TUNING CIRCUITS ARE SHIELDED"

(Continued from page 502)

A small shield is almost useless, and even with coils having restricted fields, the screening partition of an arrangement such as that shown by Fig. 1 needs to be as large as the baseboard is wide, and as the panel is high.

As mentioned, the best material for a shield is a good conductor of electricity, and the best is copper. As this is rather expensive, aluminium is usually used, and this has a sufficiently low resistance to enable the maximum eddy currents to be set up, so providing the maximum shielding effect.

When we come to more elaborate sets, using two or more stages of high-frequency amplification, or sets with band-pass aerial tuning involving screen coils and an external link coil and capacity coupling, the partial shielding of the arrangement shown is not enough.

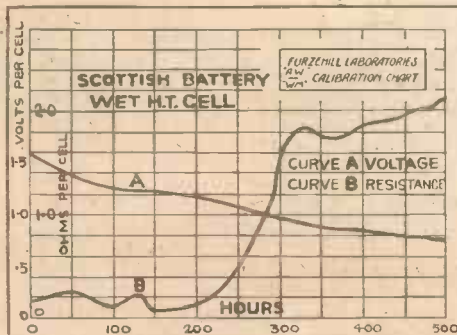
We then have to resort to complete inter-stage shielding, and this I will deal with in next week's article.

HOTSPOT.

Evelyn Gibb and James Johnston are the soloists in a programme of comedy and light opera which will be broadcast from Belfast on March 8.

An orchestral concert in co-operation with the Belfast City Y.M.C.A., will be relayed from the Wellington Hall, Belfast, on March 12.

A programme of Japanese music, "From the Land of the Cherry Blossom," will be given by the Western Studio Orchestra on March 15.



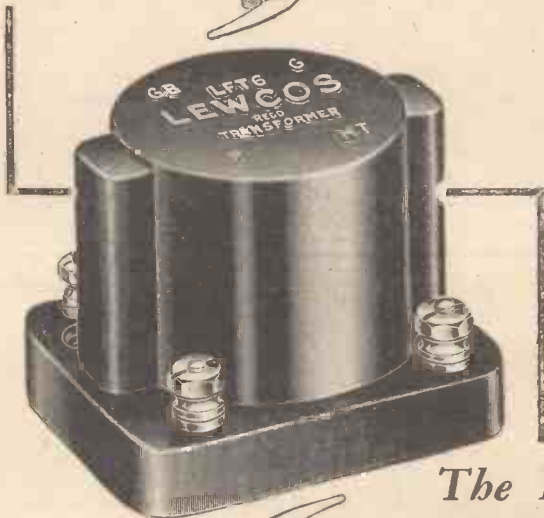
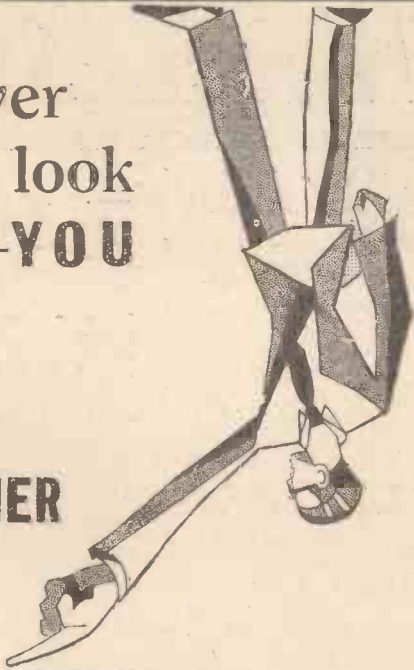
Discharge curve of a Leclanché-type H.T. cell by Scottish Batteries

Batteries, of Braeside, Uphill Station, West Lothian. This type of battery is apt to be bulky as a comparatively large cell is used as the unit, but the capacity is correspondingly high, and it offers a solution to the problem of high-tension supply which is well worth consideration.

The cell consists of glass containers measuring 2 in. square by 4½ in. high, into which is placed the electrode system and the electrolyte. This system is in two main parts, the centre or rack containing the positive electrode and depolarising agents, and around this a sheet of zinc. The electrolyte is prevented from creeping by a cork and a layer of hard grease around the top of the container.

The particular cell tested is known as the Standard No. 4, and we found it very satisfactory in practice. An intermittent

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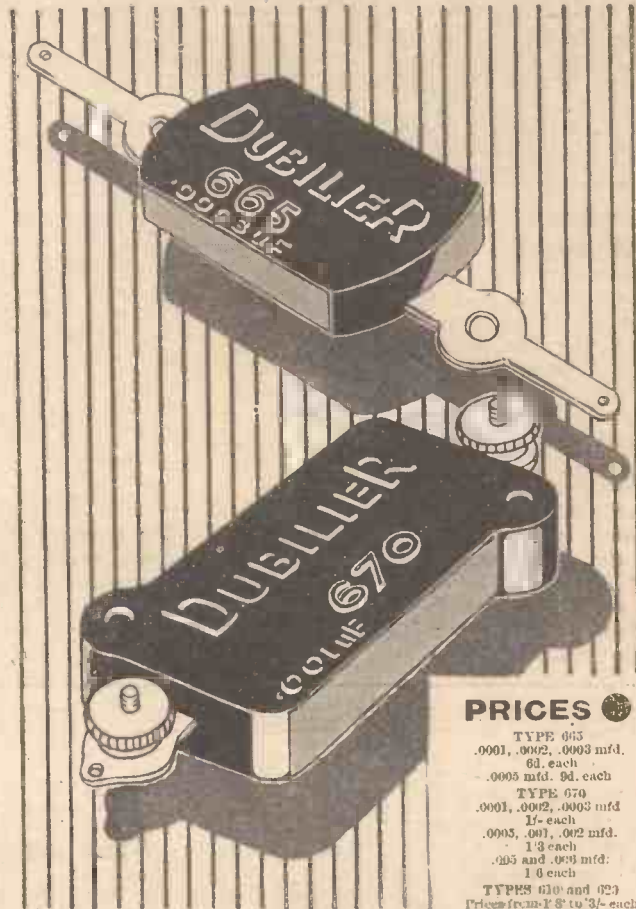
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IN MY WIRELESS DEN

Weekly Hints—**THEORETICAL**
CONSTRUCTIONAL & **BY**
W. JAMES

About Oscillation

THE results to be obtained from some sets depends considerably upon the reaction circuit. This, by the way, is true of many sets having a screen-grid stage.

It is, therefore, necessary to arrange the reaction circuit in order that the reaction shall be as smooth as possible. For the best results the circuit must be capable of oscillating very gently and it is essential that there shall be no back lash. That is, the circuit must just stop oscillating, when reducing the reaction, with the control in the exact position where the circuit was just about to oscillate when increasing reaction.

If the valve is poorly adjusted and the reaction circuit is not just right, good results will not be obtained. A bakelite

dielectric reaction condenser is not always satisfactory.

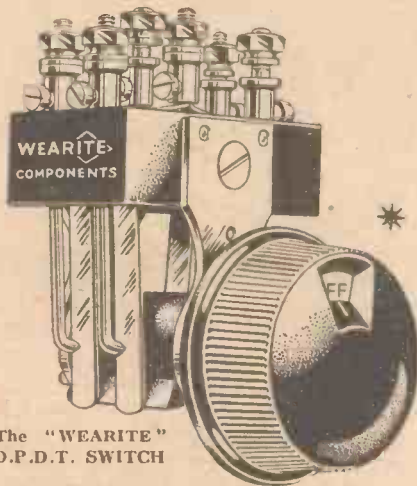
Sometimes the grid leak must be taken from the grid to a point upon a potentiometer joined across the filament battery. A lot of time can be spent in making the reaction circuit right and the improvement in the results is worth having, for it is certain that a station may be heard well with a set having good reaction and hardly at all when the reaction circuit is poor.

H.T. Eliminator Output

The output voltage of some mains units varies considerably with the current. As a consequence, the voltage from a tapping intended, for example, to be taken to a screen-grid valve may be much higher than the normal value.

In a particular case I noticed that the voltage of the screen-grid tap was about 65 when the eliminator was giving a total of 25 milliamperes and the output voltage of the power tapping was 120, being just right. When the total current was only 15 milliamperes, however, the voltages were much higher, being 85 for the screen-grid circuit. The result is that some sets would be unstable.

In mains units having fixed tapings the user must arrange for the voltages to be brought down if necessary. Usually a bigger power valve will have the desired effect of increasing the load and reducing the pressure, but if this is not a desirable change a resistance can be connected between the power output tap and the negative.



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CLICK!

YOU HEAR—FEEL and KNOW that contact has been made—good and hard

THERE is nothing half-hearted about these "Wearite" Switches—positive contact every time—clean make and break. That is because each type is a thoroughly scientific job—designed and built by switch specialists of unequalled experience. And that is why leading set designers and makers always specify "Wearite." Whatever the switching problem there is a "Wearite" Switch to do the job—and do it perfectly.

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These switches are now fitted with terminals and are complete with window knob, dial and bracket—and are "one-hole" fixing.

No.	Way	Price	No.	Way	Price
No. I.21	1-way D.P.D.T.	3/3	No. I.24	4-way D.P.D.T.	4/6
No. I.22	2 " "	3/6	No. I.25	5 " "	5/3
No. I.23	3 " "	4/-	No. I.26	6 " "	6/3

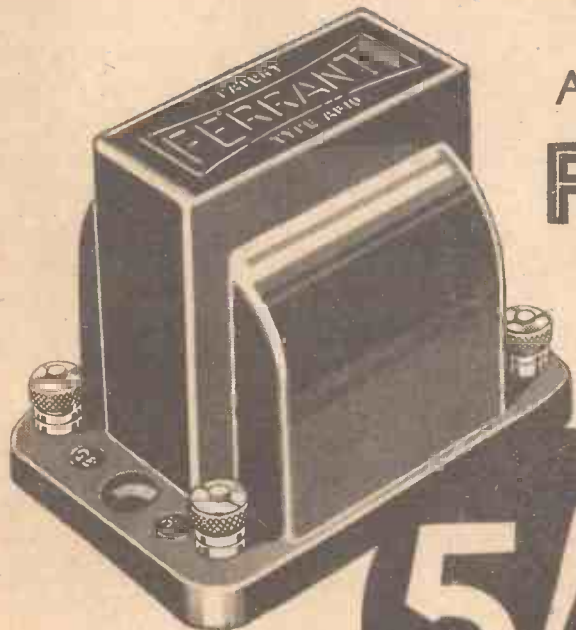
The following indicating discs are available—either black lettering on white, or white lettering on black. "Rad-off-Gram," "L-off-S," "Off-On," and also blank white for own marking.

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You can be certain it's good if it's Ferranti, because Ferranti would not run the risk of damaging their great reputation by releasing a product that is not as good as it can be made for the money.

The new AF10 is NOT the AF5, but it bids fair to dominate the low-price class just as the AF5 dominates the quality class.

**THE NEW AF10
TRANSFORMER
RATIO 1:3**



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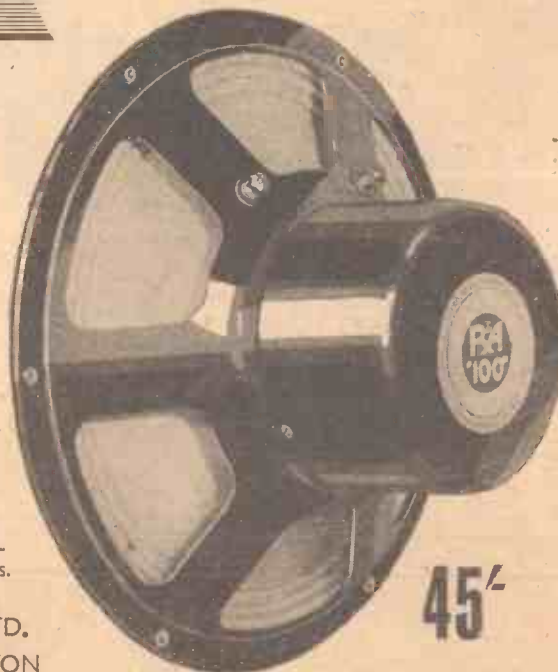
Why Reproducer?

The designers of R. & A. Reproducers might have used the customary phrase and styled their products "loud speakers"—they elected, however, to designate them "Reproducers."

Any radio apparatus designed to convert electrical impulses into air vibrations of sufficient intensity to produce a volume of sound can claim to be termed a "loud speaker."

A "loud speaker" is not necessarily a Reproducer in the true sense of the word. On the other hand, a Reproducer is essentially more than a "loud speaker." Its function is to faithfully reproduce the original performance, be it speech or music. If it does so, it fulfils its purpose and worthily justifies its existence.

The R. & A. "100" is a Permanent Magnet Moving Coil Reproducer which, given an undistorted input, reproduces speech and music with purity and truth. A Leaflet fully describing it will gladly be sent post free on request. All worthwhile Radio dealers can supply R. & A. Reproducers.



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THE WORLD AT YOUR ELBOW

Some further notes on short-wave reception

By JAY COOTE

BEFORE we explore the short-wave band below, say, 40 metres, there are two transmissions which you must do your utmost to log at the first opportunity. If you take your reading of Eindhoven (Holland), relaying the Hilversum programme, in its immediate vicinity you should search for a broadcast from Kenya Colony on 49.5 metres. The call, of course, is in English: "This is 7LO, the Nairobi station of the East African Broadcasting Company." Between 4.30 and 7 p.m. daily is the time you should choose, as at 7.30 p.m., as a rule, the station closes down with a cheery "Good night, everybody" and plays "God save the King." On some days you may find Nairobi carrying out a relay of the London programmes through G5SW, and occasionally special transmissions are made at 8 a.m. on Tuesdays or at 1 p.m. Thursdays; they are not a regular feature.

Whether you will tune in ZTJ (Johannesburg) on 49.4 metres between 3.30 and 8.30 p.m. is a moot point, but it would be wise to make a note of its likely position on your condenser scale. In any case, on almost any night you should succeed in getting good reception of W3XAL, a 12-kilowatt relay on 49.18 metres of the WJZ (Boundbrook), WEAFF (New York), and other studios in the N.B.C. network. Try at any time between 6.30 and 11.45

p.m. or between 4 and 6 a.m. (Fridays excepted) or, again, on Sundays between 1 and 7.30 p.m. At present the best period is between 9.30 and 11 p.m. G.M.T.; at a later hour the transmission suffers from fading effects. The interval signal consists of three notes (similar to those struck on a xylophone) and may be compared in style, but *not in tone*, to that of Mühlacker (Stuttgart). Bear in mind that if a call including the letter Z is given, such as WBZ, WJZ, or WBZA, the letter will be pronounced *Zee*.

Chelmsford

May I take it that you have already picked up G5SW (Chelmsford) on 25.53 metres, an easily recognisable station, as it relays the London National or Regional programmes every week-day from 12.20 to 1.30 p.m. and from 6.45 p.m. until midnight? If so, we have here a valuable landmark for more distant transmissions. Just above you may seek tests on 25.6 metres which are taking place on most nights between Caracas, Venezuela, and Nauen (Germany), and immediately below Chelmsford, on 25.5 metres, XDA (Chapultepec, Mexico), transmitting in English and Spanish between 8 and 9.30 p.m., and on some nights to a later hour. Within a hair's breadth of this reading (on 25.465 metres) on Fridays between

3.30 and 4 p.m. you should pick up the experimental channel of Chi-Hoa (Saigon); on other days the regular transmissions from Indo-China are made on 49.05 metres, to which I have already referred. Prato Smeraldo (2RO) on 25.40 metres is not on the air every night, but fairly regularly on Saturdays and Sundays, when a relay of an operatic performance is taken from Rome or Naples. It is a powerful station, and its call should be noted: "Eh-Yah, Radio Roma-Napoli."

Still descending the scale, we should strike, on 25.24 metres, W9XAA, acting as agent to WCFL (Chicago), 309 metres, another station in the N.B.C. network, and from which we may hear the WEAFF (New York) call. Then a slight movement of the dial on favourable nights will tune in W8XK on 25.24 metres, taking the KDKA (East Pittsburgh) broadcasts, also linked up with WJZ (Boundbrook). This transmitter is in action from 5 p.m. until 3 a.m.

In the immediate neighbourhood—namely, 25.20 metres—during the afternoon (4.30 to 7.30 p.m.) you cannot fail to secure a French call: "Ici Poste Coloniale." It is the Pontoise transmitter on the French P.T.T. State network, and of which the main studio is situated in Paris. I should add that the station works on three distinct wavelengths—namely, 19.68; 25.20, and 25.63 metres—at different times of the day. From 1 to 4 p.m. the lowest channel is used; from 4.30 to 7.30 p.m. on 25.20 metres, as stated above, and from 9 p.m. until midnight, and even sometimes later, on 25.63 metres.

(Continued on page 510)

AUTOKOIL

ALL-WAVE TUNER — Specified for the

"TEN STATION TWO"

An inexpensive yet highly efficient receiver with an exceptionally wide range of tuning.

This is the result of incorporating the "Autokoil."



Wireless World illustration shows "Autokoil" all-wave tuner with variable reaction coil and live-way selector switch, complete for 12/6.

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.002 fixed condenser, Dubilier	2 0
2-meg. grid leak, Dubilier	1 9
G.B. battery clip	6
Two terminal blocks, Sovereign	1 4
Four terminals, marked, Belling-Lee	1 0
Five wander plugs, marked, Belling-Lee	10
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PAPER, mica, foil, cases . . . all O.K.! then for assembly. Operation one . . . TEST! Operation two . . . TEST! operation three . . . TEST! and so on. That is how T.C.C. condensers are built, checked stage-by-stage until the final test for capacity, insulation and mechanical strength proves them worthy of the T.C.C. reputation.

That is why you can be sure of that T.C.C. .0003 mfd. grid condenser being accurate, and free from those defects which produce those mysterious "cracklings"—And that T.C.C. 4 mfd. 800 v.D.C. Test, you are sure it will stand up to its specified test and working voltages. The T.C.C. reputation is your assurance.

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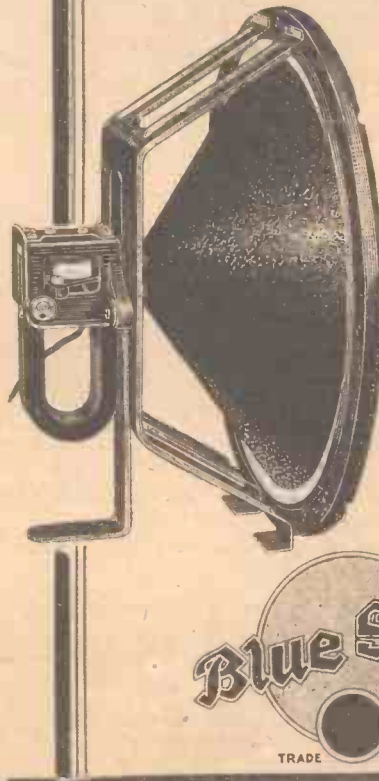
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Hutcheonad

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

"THE WORLD AT YOUR ELBOW"
(Continued from page 508)

On 25 metres you will receive a powerful harmonic of Moscow (Trades Unions), which is useful for the purpose of calibration, as frequently between 4 and 6 p.m. on 25.16 metres the call "Moskva Imeni Popova" will be picked up; it is the relay of the Moscow Popoff station. Immediately below, on 24.69 metres, you may hear—possibly distorted or jumbled—transatlantic telephony, namely, GBS (Rugby), working with its opposite number, WND (Ocean Township, N.J.), and on 24.41 metres, GBU (Rugby) in telephonic communication with WMI (Deal Beach, N.J.). Slightly below this channel, on 24 metres, you should also log CT3AQ, a very active experimental transmitter at Funchal, Madeira. He is on the air on Sundays from 3.30 to 5 p.m. and on Tuesdays and Thursdays from 9.30 p.m. until midnight. The calls are given in Spanish, English, and French. On approximately the same wavelength (24.22 metres) calls from liners, such as the s.s. *Olympic*, may be heard. GBC (Rugby) communicates with ships on 23.46 metres.

Around this region we also find FTN (Ste Assise, France) on 24.46 metres, exchanging messages with Rabat (Morocco) between 10 a.m. and 12 noon, which in its turn, on 23.8 metres, broadcasts the Radio Maroc programmes every Sunday morning at 11.30 a.m. In this case the call will be of the mother station: "Ici Radio Maroc," with the addition at times of "Ici la station de radiodiffusion de l'Office Chérifien à Rabat." All announcements are in French and the interval

signal consists of a slow-beating metronome. Here again, slightly lower (23.35 metres), you may log telephony between Monte Grande, Buenos Aires, and Madrid or Paris (Ste Assise). If, almost on top of this transmission, you hear English spoken you may put it down as emanating from WOO (Deal Beach, N.J.) in touch with the British Isles.

Students of the Bukarest (Romania) University have installed a small experimental transmitter in that city, and carry out broadcasts on every Wednesday and Saturday at 7.10 p.m. Its wavelength is 21.5 metres, its call letters CVL Bucuresci (phon: *Book-oo-recht*), and all speech is in the Rumanian language, but announcements are sometimes added in French and German. Between 7.30 and 8 p.m. you may discover Chapultepec (Mexico) sending out a news bulletin in English on 20.5 metres (see also 25.5 metres).

Finally, in this lower part of the wave-band it will be useful to log on 19.84 metres, HVJ, a second channel of the Vatican station already mentioned in these notes, and on 19.72 metres, broadcasts from W8XK (E. Pittsburgh, Pa.) between noon and 4 p.m. (Wednesdays and Saturdays), as well as on 19.56 metres transmissions by W2XAD relaying WGY (Schenectady, N.Y.) daily (except Sundays) between 7 and 10 p.m.: on Sundays between 5 and 7 p.m. G.M.T.

NEXT WEEK:
PERCY HARRIS'S "MASCOT"

NEW LOTUS COMPONENTS

A NUMBER of new components have just been produced by Lotus Radio, Ltd.: these include a new dual-range aerial coil, output choke and two-gang condenser, complete with drum drive. These new components are illustrated here. The aerial coil is of neat design, an external switch being used for wave-changing. Screening is not normally necessary, but a standard "can" for use in a screen-grid circuit is available.

The output choke, costing only 5s. 6d., has an inductance of 20 henries at an



The new Lotus parts referred to, the ganged condenser, dual-range coil and L.F. choke

average plate current of 10-12 mA. The D.C. resistance is quite low, being only 720 ohms.

The ganged condenser is fitted with easily accessible trimmers and the heavy vanes and end plates ensure accuracy of matching to within one per cent. between units. The price of the aerial coil is 5s. 6d. and of the two-gang condenser (with disc drive) from 25s. upwards.

Details can be obtained free on mention of AMATEUR WIRELESS.

ONCE MORE—
the choice is
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Now you have had time to study the wonderful arrangement of the "Home-Lover's All-Electric 3," you will realise the vital necessity for a powerful Mains Transformer, which is, of course, the transformer chosen by the "Amateur Wireless" Technical Experts—the Heyberd model 715.

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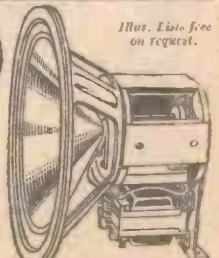
A.W. 5/32

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MOVING COIL

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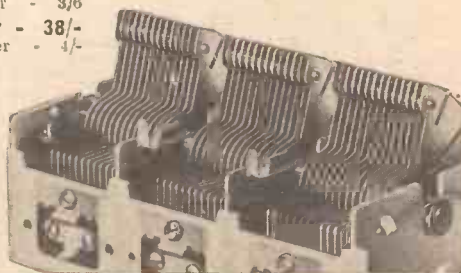
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READERS' IDEAS



AND QUESTIONS

Radio-Gramophones

SIR,—The radio-gram is now well established in many households; very many electrically controlled, very many like mine, no doubt, which has an automatic stop, controlled by the tone arm striking it at the end of the recording. This idea is certainly very good, if the record manufacturers would assist by making the width of all records the same. This, I think, is a matter that should be seen to by the producers of gramophone records, both here and abroad. What are your readers' opinions? L. D. (London, N.).

An Improvised Rectifier

SIR,—It may be of interest to some of your readers to know the following: Some time ago the valve on my H.T. eliminator (full wave) went "phut," naturally on an evening when I particularly wanted reception. Feeling desperate, and having quite a few valves by me which had finished their day for radio owing to bad emission, I tried one of these—a 2-volt L.F.—no good; then a 4-volt power, still no good; then I put in a Mullard 6-volt power (D.E.) Imagine my surprise to find perfect results, with no trace of hum. The faulty valve has since been replaced by the makers, but on comparison I find the Mullard still the best; it has now been running over two months. I feel very pleased about the matter as I had doubts when first putting it in, as to whether I should "do the eliminator in" altogether. J. T. (Twickenham).

The "Century Super"

SIR,—I am fortunate in possessing a very good edition of the "Century Super"—proud holder of a log of 153 stations, though its pride was humbled by the Worcester reader who claims 227—and never have I been lucky enough to secure Berlin Witzeleben during the daylight hours. I fancy that the reader in question heard Katowice and not, as you suggest, Sottens.

I have been experimenting with various home-made frame aerials, it is great fun. For instance, I find that although the Lewcos oscillator coil is stated to cover 23-45, 250-550, 1,000-2,000 metres with the average frame, it will bring other stations on other wavebands when used with simple home-made frames. I wished to hear the weather reports from Heston. After several deep "thinks," I ran eight turns of ordinary flex round the left wall of my room—making a frame 10 ft. square—added a centre tap, turned the wave-change switch to "Long," and at 46 on the oscillator tuning-dial Heston came in at tremendous strength. Cardington has been heard also at fair strength testing with Heston.

With four turns round that wall I can bring in all the mediums from Hilversum to Ljubljana at great strength, but I have to shorten it or change the position of the centre tap in order to reach London National at normal strength. The one

failure of these giant frames is that one cannot use the directional properties of a true frame. J. J. A. (London, S.E.).

The "1931 Ether Searcher"

SIR,—I am using a "1931 Ether Searcher" and cannot get it working quite right. The detector valve will not take anything like the 115 volts on its anode as you recommend, and consequently foreign stations are received at very poor strength and the sensitivity of the receiver is poor. A. W. (Romford).

If your detector valve will not take the full 115 volts on its anode as recommended, and the best anode voltage gives you but very weak reception of foreign stations, you may be sure there is something radically wrong with the characteristics of your detector valve. If your valve has a low impedance, lower than that of the valve we originally advised, it will not take a satisfactory anode voltage without becoming unstable. You do not state what actual valve you are using, but we suggest you try another having an impedance known to be greater than that of the present valve. When you get your detector valve working sensitively and without instability you will get satisfactory working of your receiver.—Ed.

"Three Star Three"

SIR,—I have now been working on the "Three Star Three" receiver for some weeks and so far have failed to obtain reception. The receiver seems alive and a milliammeter test proves that each valve is getting its proper share of anode current. I have endeavoured to test through the various components by substitution and all except the coils and ganged condensers have been either replaced or otherwise tested. The set still refuses to give reception, although a rustling noise from the speaker indicates that very little can be wrong. F. W. (Ware).

It seems that your ganged condensers are "shorting" in some way and we advise you carefully to inspect the fixed plate terminals as they protrude from the side of the condenser screens. If any one or all of the fixed plate terminals touch against the condenser screens, you will short-circuit the signals which would normally be applied to the input of your valves. The result will be somewhat similar to the complaint you submit.—Ed.

The "50s. Four"

SIR,—Before commencing the construction of the "50s. Four" I should like you to give me an approximation of the number of stations that are likely to be received on this set under normal reception conditions. W. B. C. (London, W.9).

The number of stations likely to be received depends upon the general efficiency of the receiving aerial, its proximity to the local stations, whether it is erected to have a directional reception effect on the locals or certain other stations, the efficiency of the earth used, the adjustment of the working of the valves, and your general ability as an operator in tuning a receiver. Normally, any amateur who is used to tuning a receiver should receive at least twenty different stations at sufficient volume to give good programme value, but an estimate of forty stations receivable on this set would not be amiss.—Ed.

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	Mains or battery.....	How many valves.....
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	Make.....	Type No.....
	Make.....	Type No.....
SPEAKER	Make.....	Type.....

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 CELESTION PPM Permanent Magnet Moving-coil Speaker (with dual-impedance input transformer), £2 7s. 6d.

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Kilo-Metres	Station and Call Sign	Power (Kw.)	Kilo-Metres	Station and Call Sign	Power (Kw.)	Kilo-Metres	Station and Call Sign	Power (Kw.)
GREAT BRITAIN								
25.53	11,754 Chelmsford	16.0	315	950 Marseilles	1.6	1,935	155 Kaunas	7.0
242.3	1,238 Belfast	1.0	327.5	916 Grenoble (PTT)	2.0	NORTH AFRICA		
281.6	1,147 London Nat.	50.0	329.3	911 Poste Parisien	1.2	303.4	825.3 Algiers (PTT)	16.0
288.5	1,040 Newcastle	1.2	345.2	869 Strasbourg (PTT)	11.5	416	721 Radio Maroc	8.0
288.5	1,040 Swansea	0.12	369.4	812.4 Radio LL (Paris)	0.5	and 32.26 m. (9,300 Kcs.)		
288.5	1,040 Plymouth	0.12	384.4	779 Radio Toulouse	8.0	NORWAY		
288.5	1,040 Edinburgh	0.3	447.1	671 Paris (PTT)	0.7	235.5	1,274 Kristianssand	0.5
288.5	1,040 Dundee	0.12	466	644 Lyons (PTT)	1.5	240.2	1,249.2 Stavanger	0.5
288.5	1,040 Bournemouth	1.0	1,445.7	207.5 Eiffel Tower	13.0	365.4	821 Bergen	1.0
288.5	1,040 Aberdeen	1.0	1,744	172 Radio Paris	75.0	367.6	816 Frederiksstad	0.7
301.5	995 North National	50.0	GERMANY			495.7	605.3 Trondheim	1.2
309.9	968 Cardiff	1.0	19.73	15,226 Zeesen	15.0	1,083	277 Oslo	60.0
355.9	843 London Regional	50.0	31.38	9,560 Zeesen	15.0	POLAND		
376.4	797 Glasgow	1.0	217	1,382 Konigsberg	0.75	214.2	1,400 Warsaw (2)	1.9
398.9	752 Midland Regional	25.0	217.5	1,370.9 Flensburg	0.5	234.9	1,287 Lodz	2.2
480	625 North Regional	50.0	227.4	1,319 Cologne	1.5	312.8	959 Cracow	1.5
1,554.4	193 Daventry (Nat.)	30.0	227.4	1,319 Munster	0.5	334.4	897 Poznan	1.9
AUSTRIA								
218.7	1,375 Salzburg	0.5	227.4	1,319 Aachen	0.25	320.7	788 Lvov	16.0
245.9	1,220 Linz	0.5	232.2	1,293 Kiel	0.25	409.8	733 Katowice	12.0
285.2	1,052 Innsbruck	0.5	239.4	1,253 Nurnberg	2.0	566	530 Wilno	16.0
352.1	852 Graz	7.0	245.9	1,220 Cassel	0.25	1,411.8	212.5 Warsaw	120.0
453.2	666 Klagenfurt	0.5	253.1	1,185 Gleiwitz	5.0	PORTUGAL		
517	581 Vienna	15.0	259.3	1,157 Leipzig	2.0	282.2	1,063 Lisbon (CTIAA)	2.0
also testing on 1,237 m. from 7.0 p.m. (Mon., Wed., Sat.)								
BELGIUM								
206	1,456 Antwerp	0.25	269.8	1,112 Bremen	0.2	ROMANIA		
210.2	1,429 Liege	0.15	270.5	1,085 Heilsberg	60.0	394	761 Bucharest	12.0
215.3	1,393 Chatelineau	0.2	283	1,060 Magdeburg	0.5	RUSSIA		
216	1,389 Liege	0.1	283	1,060 Berlin (E)	0.5	378	792.5 Moscow Regional	20.0
216	1,389 Bruxelles	0.1	318.8	941 Dresden	0.25	424.3	707 Moscow-Stalin	100.0
Conference 0.2								
219	1,370 Binche	0.1	325	923 Breslau	1.5	508.5	599 Astrakhan	10.0
240.8	1,245.8 Liege (Exp.)	0.1	360.0	832 Muhlacker	60.0	720	416.6 Moscow (PTT)	20.0
269	1,115 Liege (Coinite)	0.4	372	806 Hamburg	1.5	937.5	320 Kharkov (Rv20)	25.0
283.6	1,058 Brussels (SBR)	0.5	389.6	770 Frankfurt	1.5	967.7	310 Alma-Ata	10.0
338.2	887 Brussels (No. 2)	15.0	419.5	715 Berlin	1.5	1,000	300 Leningrad	100.0
509.3	589 Brussels (No. 1)	15.0	453.2	662 Danzig	0.5	1,053	284.9 Tiflis	10.0
BULGARIA								
318.8	911 Sofia (RodnoRadio)	0.5	472.4	635 Langenberg	60.0	1,118	265.5 Moscow Popoff	75.0
CZECHO-SLOVAKIA								
249.6	1,201.8 Prague (2)	5.0	532.0	563 Munich	1.5	1,170	256.4 Tashkerit	25.0
263.8	1,137 Moravska-Ostrava	10.0	559.7	536 Kaiserslautern	1.5	1,284	233.5 Moscow (Trades Unions)	165.0
279.3	1,074 Bratislava	13.0	559.7	536 Augsburg	0.3	also on 50 m. (6,000 Kcs.)		
293	1,022 Kosice	2.5	556	530 Hanover	0.3	1,380	217.5 Novosibirsk	100.0
341.7	878 Brunn (Brno)	35.0	569.3	527 Freiburg	0.25	1,481	202.5 Moscow	100.0
488.6	614 Prague	120.0	1,034.9	183.5 Norddeich	10.0	1,600	187.5 Irkutsk	15.0
DENMARK								
281.2	1,067 Copenhagen	0.75	1,034.9	183.5 Zeesen	60.0	1,715.5	175 Bakov	10.0
1,153	260 Kalundborg	7.5	2,900	103.5 hausen (press)	15.0	1,910.8	157 Sverdlovsk	20.0
also on 31.51 m. (9,520 Kcs.)								
ESTONIA								
296.1	1,013 Tallin	11.0	4,000	75 ditto		HOLLAND		
405.8	644 Tartu	0.5	298.2	1,006 Huizen	8.5	251	1,193 Barcelona (EAJ15)	1.0
FINLAND								
291	1,031 Viipuri	13.0	299.5	1,001.3 Radio Ilderda (The Hague)	3.0	266.8	1,224.4 Valencia	2.0
308.1	815 Helsinki	12.0	1,071.4	280 Scheveningen-Haven	10.0	348.2	861.5 Barcelona (EAJ1)	8.0
556.6	539.5 Tampere	1.0	also on 49.6 m.			368.1	815 Seville (EAJ5)	1.5
1,706	167 Lahti	54.0	1,875	160 Hilversum	8.5	424	707 Madrid Espana	2.0
FRANCE								
220.3	1,361.5 Beziers	0.5	HUNGARY			424	707 Madrid (EAJ7)	2.0
222.1	1,350.3 Fecamp	5.0	210	1,429 Budapest (2)	3.0	456.6	557 San Sebastian (EAJ8)	0.6
236	1,271 Bordeaux-Sud-Ouest	2.0	550	545 Budapest	18.5	SWEDEN		
250.2	1,200 Juan-les-Pins	0.5	1,175	255.4 Keykiavik	16.0	230.6	1,301 Malmo	1.25
255.1	1,176 Toulouse (PTT)	1.0	ICELAND			257	1,167 Hoby	10.0
265.9	1,128 Lille (PTT)	1.3	224.4	1,337 Cork (6CK)	1.2	306.8	977 Falun	0.5
271.3	1,105.7 Rennes	1.2	413	725 Dublin (2RN)	1.2	321.9	932 Goteborg	10.0
285.4	1,051 Montpellier	0.8	IRISH FREE STATE			435.4	689 Stockholm	55.0
286	1,049 Radio Lyons	10.0	273.2	1,098 Trieste	10.0	541.5	554 Sticksvall	10.0
294.7	1,017.7 Limoges (PTT)	0.5	312.2	961 Turin (Torino)	7.0	777.5	386 Ostersund	0.6
304.9	984 Bordeaux (PTT)	13.0	318.8	941 Genoa (Genova)	10.0	1,241.6	241.6 Boden	0.6
311.9	961.8 Natan-Vitus (Paris)	0.5	331.5	905 Milan	7.0	1,348.3	222.5 Notala	30.0
also on 43.75m. (6,865 Kcs.)								
ITALY								
25.4 11,810 Rome (2RO) 15.0								
247.7 1,211 Trieste 10.0								
273.2 1,098 Turin (Torino) 7.0								
312.2 961 Genoa (Genova) 10.0								
318.8 941 Naples (Napoli) 1.5								
331.5 905 Milan 7.0								
368.1 815 Bolzano 1.0								
411 680 Rome (Roma) 50.0								
500.8 599 Florence (Firenze) 20.0								
526.3 570 Palermo 3.0								
LATVIA								
108.5 1,510 Riga (tests) 16.0								
525 572 Riga 15.0								

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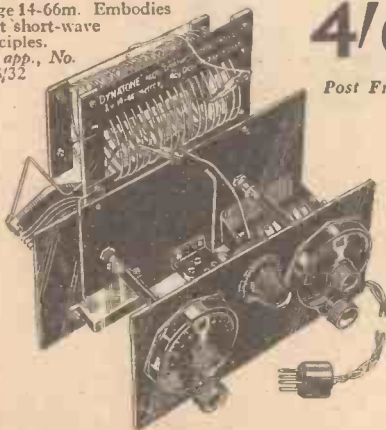
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Not more than two questions should be sent with any one letter.

The designing of apparatus or receivers cannot be undertaken.

Modifications of a straightforward nature can be made to blueprints, but we reserve to ourselves the right to determine the extent of an alteration to come within the scope of a query. Modifications

to proprietary receivers and designs published by contemporary journals cannot be undertaken.

Readers' sets and components cannot be tested at this office. Readers desiring specific information upon any problem should not ask for it to be published in a forthcoming issue, as only queries of general interest are published and these only at our discretion. Queries cannot be answered by telephone or personally.

Readers ordering blueprints and requiring technical information in addition, should address a separate letter to the Query Department and conform with the rules.

On March 19 the fortnightly Welsh Interlude, relayed on Daventry National, will be occupied by Dr. Alun Roberts, who will speak on "Recent Changes in the World of Agriculture."

Violet Loraine will play lead in a Ruritanian operetta composed by C. Denis Freeman and Mark Lubbock, which Regional

listeners will hear on March 11. National listeners are to hear a repeat performance on March 12.

Frederic d'Erlanger's "Requiem Mass," which was given its first performance in the National programme on February 27, 1931, is to be repeated Nationally on March 3.

Postcard Radio Literature

GET THESE CATALOGUES FREE
Here "Observer" reviews the latest booklets and folders issued by well-known manufacturers. If you want copies of any or all of them **FREE OF CHARGE**, just send a postcard giving the index numbers of the catalogues required (shown at the end of each paragraph) to "Postcard Radio Literature," "AMATEUR WIRELESS," 58/61, Fetter Lane, E.C.4. "Observer" will see that you get all the literature you desire. Please write your name and address in block letters.

A New Kit

YOU should drop a line, through my Catalogue Service, for details of the new Graham Farish "three." An exceedingly low-priced kit is available for this set and novel features include a combined chassis and panel of moulded bakelite, specially selective tuning, and one-knob control. **717**

Wego Condensers

Wego condensers are now being made in this country and full details of the paper-dielectric condensers and resistances in this range can be obtained free through my Catalogue Service. **718**

New Mains Units

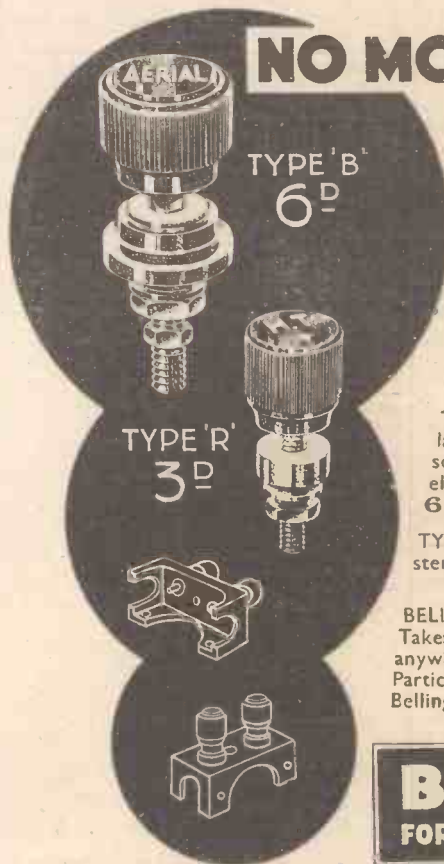
Godwinex accumulators are dealt with in a useful folder which I have just received from J. Dyson & Co., Ltd. A.C. and D.C. units, several of them provided with a trickle charging supply or with an A.C. winding for mains valves, are available, and full technical details of milliampere outputs and voltages under load are given in the new folder. **719**

Marconiphone Universal Three

The model 39 Marconiphone three-valver is dealt with in a folder which I have just received. Three types are available, one for A.C. mains 40-100 cycles, one for D.C. mains, and one for battery operation. The mains consumption (A.C.) is only 35 watts. The folder gives full details. **720**

"Amateur Wireless and Radiovision." Price Threepence. Published on Thursdays and bearing the date of Saturday immediately following. Post free to any part of the world: 3 months, 4s. 6d.; 6 months, 8s. 9d.; 12 months, 17s. 6d. Postal Orders, Post Office Orders, or Cheques should be made payable to Bernard Jones Publications, Ltd."

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets. Contributions are always welcome, will be promptly considered, and if used will be paid for. Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4.



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TYPE "R." Rotating name. 4 B.A. stem. Price 3d. each.

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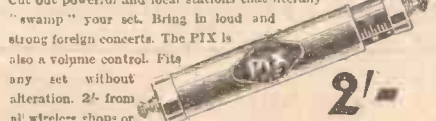
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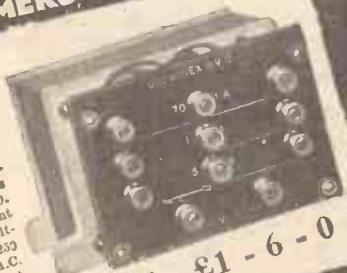
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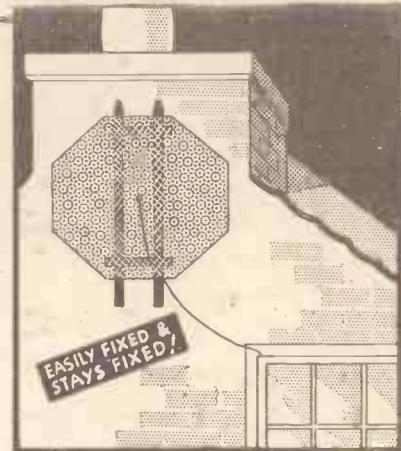


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