

WE ANNOUNCE OUR 39/- LUCERNE S.G. RANGER for HOME BUILDERS

# Amateur Wireless

and  
Radiovision

3d  
Every  
Wednesday

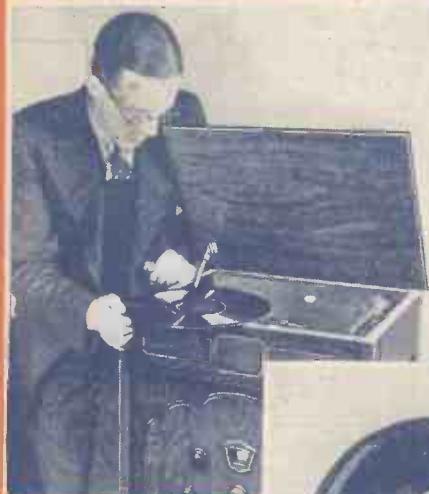
REVOLUTION IN  
TUNING DIALS

THE WORLD ON  
SHORT WAVES

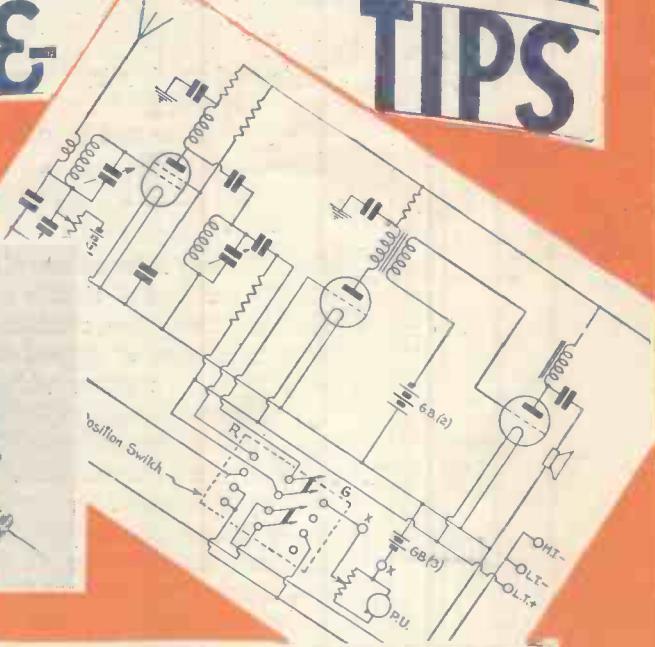
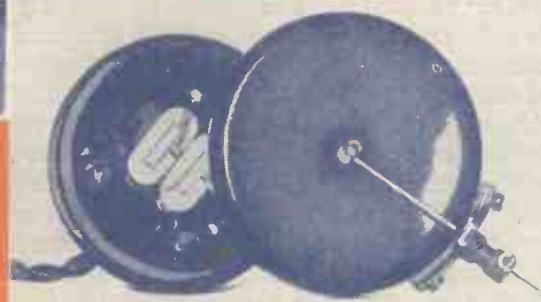
WHAT'S NEW IN  
RADIO?

TELEVISION SECTION

## RADIO-GRAMOPHONE HINTS & TIPS

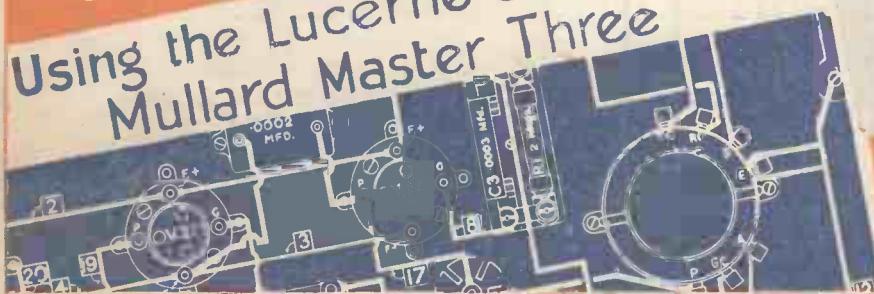


MAKING  
A PICK-UP  
AT HOME



CHOOSING, FITTING UP AND  
USING A GRAMOPHONE MOTOR

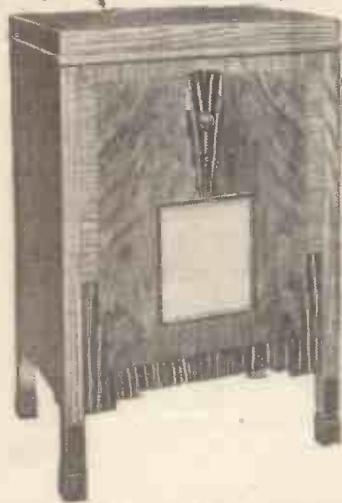
Using the Lucerne Coils in the  
Mullard Master Three



SWITCHING YOUR  
RADIOGRAM



**'HIS MASTER'S VOICE' BRING FIRST CLASS  
RADIO AND RADIOPHONOGRAPH TO ALL !**



**20 GUINEAS OR  
£1 A MONTH**



**12 GUINEAS OR  
£1 A MONTH**



Perhaps first-class radio or radiogramophone has always been beyond you? It needn't be now! The greatest maker in the world has now produced these two superb instruments at your price! The Superhet Five-Forty radiogramophone! The Superhet Four-Forty Radio.

#### THE FIVE-FORTY

**MADE TO**

**MEET**

**LUCERNE**

**WAVE-**

**LENGTH**

**CHANGES**

Radio History! Superheterodyne 5 valves (including rectifier) all-electric radio set and all-electric gramophone, combined in a beautiful modern cabinet of figured walnut. Silent-running electric motor with automatic stop and pick-up. Hinged to facilitate easy needle change. Tone control by which upper or lower registers can be accentuated. Selectivity of a very high order. New type "His Master's Voice" energised moving-coil loud speaker of balanced sensitivity at all registers. A.C. model 20 gns. (D.C. model 21 gns.) or small deposit and monthly payments of £1.

#### THE FOUR-FORTY

The Superhet Four-Forty is an achievement. It need only be compared with other sets to convince you of its superb Tone-quality, its Sensitivity and its Selectivity—perfect ability to separate completely the station you want from any other. There is volume without distortion. There is ease of tuning. There is a tone control by which upper or lower registers can be accentuated. The energised moving-coil speaker is of the latest type and mains can be used as an aerial. 5-valve (including rectifier) A.C. model 12 gns. D.C. model 13 gns. Or by hire purchase.

*Ask your dealer about these two new all-important sets. They are the two exclusive interests today! Listen to the tone! Look at the cabinets! And then consider the prices!*

## "HIS MASTER'S VOICE" RADIO & RADIOPHONOPHONES

*Send a postcard immediately for special illustrated leaflet to  
THE GRAMOPHONE COMPANY LTD., 108E CLERKENWELL ROAD, LONDON, E.C.1. PRICES DO NOT APPLY IN I.F.S.*

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# Amateur Wireless and Radiovision

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## News and Gossip of the Week

### Trolley-bus Tests

THAT august body the London Passenger Transport Board has been lately interesting itself in the delectable subject of "noises off" as rendered by the acme of modern transport comfort—the trolley bus.

Yes, they have been experimenting at the Fulwell depot with high-frequency chokes and things—all with the laudable object of cutting down these noises in broadcast reception along the bus routes.

### Double-humping Chokes

IT seems that the chokes now in use on the roof of the bus have a bad effect on the acceleration, and the object has been to reduce this effect on the performance of the bus without re-introducing the noises that the chokes so effectively suppress.

Double-humping chokes are shortly being tried out, and great hopes are held out that these will do the trick.

### Droitwich (Continued)

NOT a week goes by now without some further news of the B.B.C.'s giant transmitter at Droitwich. We feel almost that our notes on the subject are developing into a serial—but then we must keep you *au fait*, mustn't we?

This week we can tell you that the building and the masts are quite complete. Transmitting and switch gear is now being erected in the building. Still another important development is the laying of the earth system—no small job with a station like Droitwich.

### Over Six Million!

AS a nation we now lead Europe in licences for wireless reception, the latest Post Office statistics showing that we have now passed the six-million mark, the actual figure being 6,124,000.

At the end of January, 1933, the figure was 5,360,000, so that in a year we have put on over three quarters of a million. Jolly good going in these so-called hard times.

Now for seven million—and on to the goal of ten million!

### Echo of Lucerne

ON February 26 the technical commission of the International Broadcasting Union will

meet at Geneva to "consider the results of the application of the Lucerne Plan."

That is how they put it. Really, though, the meeting is to thrash out the vexed question of the long waves. Our organisation will be strongly represented by Mr. Noel Ashbridge and Mr. L. W. Hayes.

At the moment it is not known which countries will turn up to this meeting.

Will Luxembourg, for example?

### Low-power Relays

AGITATION always breaks out somewhere in this radio-minded island. No sooner does the B.B.C. quell one disturbed centre than another takes its place, crying even louder than before.

So we are not surprised, now that the North-eastern and North Scottish Regionals have been conceded, listeners in the counties of Devon and Cornwall are pleading for better services.

Possibly the B.B.C. will eventually meet such demands by the erection of low-power relays, but that will largely depend on the operation of Droitwich.

### More Local Studios

SO that every centre of culture in the land may be adequately represented in the broadcast programmes, the B.B.C. is defi-

nitely going ahead with the setting up of local studios linked to regional stations.

With the Bristol studios still in course of construction, the B.B.C. announces its decision to put up studios at Bangor, which will also feed the West Regional and possibly the North Regional.

### Watching It Grow

TO revert once again to our Droitwich saga, it is interesting to note that C. W. Skinner, who has been "O.C." Daventry for some years, has now gone over to Droitwich.

There he will watch the growth of the station that is to replace his beloved Daventry, so that when the new giant is in full service he will be well acquainted with all its funny little ways.

### Condenser "Mikes"

AFTER a great deal of experiment it seems that the condenser type of microphone, with its well-known advantages of absence of hiss and ability to handle large volume without overloading, has won the day at Broadcasting House.

All the same, the old familiar Reiss type of carbon microphone can still be seen in most of the studios, where they are greatly valued as a standby.



(Topical Press Photo.)

An amplifier made by officers! And then inspected by the Duke of York, in company with the Lord Mayor and Lieut.-Col. G. D. Ozanne, who is Commanding Officer of the City of London Signals. The occasion of the royal visit was the opening of the new Clapham Park headquarters

### Lost Metal-tape Record

OVER the now famous Harvey-Gains fight there has been much controversy, and some members of the B.B.C. have been kicking themselves because the metal-tape record of Lionel Seccombe's running commentary was wiped out within three days of the broadcast commentary.

This was done because permanent tape records are very expensive and it was not thought necessary to incur the expense of keeping it. All the same, it would have been very useful in the ensuing argument.

### Novel Geraldo Broadcast

MAKE a date with your set for March 26, please! Geraldo and his Sweet Music, the Wireless Chorus, and two principal singers, will gather together to give us a pageant of dance music.

No less than 149 tunes will be included in this musical review of dance hits extending from 1918 to 1933.

### Thirty-line Television

WHEN Droitwich takes over the medium-wave Nationals, what is to happen to the London National television? Possibly London Regional will pair with Midland Regional, the London station doing the vision and the Midland station the accompanying sound, as at present.

By the time this decision has to be taken we shall be towards the end of the summer, when in any case there will be only twice-a-week thirty-line television.

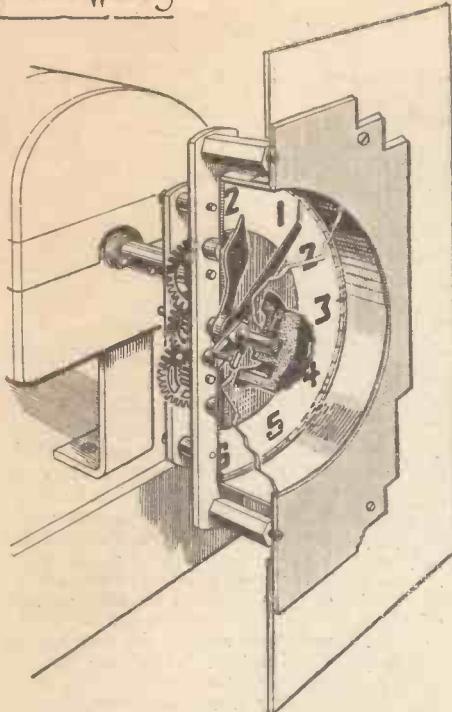
### National Programme Changes

ANOTHER change in the programme make-up will have to be considered when the medium-wavers go. We are thinking now of the Children's Hour from Daventry, which would seemingly have to be scrapped so that the new long-waver can send out the 5.15 dance music.

Possibly the late dance music will be confined to Droitwich, thus leaving the medium-wave regions open to—dare we say it?—an alternative late programme?

### O.B. Engineers Ready

YES, ready for three big annual broadcasting events; the Boat Race on March 17, the Grand National on March 23, and the Cup Final on April 28.



Dissected view of new "clock" tuning dial, which gives a 720-to-1 reduction gearing

**T**O-DAY there are over 120 stations on the medium waves and they are all within the range of a modern set with the half revolution of its tuning-condenser spindle. In the majority of sets the dial consists of a disc of about 4 in. diameter engraved half-way round and on this scale of about 6 in. length we have the whole 120 stations crowded.

Now the ideal tuning indicator must have a very long scale so that there is a fair space between each station, say, several degrees.

If we reckon the small divisions  $\frac{1}{12}$  in. apart and an average of ten divisions per station channel, it will need a scale over five feet long for 120 stations, which is out of the question with a dial of the usual design.

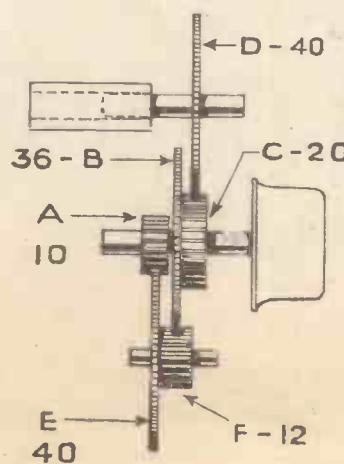
#### The Dial of Dials

While considering these points, I chanced to look up at the clock, this dial of dials which is in every home. Here is the ideal radio dial.

By means of the two hands we are able to divide one revolution of the hour hand (12 hours) into 720 parts (minutes) and to read off any one part with the greatest ease, and with a dial of about 4 in. diameter, from the other side of the room.

By arranging for the tuning condensers to be rotated from minimum to maximum while the hour hand moves round the dial from 12 o'clock to 12 o'clock and reading off as for the time in hours and minutes, we have in effect, with a 4 in. diameter dial, a scale length of no less than 12 ft. The 100 station channels are, therefore, an average of nearly  $1\frac{1}{2}$  in. apart and come in at about 7 minute intervals.

(Right) In this diagram the figures indicate the number of teeth. Of the gear wheels, A is fixed to knob spindle carrying minute hand (not shown); B and C, fixed together, are free on knob spindle carrying hour hand (not shown); D, fixed to condenser spindle; E and F, fixed together, act as intermediate pinions. The drive is via A, E, F, B, C to D.



# A Revolution in Tuning Dials

Designed by T. W. RIDGE, A.M.I.E.E.

It only remains to put the idea into practice and the photographs show a model that has been made\*. The controlling knob is connected to a spindle in the centre of the dial and this spindle is geared by means of the usual 12 to 1 clock wheels to a sleeve which fits round it and carries the hour hand.

It is necessary for the hour hand to make a complete revolution while the tuning device, which is usually a bank of condensers, moves from minimum to maximum. A 2 to 1 gear is, therefore, provided between the hour hand sleeve and the condenser shaft coupling, so that we have a 24 to 1 gearing between this and the control knob.

The minute hand will, of course, move with the centre spindle and the knob, but, unfortunately, with all cog wheels there is a certain amount of backlash, due to the play between the teeth.

With the friction drives usually employed this is avoided, but there is risk of a slip taking place and as an indicating hand is used on each gear, this must be avoided and a positive drive used to keep them in step.

The effect of the backlash is noticed when reversing the direction of tuning, the centre spindle revolves a small amount before the condenser shaft commences to move; consequently, if the minute hand were fixed directly to the spindle, the readings when tuning up would be a little higher than when tuning down. With good gears, the backlash would be quite small, but in the model, which is made from a very odd collection of alarm-clock wheels, it is serious.

In any case, the trouble is quite simple to overcome. Instead of fixing the minute hand to the spindle it is counterbalanced and loosely pivoted on the hour hand collar. A small forked piece is fixed to the spindle and this moves the hand, so that on reversing the direction of rotation the hand remains stationary while

the clock markings, it can have wavelengths (or, better still, kilocycles) indicated at the point of the hour hand and also (if desired) the names of stations, but I think it far better to have a list, which can have every station on it, with its dial reading alongside.

Owing to the 2 to 1 gear the shaft of the condenser rotates in the opposite direction to the hands and the dial should be connected to the appropriate end of the condenser shaft according to whether it is calibrated in wavelengths or kilocycles.

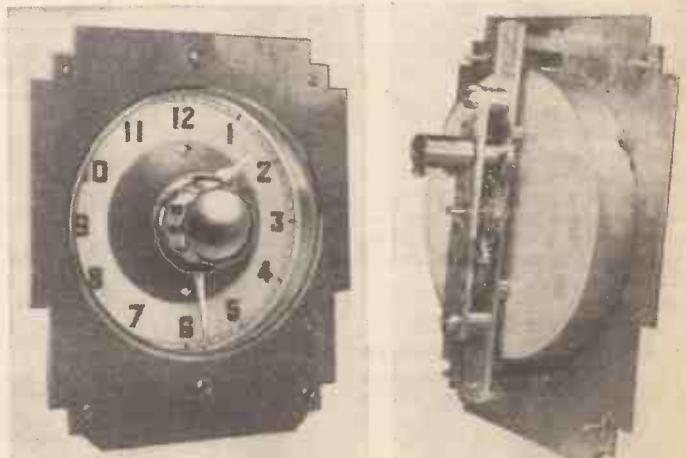
#### Understood by Everybody

The beauty of this dial is that it can be understood by anybody and, as the station positions are in the form of time, it will probably be found easier to remember a number of them. Also, the setting is by no means critical, for usually it is quite near enough if set within a minute of the correct point.

For instance, with the dial connected to the oscillator condenser of a super-het Algers (825 kilocycles) came in at 6.24, Mühlacker (832 kilocycles) was at 6.31 and London Regional at 6.41.

The design of the escutcheon and scale can take many forms and can be quite ornamental and need not, of course, be large. It can be as small as a watch dial and still be very much easier to read than many scales on modern sets.

It would be better, perhaps, to remove the knob from the centre of the dial as shown in the model and to fix it below, driving the centre



Two views showing the front and back of the new "clock" tuning dial, an entirely new idea

the spindle rotates a small predetermined amount and takes up the backlash.

The dial itself is marked as an ordinary clock face and can be illuminated from the front or behind in the usual way. In addition

spindle by means of the usual cord-and-pulley arrangement. The hand would not then cover the dial while tuning.

Another small point is that the top of the knob should have one or more circular depressions in it so that should one be listening to, say, Budapest, or some such station in the region of 300 kilocycles, and Fécamp is called for, the tip of the finger can be placed in a depression and the knob twirled round quickly, for when 12 o'clock is reached, the dial must, of course, be turned backwards.

\* Prov. Pat. No. 32881.

# Our 39/- Lucerne S.G. Ranger

## All About "The Experimenters'" Latest Design

CAN it be done? A really soundly designed three-valver, with a screen-grid stage, for just under a couple of pounds? You are asking us. Now we are telling you—yes. It has been done. By those inimitable contributors of ours, "The Experimenters."

Anything under their name is worth reading, as regular fans must now agree. But this time they have outstripped their usual good form, having produced a set that will strike deep into the hearts of all real amateur constructors.

Because we imagined they would not like to depart from their usual modest methods, we have asked these two collaborators to stand aside this week, and let us do a little talking on their behalf.

"The Experimenters" were rather keen to "spill the beans" this week, but when we came to look into the production of the drawings we

were so impressed with the obvious appeal of the set that we persuaded them to hold up their article for a week so that the design might be presented with due honours.

We must apologise to those readers who were keenly expecting to see the whole story this week. Please do not blame "The Experimenters," but rather the excellence of their design,

which has inspired us to do more in the way of presentation than would normally be justified.

Meanwhile, we should like to line up some of the more significant facts about the set, which will be known as the 39s. Lucerne S.G. Ranger.

**Its low price does not mean that essential refinements of modern design have been skimped.**

The secret of the unusually good value for money aspect of the set lies in the use of carefully chosen parts in conjunction with several "key" components made at home.

As you know, this set is the culmination of a recent series on making your own components, which has included details of coils, a high-frequency choke, and a low-frequency transformer.

*All the parts so described are employed in the 39s. S.G. Ranger. Two of the Lucerne coils, two of the high-frequency chokes, and the low-frequency transformer.*

These components, though very cheap to assemble at home, give first-rate performance. Employed in a straight set they cannot help adding to its efficiency.

Looking over the finished set, without reference to price at all, you would say that it is a well-designed job. It says much for the skill of those "Experimenters" that there is no sign of cheese-paring at any part of the finished job.

This is a point we most earnestly want to stress. That although the price is low the performance is exceptionally good.

It has been truly said that the heart of a set is its coils.

By now many of you know something about the fine ranging properties of the Lucerne coils, know that they cover the ether front from lowest to highest wavelengths without a break, know that their flexibility meets every sort of aerial need—know, in fact, that these coils are not only cheap to make but ideal in action under present conditions.

Two of the Lucerne coils are in the new set. One for the aerial tuning, the other for the intervalve coupling between the screen-grid and the detector valve.

Around these focal points of the set "The Experimenters" have engineered one of the best screen-grid, detector and power circuits we have ever had the good fortune to examine and test.

They have shown how coils costing only half a crown each to make can bestow upon a straight three a high measure of selectivity and excellent ranging power. How, with high-frequency chokes made at home for only one and sixpence each, and a low-frequency transformer costing only three and sixpence to assemble, these coils work in harness together in a way that cannot fail to please every really keen fan.

You do get a feeling of interest when you look over the 39s. Lucerne S.G. Ranger, because you see that it is somehow "different" from the usual run of constructor sets.

Of course it is different! Partly because so much of it is built and not merely assembled, partly because of that individualistic touch of "The Experimenters" and partly because of its ultra-simple wiring.

Few if any sets presented by wireless papers can claim such a very simple disposition of connecting wires.



We try out the 39s. Lucerne S.G. Ranger for "The Experimenters." It put up a rattling good show under difficult conditions—just the set to make the most of the new Lucerne Plan

layout, with its simple vertical metal screen between the screen-grid stage and the rest of the set. Like, too, the symmetrical layout of the panel controls, with two separate tuning condensers as the main controls.

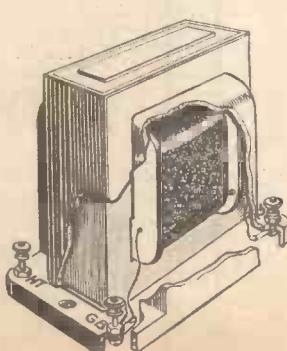
Don't imagine that this set is limited in its appeal to those who want to build their own parts. All the special home-builder's parts can be obtained—at very slight extra cost—ready made to "The Experimenters'" specification.

Many of the parts are probably interchangeable with parts already in your spares box—such as the high-frequency chokes and the transformer.

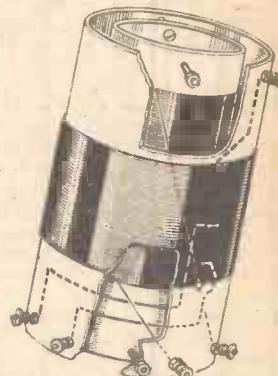
You must, of course, use the Lucerne coils, but then everyone with discernment will want to use them in order to enjoy their wonderful advantages of selectivity and range.

Next week, then, you may count on a fully detailed article from the united pens of "The Experimenters." They will give you all the information needed to build their latest design. If you have been thinking of making up their special components, don't delay. Get on with the job and be ready for the design that makes the most of them.

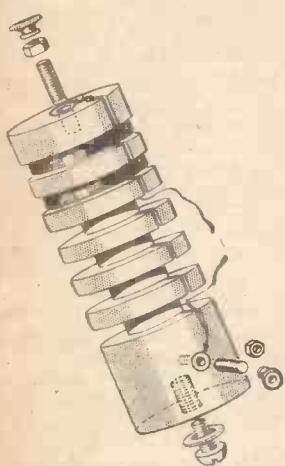
We believe that the 39s. Lucerne S.G. Ranger will enjoy a huge popularity, not only among those keen enough to build their own parts but among all types of listener on the lookout for an essentially sound yet really cheap straight screen-grid three-valver.



Low-frequency transformer you can also make at home for the low cost of 3s. 6d.



Lucerne coil, designed by "The Experimenters," costing only 2s. 6d. to make



High-frequency choke designed by "The Experimenters." It can be made at home for 1s. 6d.

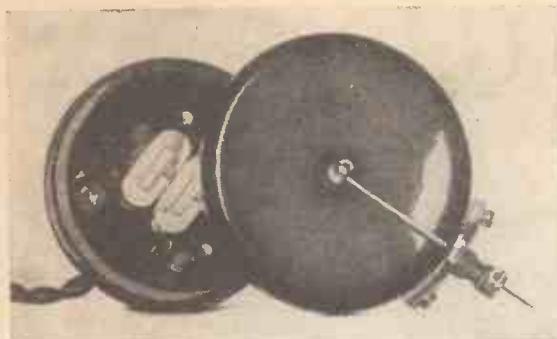


Fig. 1.—A telephone earpiece provides the necessary magnets and diaphragm for the pick-up

EVERY amateur who is keen on making his own parts will want to know how to make this ingenious and remarkably efficient pick-up for a few pence, or even at no expense at all if, as is very likely, he has the necessary materials among his old wireless and gramophone junk.

The pick-up is made out of one earphone and an old gramophone soundbox. Even if you do not happen to have these articles already, they can be purchased very cheaply; when making one of these pick-ups I found that I could buy a pair of headphones for 7d., and a gramophone soundbox cost me 1½d. The total cost of the parts used for the pick-up was only 6½d.

#### Parts of Soundbox Used

The only parts of the soundbox which are used are the needle holder and the stylus-bar which connects the needle with the centre of the mica diaphragm.

Having detached these parts, turn your attention to the earphone, and unscrew the cap. It will now be necessary to drill two small holes in the rim of the cap in order to mount the needle holder in the manner shown in the photographs.

In most earphones there is a hole in the

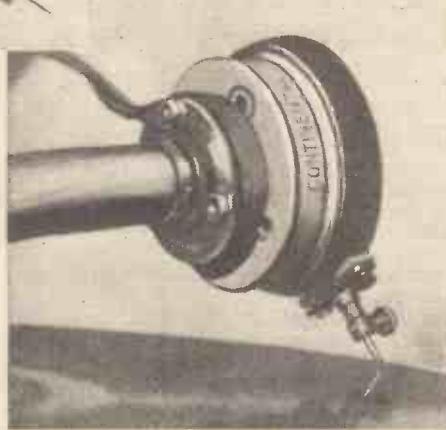


Fig. 2.—Completed pick-up being used for the electrical reproduction of records

centre of the cap; but, if not, drill one about  $\frac{1}{4}$  in. in diameter, so that the stylus-bar may be pushed through. See that the stylus-bar enters the earphone exactly in the centre; if it does not, it will probably be necessary to insert fibre or rubber washers between the needle holder and the rim of the cap, as in Fig. 1.

The next step is to solder the end of the stylus-bar to the centre of the earphone dia-

phragm, and one part of the pick-up is complete.

A few alterations will now be needed in the body of the earphone. Usually it is not convenient to use the terminals which project from the back, because they interfere with the mounting of the complete pick-up on its arm. Therefore bring the flex in through a small hole in the side, and solder the ends of the wires to the terminals inside.

All that now remains is to arrange for the mounting of the pick-up upon some form of arm, and for this purpose the gramophone tonearm is probably the best, because the collar which fits over the end of it can be detached from the old soundbox and fastened to the back of our new pick-up by means of three small bolts (see Fig. 2). The earphone magnets will have to be removed for this job.

#### Weighting the Tonearm

As a single earphone is not so heavy as an ordinary soundbox, it may be found necessary to weight the tonearm slightly, and experiments should be made until the pick-up rides in the record grooves with about the same weight as the soundbox.

When the alterations to the earphone are complete, screw the cap on tight in order to prevent rattle, and see that the diaphragm occupies its original position in relation to the magnets.

The pick-up should be mounted on the arm so that the needle is at an angle of about sixty degrees. As in an ordinary pick-up, the wires are taken to the grid of the detector valve and earth respectively.

## Broadcasting in the U.S.A.

By Our Special Correspondent: LIONEL MERDLER

#### LIFE IN 2434

**B**UCK ROGERS introduces a new phase into the broadcast world and depicts the adventures of a twenty-fifth century hero by a series of vivid radio sketches which will be continued throughout the year for American listeners. The photograph shows Buck Rogers with the heroine, both equipped with safety helmets and death-dealing ray pistols. Note the fashion for the twenty-fifth century.

Newspaper readers can follow the broadcast up in the daily serial strips which are now a feature of American papers, and this gives a clearer conception of the various stages of the play..

Travelling from planet to planet and meeting fearsome monsters and strange warlike beings, the adventure series of Buck Rogers has formed one of the big draws for American advertisers.

It may perhaps seem strange to British listeners how such a serial story can have any appeal to the average person.

The appeal is chiefly in the thrilling and breath-suspending climaxes at the end of each broadcast. Nothing, of course, can be seen as television has not yet arrived even in America. One's imagination need not be stretched too far, however, in the effort to visualise the scene as the weekly coloured

strips in the Sunday newspapers form a useful and entertaining supplement to broadcast.

Judging by the series of frightful crashes and earsplitting droning noises that accompany the more exciting parts of the story, life in 2434 will be none too quiet and certainly far from peaceful!

#### NINO MARTINI

**I**T is claimed for Nino Martini that he has one of the finest voices on the radio, and listening to him in the Columbia studios in New York, I could well believe it for he has, in addition to a wide vocal range, a beautiful microphone voice very well suited for broadcasting.

He was first heard in the States over the Columbia system, and this won him immediate popularity and secured important operatic engagements.

Born in Verona, Italy, he is just twenty-nine years old, an established favourite at the studios and one of the stars in the Sunday evening five-star programme.

Certain critics doubt whether his voice is of sufficient power to fill comfortably a large auditorium.



Buck Rogers, with the heroine of a new American series of radio sketches to be continued throughout the year



Nino Martini

For the microphone, however, this objection ceases to hold, and singing well within his capabilities, Nino Martini is enabled to give listeners the full tonal richness of his operatic selections.

## Mr. Flex Calls on a Friend—



—Who Takes Him At His Word



## Values That Stop That Sinking Feeling!

Adventures in an Express Lift!

**I**N the course of my chequered career I have had many lift adventures. At one time shot up like greased lightning to the top of the Woolworth Tower in New York. At another stuck for half an hour in one of those crazy "pull-the-rope" bird-cages in a Paris hotel, noted more for its cuisine than for modern methods of transport.

But never such an uncannily calm lift ride have I enjoyed as when ascending and descending the seven or eight floors of the new Shell Mex building on the Thames Embankment.

You step inside these lifts, the doors slide together, the operator presses a button, and the only way you can tell that any movement whatever is taking place is by looking above you to the little indicating lights, as they rapidly change from one to two, to three, and so on up to the top floors.

None of that frightfully sickening "leaving your tummy behind you" sensation of the New York expresses. Because these lifts are totally enclosed you have no visible check on motion at all.

## Convincing Demonstration

I amused myself being shot up and down a few times in Shell Mex House, and then, thanking the operator for his most convincing demonstration of lift riding *sans* sinking feeling, I wended my way towards the roof.

Mr. Walker, senior electrician, was delightfully modest about these lifts. But he did say he thought they were the smoothest in London. Then he showed me why. It is all done by the aid of a little two-valve amplifier, which bypasses current to work the lift relays.

Of course, I did not know much about lift electricity, but it was obvious that deceleration had something to do with cutting down the current. In the old-fashioned systems this was done by switching in resistance coils, but then things were rather jerky for the poor unfortunate inside the lifts.

Now, in these ultra-modern lifts, they manage more scientifically. At the top of the

lift cages are arranged small induction coils, fixed so that they slide over iron plates fitted at various points up the lift shaft. As the coils pass over these plates the current through them is altered, of course, and this current variation is amplified by the two-valver I examined with the roof gear.

Quite a simple job, it is. The secondaries of one side of the cage coils go to the input of the first valve, which is choke-capacity fed to the second valve. In the output circuit of this second valve there is an adjustable relay coil, which is coupled to the deceleration relay switches.

All you wireless fans, please note that the smoothness of these Shell Mex lifts is really due to that two-valve amplifier. Without that the relays could not be worked by the passing of the lift-cage coils over the iron plates.

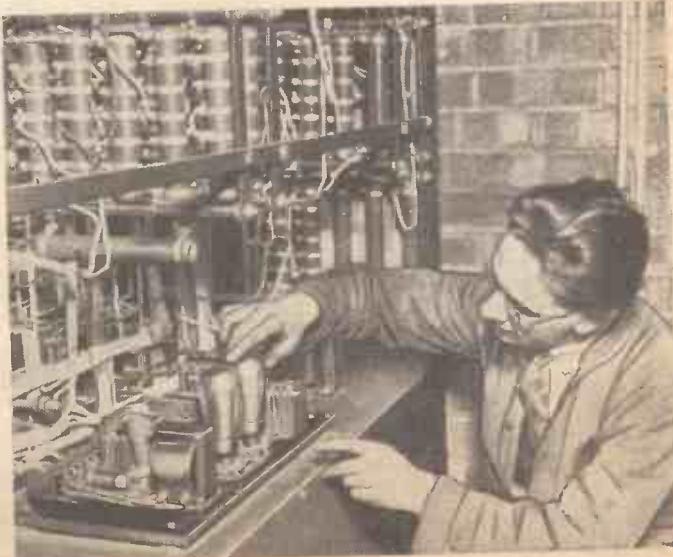
Seems queer, doesn't it? A couple of PX4's, a Westinghouse metal rectifier, and a few components such as every keen amateur possesses—and you have the key to the secret of London's smoothest lifts!

By the way, there was a story going around that this amplifier enables the engineer in charge of the lifts to pick up broadcast programmes. *Don't you believe it!*

As a matter of fact, Mr. Walker is quite a hand at experimenting and he has scrapped more than one amplifier.

One of the older amplifiers came the way of his assistant, who, in the true experimenter's way, took it home and added a detector stage with a tuning circuit. That is how the lift amplifier came to deliver radio programmes—when it was converted into a complete receiver.

I laughed about this all the way to the top of the lift. "Ground floor, please," I murmured, and tried hard to detect that sinking feeling. But no, the amplifier and its relays were doing their stuff, and what lift engineers expressively know as "tummy sensation" simply was not there. ALAN HUNTER.



[British International photo]

Mr. Walker's assistant replacing one of the valves of the amplifier that helps to smooth out the action of the lifts in the Shell Mex building on the Thames Embankment



Designed especially for remote control by Radio Furniture and Fittings

**E**SSENTIALLY designed for remote control, the new set marketed by Radio Furniture and Fittings, Ltd., of 106 Victoria Street, London, S.W.1, is unique. It is so arranged that at any remote point the receiver can be switched on, a choice of three stations selected, volume adjusted, and, finally, the set switched off when not required.

The receiver has three output lines, each giving an output of 5 watts. The price in walnut cabinet is 60 guineas; or, with automatic record changer, 72 guineas.

Two attractive cabinets—specially suitable for the Ether Searcher—are illustrated on this page. The horizontal model is £1 7s. 6d., and the upright model is £1 9s. 6d. (prices include carriage). These cabinets are very well made and will be useful for housing many AMATEUR WIRELESS designs.

The manufacturers are the Dallow Manufacturing Co., Ltd., of Forge Mill, Milford, Derbyshire.

A time switch which can be used in conjunction with an ordinary alarm clock to switch a set on at any given time has been produced by the S.F.P. Electrical Co., of North Bar Works, Banbury. Known as the Cockrose, this device comprises a small cabinet

on which is a lamp holder and a socket. When the alarm clock rings, the radio set (or any other mains-driven apparatus) is automatically switched on. The price is 12s. 6d.

From Ward & Goldstone, Ltd., of Frederick Road, Pendleton, Manchester, we have received a sample of a new five-way cord suitable for modern superhets. Two grades are available—three leads of 23/36's and two of 70/36's or three of 14/36's and two of 70/36's. With 4 volts at 6 amperes, the voltage drop in the 70/36 wires is negligible. The price of the heavier lead is 7d. per yard and that of the lighter grade 6d. per yard (plus 20 per cent. for quantities less than 100 yards).

Standard Telephones and Cables announce a new three-valve battery set at £7 9s. 6d. It is a chassis-built screen-grid, detector and pentode set (Micro-mesh valves) and incorporates a



Cockrose time switch worked by an alarm clock

permanent-magnet moving-coil loud-speaker. The cabinet is of oak. Pick-up and alternative aerial terminals are provided. Further details can be obtained from Standard Telephones and Cables, Ltd., of Connaught House, Aldwych, London, W.C.2.

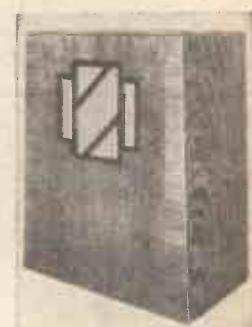
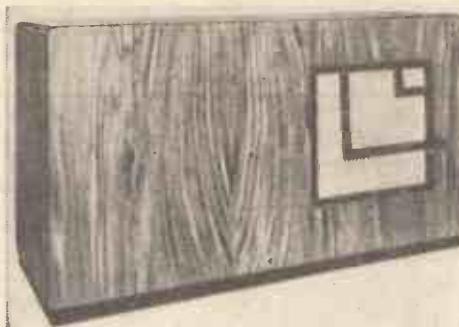
Owners of Marconiphone model 269 portable sets who want to take them out of doors will be

interested in a new canvas cover that has been introduced. A flap is provided so that the set can be operated with the cover still in position. The price is £1 5s.

Whiteley Electrical Radio Co., Ltd., of Victoria Street, Mansfield,

be obtained from the makers at Hollinwood, Lancashire.

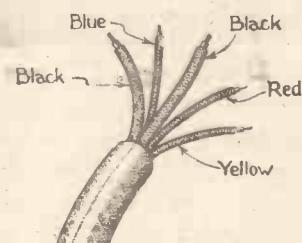
The new Ferranti Arcadia Radiogram is a set for which many have been waiting. It is supplied with a massive walnut cabinet and embodies the same



Two cabinets made by Dallow Manufacturing Co., Ltd. They are suitable for the Ether Searcher recently described in "A.W."

Notts. announce a new nine-pin valve-holder for new types of valves that are now making their appearance. The price is 2s. 3d.

Ferranti's are entering the battery-set market with two receivers—a five-valve set for use with an external aerial and a six-valve portable. The first, to be



Golton five-way cable for wiring modern superhets

known as the Lancastria Battery Receiver, will sell at 14 guineas and the second, to be called the Lancastria Portable, is listed at 15 guineas. Ferranti type VHT<sub>2</sub>, VS<sub>2</sub>, H<sub>2</sub>D, L<sub>2</sub> and HP<sub>2</sub> valves will be used. Further details can

receiver chassis as the Standard Arcadia receiver. A point which will meet with approval is the inclusion of a combined tone control and scratch filter, and a combined radio and gramophone volume control.

Both the control panel and the loud-speaker are mounted at an angle to give ease of manipulation and the best reproduction.

A.C./D.C. valves, synonymous with the name of Tungsram, are now becoming very popular. The new Tungsram heptode, designated MH1118, has now been priced at 17s. 6d. This will enable home constructors to make their own A.C./D.C. superhets and use this valve as a combined detector-oscillator.

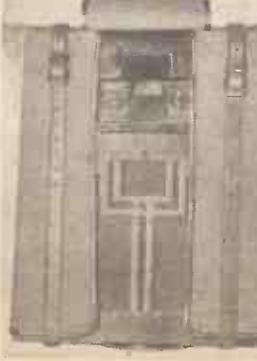
Nine-pin valve holders, which have been available for some time, can now actually be used with the introduction of the Mazda TP2620, a special self-oscillating frequency changer consisting of a pentode and triode in the same bulb. The heater voltage of this valve is 26 with a heater current of .2 ampere. It is supplied with a standard nine-pin base.

The second valve in this range is the VP1321, an indirectly-heated high-frequency pentode with a seven-pin base. The heater voltage for this valve is 13; the current remaining at .2 ampere. The Edison Swan Electric Co. are the first English manufacturers to introduce valves of this type and officially label them as universal A.C./D.C. valves.

Kolster Brandes have just introduced the KB363 receiver. This is a four-valve battery set, with a variable-mu stage and a class-B output valve giving 2 watts. The price of this set, complete with walnut cabinet and all accessories is 12 guineas.



Three-valve battery set marketed by Standard Telephones & Cables, Ltd.



Canvas cover for the Marconiphone model 269 portable receiver



## More than a Pentode—a Screened Pentode . . .

. . . and more than a Screened Pentode, a Mullard Screened Pentode. It has come to make your set the last word in up-to-date reception. You see, we, as specialists in the science of Home Radio, have been investigating the aerial stage of A.C. receivers. Some years ago we went to great pains to perfect the Pentode type of valve for use in the speaker stage of radio sets. Perhaps you remember how enthusiastic everybody was about this Mullard innovation? And now we have succeeded in bringing more power into the early stages of A.C. receivers—we have perfected the Pentode for the input stage. What an achievement! Ask your dealer about it. And remember—the Screened Pentode is made by Mullards—which speaks volumes.



Whenever you want advice about your set or about your valves — ask T.S.D. — Mullard Technical Service Department—always at your service. You're under no obligation whatsoever. We help ourselves by helping you. When writing, whether your problem is big or small, give every detail, and address your envelope to T.S.D., Ref. B.Y.D.

**V.P.4      S.P.4      17'6 THE · MASTER · VALVE**

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# INDIVIDUALITY

**S24** New High Slope non-microphonic low H.T. screen-grid Valve for Range with economy, in fully-screened "straight" sets and super-hets.

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**VS24** New Variable mu.screen-grid Valve for long range, combined with high quality local station reception by grid bias volume control.

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**S23** New low H.T. non-microphonic screen-grid Valve to improve all screen-grid kit sets and portables. For sensitivity with stability.

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15/6

**VP21** The first screened H.F. Pentode for Battery Sets. Particularly useful for maximum amplification with low H.T. voltages, or in conjunction with high efficiency tuning coils. 7-pin base fitting which enables metal coating to be earthed.

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A choice of four 2-volt screen-grid valves (one an H.F. Pentode)--with characteristics specially designed to improve your set conditions.

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# On your wavelength!

## Six Million Mark

THE great army of wireless listeners has topped the six-million mark by more than 100,000, for the total is now 6,124,000. It is a marvellous increase, since in the past twelve months the numbers have grown by no less than 758,000.

This little country of ours now holds the European record. Our closest rival is Germany, which, with a much larger population, has only 5,052,607 licensed listeners.

When broadcasting first started in this country in November, 1922, there were under 30,000 licences issued. By the end of 1924 the number had grown to 600,000 and the first million was reached by the end of the following year.

The second million was achieved in 1927, the third in 1930, the fourth in 1932, and the fifth last year.

## Wireless In Every Home?

A BOUT ten years ago I prophesied in these notes that not many years would pass before the wireless set would be as much of a household fitment as the piano or the sewing machine.

Well, there are more wireless sets in use nowadays than either sewing machines or pianos.

Our country contains just over eleven million homes, so that more than half of them now have their wireless sets. One lay paper, I see, makes the rather startling statement that it is calculated that between nine and ten million British homes to-day have wireless. I really hope that there aren't between three and four million pirates!

## Music from Valves

POSSIBLY you heard the "musical wave" played during the "In Town To-night" series the other Saturday. If you did, you must have been very much struck by the extraordinary way in which it imitated the tone of all kinds of instruments and by the wonderful purity of its notes.

The musical wave works on much the same lines as the familiar note oscillator used for the tuning note. It is so far only an interesting demonstration apparatus and has hardly reached the stage which entitles it to be called a musical instrument.

Its scope is limited still to the playing of melodies only, but there seems to be no reason why it should not eventually be developed into something as versatile as the cinema organ.

## Revolution in Music?

IT is quite on the cards that the wireless valve may produce something like a revolution in music. Probably you know that no musical instrument can emit anything approaching a pure note.

Every note played on the piano, the violin, the clarinet and so on is really a chord consisting

of the fundamental and a whole mass of harmonics. The reason why each instrument has its own characteristic tone is that each has its own special set of harmonics.

Now, with a wireless valve it is possible to produce perfectly pure notes free from harmonics.

They would probably sound very strange at first to our unaccustomed ears, but in time we might come to find that they had a particular charm of their own.

## Radio Taxis

A WEEK or two ago I mentioned that in the United States, the radio taxi was taking the road. I now learn that New York alone has over two thousand taxicabs fitted with wireless receiving sets. They have proved so popular that they are rushed almost off their wheels with business.

American tastes differ a good deal from ours. What would Mrs. British Listener think about this?

"Right now women shoppers can listen on their way downtown in a taxi to a description of items offered in sales held by the big department stores."

Wireless advertising is bad enough in the ordinary way, but when it comes to turning it on in taxis, well !

## All-in Valves

YOU remember my writing jokingly that if the development of portmanteau valves continued we should one day find the bulb, including the coils and the tuning condensers?

*This has actually come to pass.* Experimental valves for ultra-short-wave work have been made with the tuning arrangements inside them. And not only that;

even the aerial has been included in one instance!

The condensers are not of the variable variety, for the valves are intended for reception only on one fixed wavelength.

For this purpose the idea is excellent, since owing to their being in a vacuum there is no fear of the coils or condensers being affected by damp. Once the filament has warmed up the temperature inside the bulb remains constant.

## New Valve Developments

THERE are some interesting new productions in our own country of patterns intended for broadcast reception.

One that interests me very much is the new Marconi and Osram QP21, which seems to have all the good points of both QPP and class B with hardly any of the bad ones.

It consists of two pentodes in the same envelope, cleverly arranged so that the two halves work with a common screening-grid voltage. This eliminates all the bother that we used to have in matching up pentodes.

The new valve has two very big advantages. First of all, it requires no driver in front of it and can therefore come immediately after the detector valve. Next, it handles either big or



Ben Gigli, famous tenor, is caricatured by Fernando Autori, the well-known bass, during a lull in a recording session at the H.M.V. studios



Real hustle! Cary Grant, famous film star, buys an Eko set at Bristol, his "home town." The next day he was married to Virginia Cherrill and then sailed back to the United States again

small volume with a minimum of distortion.

The only criticism that I have to make is that the filament current is .4 ampere. Low-tension current is a bit of a problem nowadays to the battery user and the best part of half an ampere is more than one valve ought to require, even if it is a twin.

## Heard of the Air Cell?

I WONDER if you have ever heard of the air cell? It has been in use for some years in America, though so far it has not appeared in this country. The air cell is designed for filament heating purposes and it is made up into batteries with an initial voltage of rather over 2.5.

The way in which it works is most ingenious

As you know, the big problem in any kind of primary cell is depolarisation. Hydrogen bubbles form round the positive electrode and they must be got rid of somehow. In the ordinary dry cell manganese dioxide is used. It parts readily with its oxygen, which combines with the hydrogen to form water.

### Air as Depolariser

THE air that we breathe contains large quantities of oxygen and in the air cell a means has been found of using this for depolarisation. A special form of carbon has been produced which has the wonderful property of drinking in oxygen from the air. The cell thus "unchokes" itself automatically.

And it works. I have just seen some laboratory test results which show that when it is discharged at .06 ampere for four hours a day the air cell battery has a life of 1,100 hours before its E.M.F. falls below 2 volts.

That means it would give a whole year's working with a big battery superhet. Something of the kind is badly needed in this country. Can't we have it?

### Micro-wave Air Stations

OLD hands will remember the days when there was so little in the way of broadcasting that one of our main diversions was listening to the telephonic transmissions between aerodromes such as Croydon, Lympne, St. Inglevert, and Le Bourget.

They are still to be heard occasionally on round about 900 metres, though much of the work is now done in morse. Now there is a micro-wave system with a wavelength of 17 centimetres in operation between Lympne and St. Inglevert. The great point about the micro-waves is that their transmissions are free from every kind of interference, whilst the power required is minute.

### Valves with Graphite Plates

WE are so used to the idea that the plate of a valve must be made of metal that it comes almost as a shock to read that after a long series of experiments valves with graphite plates have been successfully produced.

The great drawback to metal is that no matter how smooth it may look, its surface is always actually a mass of tiny cracks and crevices. These form lurking places for gases of various kinds which cannot be entirely driven out by "gathering". The result is that valves with metal plates tend to soften through the emission of gas from their plates after they have been in use for some time. This applies particularly to big transmitting valves.

Carbon has the advantage in being more easily cleared of gas and the small amount that does remain is so firmly held that it does not escape to soften the vacuum.

### Now's the Time for America!

I WONDER if you have noticed the astonishing way in which American stations are coming in by midnight or very little later? As soon as the Continental stations have closed down and cleared the ether you can pick up quite a few transatlantics on most nights.

They don't take much finding either, for lots of them are coming in as strongly and as steadily as the average Continental station.

The belt between about 230 and 320 metres is the best just now at about midnight.

It contains such splendid stations as WIOD, WPG, WTIC, WHAM, WCAU and KDKA. Make a tour over that portion of the medium waveband next time you're up rather late and I think that you will have a surprise.

### Europe's Ether Settling Down

THE Lucerne Plan really seems to have got into working order at last. Even on the long waves things are now quite good. Huizen, Königswusterhausen, Warsaw, Luxembourg, Motala, Kalundborg and Oslo can usually be heard well, though Radio-Paris is still interfered with.

On the medium waves there is a veritable host of stations waiting for the long-distance man. You can certainly receive clear of interference quite as many stations as before the coming of the new plan and on most nights the number is rather greater than it was at the end of last year.

As soon as the small fry working on common wavelengths have installed apparatus that will prevent them from wobbling we shall have a marvellous choice of programmes from all over Europe.

### This Propaganda!

DID you see that amazing story in one of our "dailies" about the B.B.C.'s attempt to jam Moscow's English talks? According to the report the B.B.C. sent out strong Morse signals, which for a time rendered the Moscow signals unintelligible.

## NEXT WEEK!

On page 207 we give preliminary details of the 391-Lucerne S.G. Ranger, a blueprint and special photoplano wiring guide of which will be given next week. Here are some of the outstanding features of the design:

- Screen-grid three-valver for which all the parts can be obtained for 39/-.
- Lucerne coils with extended wave ranges to cope with the new broadcasting plan.
- Variable selectivity without loss of volume.
- Large baseboard and panel so that there is no cramping of the parts.
- Extremely simple wiring that any beginner can follow without difficulty.
- Home-made coils, high-frequency chokes and low-frequency transformer—or they can be bought ready-assembled if desired.
- Between thirty and forty stations at good loud-speaker strength with good quality.

Later, though, Moscow is supposed to have put up its power and beaten us. Of course, the whole story is absurd, the B.B.C. denying all knowledge of it when I taxed them.

I hear that the Russians have under construction a 1,500-kilowatt station—just ten times as strong as our projected Droitwich. If this station comes on the air it will take a lot of shouting down, won't it?

### Fashions in Knobs

ONE used to be able to obtain all components which required them with nice black knobs. Now for some reason which is beyond me it has become fashionable to fit brown or mottled knobs, and as often as not a particular component is available only in the tuppence coloured form.

I want black knobs. I like black knobs. What annoys me more than anything else is to find when I have assembled my components for making a set, that though most of them have arrived with black knobs, there is one miserable gadget with a brown excrescence.

Sometimes I dream that I am attending a meeting of the Component Manufacturers' Association and that they are listening with bated breath and pencils running rapidly over note pads whilst I address them. It is marvellous how they drink in the suggestions that I have to make—and then I wake up.

### Radio and Other Waves

THE famous Nobel prize for physics has been divided this year between Oxford and Cambridge in the persons of Dr. Schrödinger and Dr. Dirac. Although the work of these two brilliant young scientists hardly comes under the head of wireless pure and simple, it certainly is very much bound up with radiation in general, and covers such things as "spinning electrons" and the peculiar "resonance tuning" which occurs between electrons.

In a sense, it is a development of the new theory of wave mechanics for which Dr. Heisenberg received the same prize last year—a rather startling point of view which reduces atoms and molecules, and in fact, all kinds of matter, into what has been called a "wilderness of waves."

I don't think the theory was originally intended to apply to the ether—either before or after the Lucerne plan—but there are times when most listeners would agree that it isn't far wide of the mark!

### Modern Science

AS a matter of fact, quite a lot of the most up-to-date scientific work has a distinctly "wireless" flavour. Take for instance the mysterious cosmic rays which come from nobody knows where, and make even learned professors feel somewhat hot and bothered. Then there is the quantum theory, which is so largely concerned with "bundles" of radiation and what not. It is true that such radiation is very much shorter than anything we have so far produced by wireless methods, but they are intrinsically the same kind of thing.

It all really goes back to Clark-Maxwell, who started a very big ball rolling when he first produced his famous electro-magnetic theory. Although nobody quite knows where it is all going to end, there is some satisfaction in feeling that one's favourite hobby is at least on nodding terms with "red-hot" science.

### Radio Bootleggers

IN America, broadcasters have given the unlicensed listener in Great Britain a new name. Here he is, of course, referred to as a "pirate"—though why I never have been able to make out. The Americans now call him a bootlegger—no doubt lining up his crime with rum running and all that. It seems the Americans are interested in our ways of tracing licence dodgers.

On both sides of the Atlantic there will be interest in the news that the British Post Office is starting another of its famous "drives." Starting on March 5 one of the direction-finding vans will visit Cardiff, Newport and Swansea areas. No doubt, as usual, the local post offices will be flooded with conscience-stricken listeners paying overdue tribute.

# More Details for Using the LUCERNE COILS

*The Experimenters*

Give Further Hints and Deal in Particular with the Mullard Master Three

We have already told you that the Lucerne coils can be used in almost every set which does not use screened coils to prevent instability. While this is perfectly correct, there are one or two little points which must not be overlooked if maximum results are to be obtained.

Some thousands have already discovered that this coil will give a wider tuning range as well as better selectivity. But there are certain receivers which require slight modification before this coil will give 100 per cent. results.

The first point to remember is the capacity of the reaction condenser. We designed this coil to operate in conjunction with a .0005-microfarad reaction condenser. It is essential that you keep to this capacity. There may be some of you who are using a differential condenser, in which case this should be taken out in favour of the correct type.

#### Simple Alterations

The alterations in such circumstances are quite simple. All you have to do is to take the terminal marked R.C. on the coil to the fixed plates of the condenser and then join the moving plates to earth. Then connect the terminal marked P on the coil to the plate of the detector valve. That completes the reaction circuit.

Some readers may find that the reaction does not boost the signal strength as it should. To overcome this connect a condenser of .0003 microfarad between the anode of the detector valve and earth.

We have mentioned from time to time that the detector valve should be of low impedance. We still find that some readers are using a high-impedance valve such as a PM1A and 210RC types. You will find that the most suitable valves for use as a detector are those having an impedance round about 13,000 ohms, such as the Cossor 210DET or the Mullard PM2DX. With these valves you will find that oscillation is very smooth and even over both wave ranges.

We cannot possibly tell you the alterations necessary to use these coils in all the sets that it will suit because this runs into some hundreds, but if you follow the constructional articles and also the few points mentioned in this article you should have no difficulty in obtaining first-class results.

#### Another Good Kit Set

We have already decided that there were certain sets in which it would be advisable to describe more fully the incorporation of this coil. The first set that we altered was the Cossor Melody Maker and since then many readers have clamoured for the Mullard Master Three Star to be treated in the same way. This receiver was first issued in September, 1928, and has since then given wonderful results all over the country, but it can hardly be expected to be equal to the task of separating the stations which are now packed so closely together on the medium waveband.

The type of coil is hardly suitable for this purpose and even should you use a preset condenser by the time you have obtained the degree of selectivity you require half of the volume has already gone.

In addition to this very few users can hear the low-wavelength stations such as Fécamp, Aberdeen and Bournemouth or, on the other hand, high-wavelength stations such as Athlone and Budapest. For those readers there is only one solution—the Lucerne coil. This will, in almost every instance, completely overcome these little troubles, when otherwise the only solution would be to buy a new set.

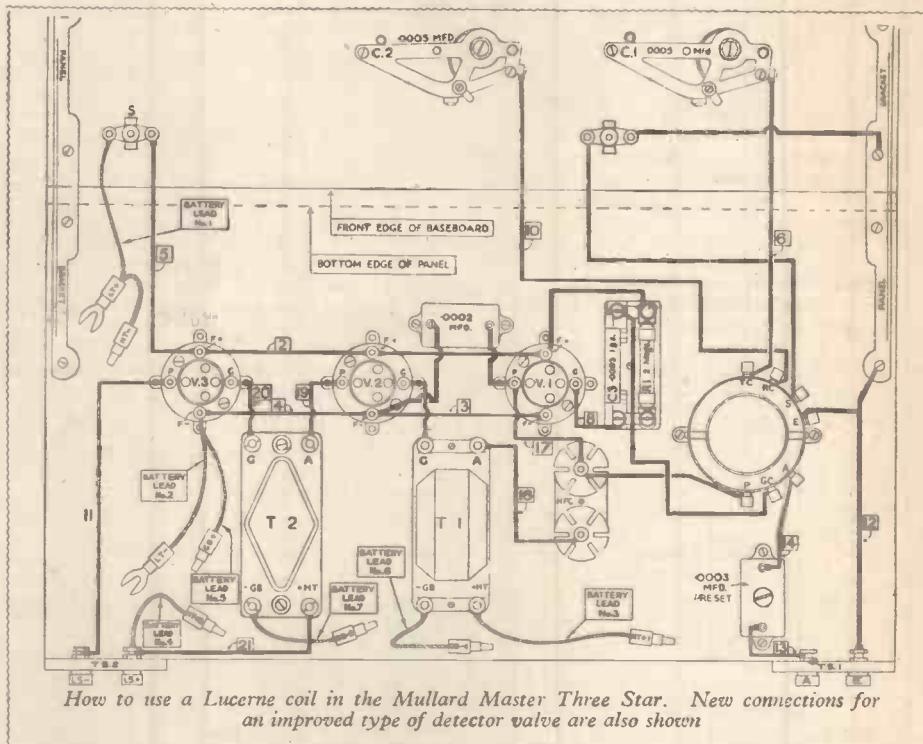
It is a very easy matter to alter the Mullard Master Three Star, particularly if you do everything in the right sequence, but of course, if you start taking components and wires off indiscriminately, some of you who are not too technically minded will get in a tangle.

Make the alterations in this way; we will show you how to do it in easy stages. Remove the dual-range tuning coil and the switching

After you have done this, connect up in the following way. The terminal marked P on the coil to the top of the high-frequency choke or to the plate of the detector valve. Terminal marked A to one side of a .0003-microfarad preset condenser, the other side of which goes to the aerial terminal on the terminal block.

On the other side of the coil join the terminal marked E to the earth terminal on the terminal block and underneath the panel bracket. The terminal marked "Switch" goes to one side of a push-pull switch and then to the other side of the switch through the panel bracket again.

The terminal marked RC on the coil goes to the fixed vanes of the reaction condenser. The other side of the reaction condenser makes automatic contact on to the metal panel, but should you be using an ebonite panel the



How to use a Lucerne coil in the Mullard Master Three Star. New connections for an improved type of detector valve are also shown

which goes through the panel. Of course, when you do this it will mean removing all of the associated wiring, but there is absolutely no need to touch any connections except those actually in the grid and tuning circuit.

This will leave a small hole in the panel through which the switch gear originally went. If you are careful in your choice of a push-pull switch for wave changing this spare hole will do for the switch if it is enlarged.

After you have taken out the old coil, disconnect the .0001-microfarad condenser in series with the aerial. Then screw into position the Lucerne coil. You will want the grid coil with reaction, not the aerial coil. The rest is all plain sailing, as you can see from the wiring guide, but make quite sure that you get the side with four terminals nearest to the panels.

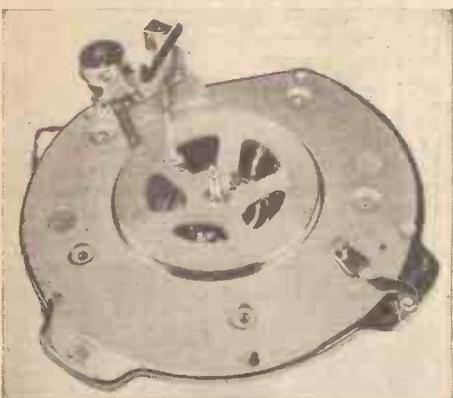
moving plates of this condenser must be joined to earth or low-tension negative. The terminal marked RC on the coil is then taken to the fixed plates of the .0005-microfarad tuning condenser marked C1 on the blueprint.

Here again, if you are using a metal panel, the moving plates need not be connected, but if you are using an ebonite one the moving plates must be connected to earth or low-tension negative.

We have left GC to the last for a particular reason. The grid condenser and grid leak are at the moment joined together. You should disconnect the common end of the .0003-microfarad condenser from the 2-megohm leak and take the condenser to the terminal marked GC on the coil. Then join the grid leak to low-tension positive.



Typical arrangement of a motorboard. Note the needle cups and the gramo-radio switch on the right



Top of an electric motor, with turntable removed to show the automatic stop mechanism

IT is a safe bet that listeners without a radio-gramophone arrangement have, tucked away somewhere, an old acoustic gramophone. Reproduction from these old machines cannot be compared with modern radiogram methods. The cost of converting, or even fixing up, an entirely new piece of apparatus will not run into more than a few pounds.

The advantage of electrical reproduction of records is much too well known to need comment. The quality of electrical reproduction depends mainly on the pick-up used, the type of amplifier and loud-speaker and, what is very important, the little whys and wherefores when the gear is being fitted up.

Let us in these brief notes run through the process of electrical reproduction of records, summing up as we go the major points in nutshell form.

#### GRAMOPHONE MOTORS

Choosing the right type of gramophone motor to suit one's requirements is not a difficult matter. The major problem, if one happens to be on electric-light mains, is whether a clockwork or electric motor is used. From my own experience, I can say that once an electric motor has been handled, even the thought of using a clockwork type never occurs.

However, if you decide to use a clockwork motor, make certain that you get one with a really strong spring. Nothing is more objectionable than to

# Radio-gramophone

## All You Want to Know Choice, Fitting Up

hear the awful ear-splitting noise from the loud-speaker when a gramophone motor slows up during the playing of a heavy passage on the record.

The best type of clockwork motor is the double-spring or even triple-spring type. You find that it will give you the best service in the end and the cost is not a great deal more.

Some of the multi-spring motors play three 12-in. sides without the necessity of rewinding.

#### Choice of Electric Motor

The choice of an electric motor must be considered more carefully. The first thing you must find out is the type of electric-light supply on which you intend to work the motor. If it is D.C. (direct current) you must find out the voltage, and if the mains are A.C. (alternating current) then not only must the voltage be determined, but the periodicity—or frequency, as it is frequently called—must be found out as well.

If you are not sure, a telephone call to the electric-light company with a request for details is the safest course.

You must give the particulars of your house supply to the dealer when ordering your motor. If you happen to be on D.C. mains it is worth thinking a moment before going into a shop and ordering a D.C. motor. Perhaps some day your domestic supply will be changed from D.C. to A.C.—this is being done in many places nowadays—or you may move to another district later, where the mains are of the A.C. variety.

A motor known as the universal type, which can be worked off either D.C. or A.C., is worth considering. Admittedly, they are more expensive; but, even so, the additional cost of a universal motor over an A.C. type is, when you come to think of it, really only a form of insurance.

The same remark may apply to listeners on

A.C. mains, but there is no chance of A.C. mains being converted to D.C. In time to come the whole electric supply of the country will be standardised as A.C.

Recently, Simpkins Electricals, Ltd., introduced a small rotary converter for use on D.C. mains, which will give sufficient A.C. output to work one of their synchronous A.C. motors. I believe that this is the only firm who make a motor of this type.

If you go into a shop and ask for an A.C. motor, you will be told that there are three principal types—the ordinary models with a commutator and brush contacts—frequently the cause of interference—and the induction and synchronous models.

Most of the ordinary and induction types can be used on all electric-light mains between 110 and 250 volts and frequencies between 40 and 60 cycles. In some districts the frequency is not of the standard variety—sometimes 25 or 33.3 cycles—and special motors are necessary for use on these mains.

Generally speaking, it can be assumed that the induction and synchronous types are best for incorporation in radiogram outfits. These motors do not incorporate a commutator; there are no brushes to need attention; therefore, there is little possibility of interference between the motor and the low-frequency amplifier. The brush contacts often spark, giving rise to noises like atmospherics in the reproduction from the loud-speaker. There are simple methods of suppressing interference from gramophone motors and these we will discuss later.

#### Frequency of the Supply

One has to take particular notice of the frequency of the house supply if one intends using a synchronous motor. The synchronous type of motor is driven by two sets of magnets

and the speed of the motor naturally depends on the number of times the polarity of the A.C. mains changes per second. These motors are designed generally for use on A.C. mains with a periodicity of 50 cycles per second.

The magnets of the motor are so arranged that when it is being used on 50-cycle mains, the correct speed of 78 revolutions per minute is automatically obtained.

The speed of synchronous motors, you will see, cannot be varied; they either run at the right speed or stop altogether.

The turntable of these motors will not start when the A.C. mains are switched on. They require to be given a sharp turn with the hand, then they will go on running indefinitely as long as the current is applied to the motor.

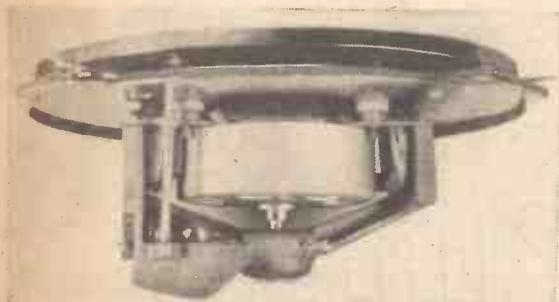


Filming one of the H.M.V. electrical recording outfits for a Pathécam Weekly production. The recording wax can be seen on the right under the light

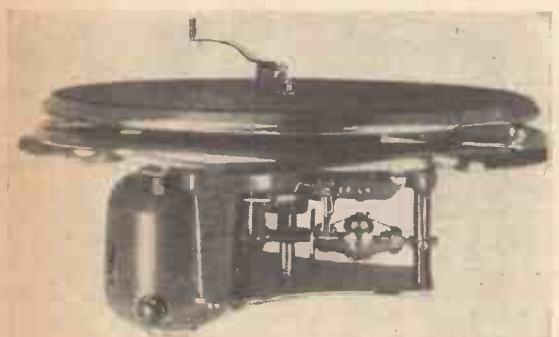
# The Motors

## About Their and Use

Funnily enough, synchronous motors consume more current when the motor is switched on and the turntable is stationary than when the turntable is rotating. The current, in any case, is quite small; the average current consumption for a synchronous motor being about 5 watts.



Example of an electric gramophone motor with enclosed mechanism



In this photograph the governor to give constant-speed running can be clearly seen

By a little mental arithmetic, it can be seen that the cost of running a synchronous motor is the price of one unit of electricity (1,000 watts per hour) for 200 hours. That is very cheap, you will agree.

### MOUNTING A GRAMOPHONE MOTOR

When you unpack the motor from its box, you will find a sheaf of papers telling you how to mount it, and also a template for drilling the motorboard. As a rule, these instructions are very comprehensive and the average amateur should experience no difficulty in drilling his motorboard and mounting the motor correctly.

There are, however, just one or two things that should be carefully watched. First, make certain that when the turntable is put on the record-spindle it fits well and that the turntable is parallel to the motorboard.

In any case, it is not a bad idea to put a spirit level on the turntable to make certain that the table is exactly horizontal; perhaps

the motorboard, or even the floor itself, is not level. You must, by some method or another, even if



We can't all make our own radio gramophones, for one reason or another, so we have to buy one. Here is a group of enthusiasts discussing the merits of some of the latest H.M.V. record releases

it comes to putting paper under the legs of the cabinet, make the turntable perfectly horizontal if the wear on the records is to be minimised.

Imagine, for a moment, a pick-up tracking on a record that is not horizontal. The actual weight on the record will not be at the bottom of the groove; it will be slightly to one side, with the result that if we go on playing the record, in a very short time one of the walls of the grooves will be more worn than the other.

It will be seen at once that the first thing to suffer will be the reproduction. The clear definition of tone will vanish, and in a very short time the record, when played, will make all kinds of queer noises.

Not only will the pressure on the record be uneven, but it stands to reason that the pressure on the needle of the pick-up will also be uneven. Actually, the strain on the needle will be felt at the head, where the delicate damping arrangement is fixed. In time we should find that this strain on the pick-up damping arrangement would put the needle out of alignment, with the result that quality would become worse, simply because the pick-up would be faulty.

### MOTOR VIBRATION

One problem that is common to both the spring and electric variety of gramophone motor is vibration. Often the mechanical noise caused by the motor affects the response of the pick-up. The noise would be converted by the pick-up into electrical vibrations, passed through the amplifier, and eventually would emerge from the loud-speaker in the form of a background noise of some sort.

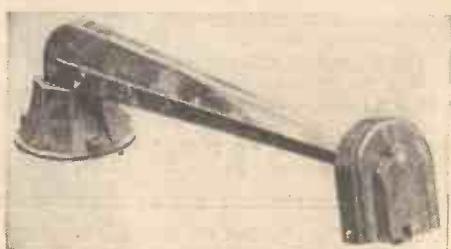
There are several ways of preventing this effect, and it only needs the practical man to rig up some method whereby the motor is

sound-insulated from the rest of the cabinet. Here are some simple ideas that you might try if you are having trouble with motor vibration:

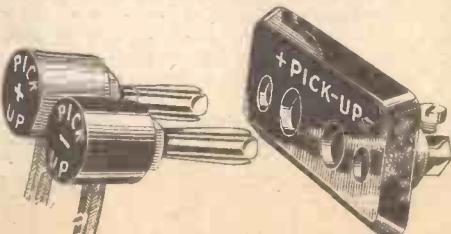
#### Supporting on Rubber Washers

If the motor is mounted on a metal plate ready for fitting in a large hole in the motorboard, a simple way is to support the motor on large rubber washers—between the motorboard and the plate of the motor, so that the motor is raised from the motorboard. With the ordinary type of motor, fitted by the ordinary nut and bolt method, the same idea can be tried, but usually rubber washers for the purpose are supplied by the makers.

Failing this very simple remedy, there is another method worth trying. Take out the complete motorboard with motor and round the ledge on which the board rests in the cabinet



A typical electromagnetic gramophone pick-up for the electrical reproduction of records



Special pick-up plugs and socket made by Bell & Lee



Trying out a home-built table radio gramophone. Such an instrument can be made very cheaply

fit some rubber draught preventer—you can buy it from your local hardware dealer. This rubber draught preventer has a tubular portion at one edge and is flat at the other. The flat edge should be tacked on to the side and, of course, the motorboard will "float" on the tubular edge of the rubber tubing.

If you want the whole job to look really neat, the ledges on which the motorboard rests should be lowered  $\frac{1}{4}$ -in. before the rubber is tacked on, so that when the board is replaced the top is level with the ledges of the radiogram cabinet. If the motorboard supports are not lowered, of course, it will project up a little above the side ledges.

#### CORRECT RUNNING SPEED

There seems to be a general impression among gramo-radio fans that the speed at which a record is played does not matter one iota as long as the reproduction appears to be all right. But it stands to reason that when the tune is recorded, the recording wax is rotated at a constant speed. Nowadays the recording speed has been standardised at 78 revolutions per minute. Let us see what will happen if we do not reproduce our records at that speed.

Suppose, for instance, we play them at 85 revolutions per minute. In the first place,

THE "atmosphere" of an outside broadcast is very largely created by the incidental noises one hears in the background. Sports commentaries in particular owe much of their realism to what might be termed, in theatrical parlance, the "noises off."

Against a background of dead silence, a running commentary on an international Rugger match, for instance, would be a relatively tame affair! Half the fun would be lost for most people if they could not hear the excited yelling and cheering of the crowd and all the other noises that make listeners feel as if they were actually in the midst of the spectators.

#### Oxford and Cambridge Boat Race

The Oxford and Cambridge boat-race commentary, too, would fall very flat without the cheering of the crowds beside the river, the hooting of sirens, the occasional roar of aero engines as the giant air-liners, carrying

the pitch of the music being played will be higher. In simple language that means that, say, a middle C as played in the recording studio will probably be a D- or E-flat when we hear it from our loud-speaker, with the result that the whole musical effect will be destroyed. This may seem a startling suggestion, but music is not written in a special key for the fun of the thing.

#### On the Mellow Side

A work written in E-flat sounds, as you know, on the mellow side compared with a work written in D. Incidentally, another result of 85 revolutions per minutes would be that the time would be decreased, and you would not get your value for money with the record because the playing time, naturally, would be less.

Of course, for dance music, it does not really matter at all providing the time is right and there is a musical noise of some sort.

There are some very simple ways of ensuring that the motor is "revving" at the correct 78 per minute. The most simple, although rather boring, is to stick a piece of paper on the side of the turntable and count the revs. per minute with the aid of a watch. Another way is to get a stroboscope and view it with the aid of an ordinary electric light, which must be working on 50-cycle A.C. mains.

The stroboscope is so arranged that when revolving at 78 revolutions per minute the little black squares on the outside appear to remain stationary. Most gramophone-motor manufacturers supply a stroboscope disc free with their motors. The synchronous type of motor is useful in this respect in that it has no speed regulator and will only revolve at the correct speed.

#### INTERFERENCE FROM GRAMOPHONE MOTORS

Interference caused by gramophone motors can be divided into two kinds. One, an ordinary hum that gets worse as the pick-up moves across the record to the centre, and the other, an intermittent noise sounding like atmospherics.

The first type of interference may be due to several causes, but usually it can be cured by shielding the pick-up leads and earthing the

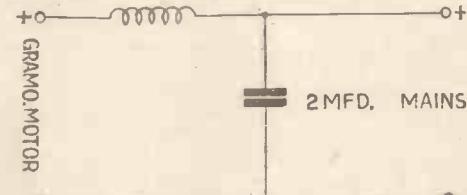


Fig. 1.—How to connect a D.C. motor to avoid interference

## Local Colour That "Makes" Outside Broadcasts

privileged spectators, circle overhead, and suchlike sounds which make the whole broadcast seem so real.

For the average listener the thrill of listening to a motor or motor-cycle race, or, say, the seaplane race for the Schneider Trophy, is enormously enhanced by hearing the devastating roar of the powerful engines as the competing machines hurtle over the course. Without these fascinating background noises, a race commentary would be apt to become nearly as staid as a news bulletin!

No matter how brilliant the descriptive

shielding. Secondly, a piece of copper or aluminium foil tacked underneath the turntable and earthed will, in conjunction with the first remedy, in most cases stop the trouble.

The second form of interference, sounding like atmospherics, can be put down to the brush contacts in the motor. Simple ways of curing this interference—or, at least, minimising it—

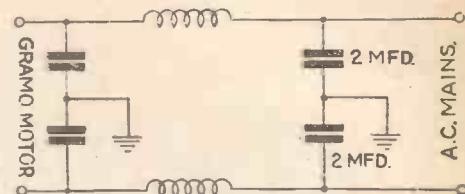


Fig. 2.—Connecting an A.C. motor to minimise mains interference

can be seen from Figs. 1, 2, and 3. The method shown by Fig. 1 for D.C. motors is very simple. A mains high-frequency choke is inserted in the positive lead and decoupled on the mains side by a 2-microfarad condenser.

In some cases the positive side of D.C. mains is earthed; then, of course, the mains high-frequency choke must be put in the unearthing lead.

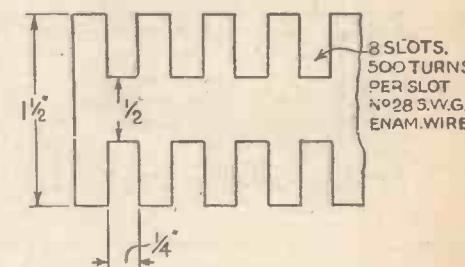


Fig. 3.—Details for making a mains high-frequency choke

The arrangement for A.C. motors can be easily seen from Fig. 2. In this case we use two mains high-frequency chokes, one in each lead; two 2-microfarad condensers are joined across the mains and the centre point is earthed.

Some listeners may like to try their hands at winding their own mains high-frequency chokes. It is not difficult, as can be seen from Fig. 3. The former which should be of ribbed ebonite or wood, can be obtained ready made from many ebonite manufacturers, for example, Becol or Redfords. The dimensions of the former are given in Fig. 3. The wire is wound in 8 slots in the same direction. Between 2,000 and 3,000 turns are necessary.

There is, as a rule, little interference caused by induction and synchronous types of gramophone motor.

A.B.L.

work of the commentator, the running commentary on the Derby or the Grand National would become relatively lifeless if it were shorn of such typical background sounds as the shouting of "bookies" and the yelling crescendo from the crowd at the finish. These things make the broadcast live! They make all the difference between a red-hot running commentary and a mere eye-witness account after the event.

#### Incidental Play Noises

Even in the quieter pleasures of listening, incidental noises play an equally important part. When speeches at public banquets, etc., are being broadcast, the appropriate atmosphere is largely created for listeners by the "banquet" sounds and murmur of conversation that one hears in the few moments elapsing between the switching on of the microphone and the commencement of the speeches.

W. O.

# Portadyne B72 Battery Superhet

SO far this season there has been a general tendency to decrease prices and at the same time to give even better value than ever before. We are quite used to superhets costing 12 to 13 guineas, even though this is a very low figure. The new Portadyne B72 costs £10 19s. 6d., an extraordinarily low price.

That the receiver is better than any the makers have turned out before, of this type, means that this is an exceptional bargain.

The cabinet is of dark polished walnut, of very severe design, which is most pleasing to the eye.

The dimensions, when one considers that the



*The set in use. Note the neat internal arrangement.  
The batteries are supplied by the makers*

receiver is totally self-contained, are very small indeed. It is barely 14½ in. wide, 18 in. high, with a depth of 10½ in.

As is usual with the modern superhet, the controls are very simple. Just three knobs and a separate master switch on the left-hand side of the cabinet. Of these three knobs the left-hand one is the volume control, while in the centre is the master tuner, with a ratio of about 6 to 1; the wave-change switch is on the right of the set.

The escutcheon plate is almost flush with the cabinet and of similar colour, with an illuminated tuning dial calibrated in wavelengths.

At the rear of the cabinet provision has been made for plugging in a gramophone pick-up and an external loud-speaker.

The circuit is very efficient and makes

the utmost use of the latest modern valves. The undistorted output from the class-B valve is a little under 1,500 milliwatts, although the rating is only 1,300. As it is a battery set, the high-tension consumption is of vital importance, and we know that the figures we are going to give you will cause some comment, because they are so much lower than one would anticipate.

The "rest" current, that is, with the receiver switched on but not reproducing any signals, is 6.5 milliamperes. When the output is increased to 500 milliwatts, which is ample for the average room, the anode current averages 8 to 9 milliamperes. If the vol-

ume is increased to the maximum, that is, a little under 1,500 milliwatts, the anode current averages 10 to 14 milliamperes.

This is due to a very careful choice of valves, the application of bias wherever possible, and the use of a special biased type of class-B valve. The set is supplied with a 123-volt high-tension battery and a 13.5-volt grid-bias battery, so you can realise that the quality can be really good. The moving-coil loud-speaker is of large dimensions and does give a very level frequency response.

It is claimed that the selectivity is 9 kilocycles, but we find that this is a very conservative estimate. On medium waves stations separated by 9 kilocycles could be received without any interference at all; on long waves Radio Paris could be separated from Hilversum,

## SPECIFICATION IN A NUTSHELL

Makers : Portadyne Radio.

Model : B72.

Price : £10 19s. 6d.

Valve Combination : Combined oscillator/detector, PM12M; single intermediate-frequency stage, S215VM; second detector, L2DD; double-diode-triode; driver stage, PM2DX; and biased pentode, PD220A.

Power Supply : Dry batteries and low-tension accumulator.

Type : Self-contained table model.

Remarks : Exceptionally cheap superhet that gives adequate selectivity.

*Front view of the Portadyne B72 battery superhet table receiver giving a selectivity of 7 kilocycles. This is good for any set.*

Now as to the performance.

The wavelength range is between 200 and 550 metres and 800 to 2,000 metres. On the medium waves, during the early evening, we were able to pick up eighteen stations below 250 metres, while above this wavelength stations came in with monotonous regularity. We feel quite sure than even under very poor conditions a minimum of at least fifty stations could be relied upon.

When tuning through stations, such as the National, which are usually very loud, the automatic volume control comes into action and reduces the level to comfortable room strength and so prevents blasting. Fécamp on 206 metres was heard at full loud-speaker strength during the morning, while at lunchtime Budapest, was tuned in at good volume.

## Cutting Out the "Local"

Even when the receiver is used close to the local station, no more than one channel either side was lost through sideband splash.

On the long waves twelve stations were heard in broad daylight, including Warsaw on 1,200 metres, and even weak aeroplane transmissions could be picked up without any difficulty. The only station on this waveband that we found difficult to tune in free of interference was the Eiffel Tower, which is very close indeed to Daventry.

This receiver will pick up all of the programmes the average man is likely to require, with good quality and at low interference level. In view of the low anode-current consumption the set will be most economical to run, and the efficiency is comparable to that of many A.C. sets of similar type.

# Valve and Set News from All Quarters

IT is becoming quite a habit for the more prominent manufacturers to introduce new receivers and components in the early part of the year as well as at exhibition time. Philips Lamps, Ltd., are to release on March 1 a remarkably cheap set for the battery user.

It is designated the 834B and is priced at 10 guineas. It uses five valves, including one to control the high-tension current, a moving-coil loud-speaker and is supplied complete with dry batteries and low-tension accumulator.

Although there have not been as many new battery valves as we could have wished, there are signs that in the next few weeks we shall see the introduction of half a dozen or so new ones. The Mullard Company are to introduce

the VP2, a variable-mu high frequency pentode with a five-pin base (price 15s. 6d.). This will be followed by the SP2, another battery high-frequency-pentode, but with a fixed grid base.

The TDD2, a battery-operated double-diode-triode, similar to the TDD4 which operates on A.C. mains, is now ready. This valve takes a current of .1 ampere at 2 volts and is supplied with a five-pin base.

Radio gramophones with automatic record changers are becoming more popular and at the same time less expensive. The General Electric Co. have just introduced their automatic record-changing Superhet Eight. The catalogue number is BC3448 and the price

is 50 guineas. It is suitable for A.C. mains only and is really one of the cheapest sets of its kind.

We are glad to see that at last the Ferranti people are to augment their range of valves. They have just introduced three new battery valves, all with 2-volt .1-ampere filaments. These are the VS2, variable-mu screen-grid; the H2D, a double-diode-triode; and a triode valve, designated the L2, which can be used either as a small power or driver valve. These valves will all be available at the end of February.

Further news items appear on page 210 of this issue—don't overlook them.



There is a great deal of fun to be had with a good radio gramophone

THE radio gramophone has proved to the hilt its value as an instrument for the provision of home entertainment. Not only are the sales of "ready-made" instruments increasing steadily, but, thanks largely to the pioneer work done by AMATEUR WIRELESS and by *Wireless Magazine*, the radio gramophone has now been brought well within the scope of the home constructor.

Some make combined apparatus, the wireless part of the set and the gramophone turntable being contained in the same cabinet; others adapt clockwork or electrically-driven gramophones for use with the last two valves of a receiving set by means of a pick-up.

#### Handiness in Operation

Whichever kind of apparatus is made, its handiness can be greatly increased by the provision of special switches. These are not of a very complicated kind and they are so extraordinarily useful that if the intending constructor examines the diagrams which accompany this article he is sure to decide to adopt one or other of the methods suggested.

Take, first of all, the problem of switching over from radio to gramophone. So long as there is no high-frequency valve it is a simple enough business, for all that needs to be done by the switch is to transfer the grid lead of the detector valve from the grid condenser and leak to one of the pick-up terminals.



How the set, loud-speaker and batteries are arranged in a radiogram cabinet

# Switching for Your Radiogram

By R. W. HALLOWS, M.A.

The other pick-up terminal is already connected via a grid-biasing battery to low-tension negative. But in many sets there is a high-frequency valve, and it is then most desirable that the switch should be so arranged that this is cut out when the set is employed for the playing of records. Fig. 1 shows a simple method of achieving this end.

It is applicable either to the self-contained radiogram or to the outfit consisting of separate wireless and gramophone parts. The switch should, in any case, be mounted in the wireless set, and if there are pick-up terminals their place in the scheme is indicated at xx in Fig. 1.

The type of switch required is known as a three-pole three-position. The barrel pattern is very suitable, though it must be so arranged that there is a mid-position of the knob or lever in which all contacts are broken.

See what happens in Fig. 1 when the switch is turned over to "Gramophone." The grid of the detector goes straight to the volume control of the pick-up; the negative of the filament current supply is connected to the low-tension negative busbar and to earth, but the low-tension positive busbar is broken by the switch so that the first valve is thrown out of action.

Now imagine the switch turned over to the "Radio" position. The grid now goes to the grid condenser and grid leak; the low-tension negative busbar is connected up, and that part of the low-tension positive of the first valve is no longer broken. All three valves are thus in action. The same kind of switching can, of course, also be used if there are two or more high-frequency valves.

The variable-mu screen-grid valve, which is now so popular, introduces problems of its

own. The most important of these from the switching point of view concerns the grid-bias battery ( $GB_1$  in Fig. 2), which is used in conjunction with a potentiometer as a volume control.

#### Avoid Current Drain

It is most desirable that this battery should be cut out when the set is switched off, for otherwise it will be continually under a current drain through the resistance winding of the potentiometer.

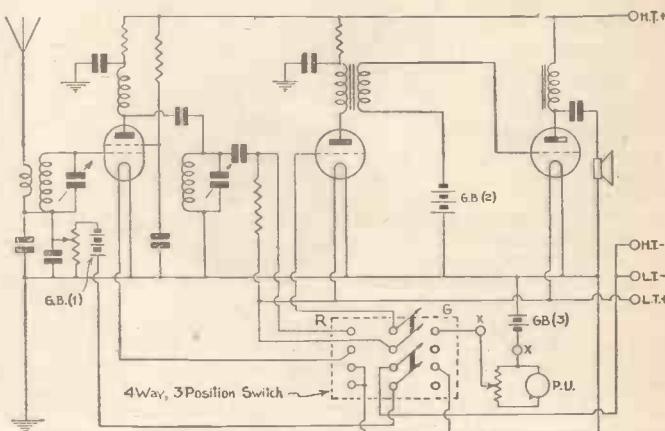


Fig. 2.—Switching a radio gramophone when a variable-mu valve is used for high-frequency amplification

Unfortunately, we cannot do this by means of a switching arrangement like that seen in Fig. 1. At first it seems that this should be possible, since when the switch is in the "off" position both the positive and negative low-tension connections of the first valve are broken — there remains, though, the path through the valve filament, as you will see if you care to draw a diagram—and try to work out radiogram switching for a variable-mu valve with a three-pole switch.

The simplest method is that illustrated in Fig. 2, where a four-pole three-position switch is used. In the "off" position all the valves and  $GB_1$  are out of action. When the switch is turned to "Gramophone," detector goes to the pick-up, the last two valves are switched on, first valve remains idle and there is no path for current from  $GB_1$ .

#### On Radio Position

On turning the switch over to the "Radio" position all three valves come into operation, whilst the circuit of the potentiometer across  $GB_1$  is automatically made. In Fig. 2 again, letters xx indicate the position of the pick-up terminals if the switch is used for two separate units.

From these two typical examples you will appreciate that a certain amount of care in switching will be amply repaid by convenience in action.

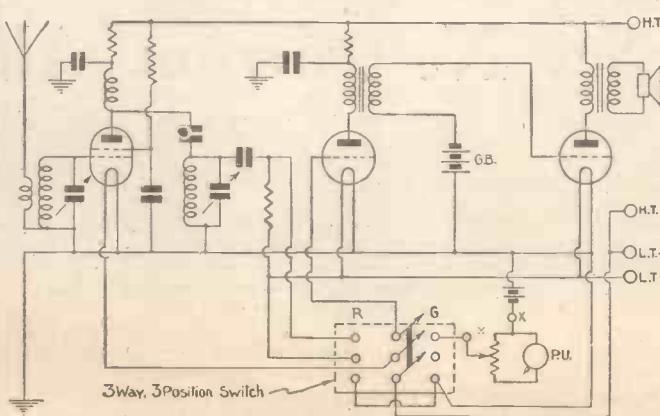


Fig. 1.—Switching system arranged to cut out high-frequency valve during gramophone use

# Adapting Television Apparatus for Increased Scanning

**A**MATEURS who contemplate building television apparatus are sometimes concerned whether in the event of the number of scanning lines being increased the gear would become useless. As a matter of fact there is scarcely any prospect of the thirty-line transmissions being discontinued for twelve months at least, so there need not be much fear in this respect. However, it will be interesting to consider what can be done with the various types of receivers which are now available to the amateur if it is desired to increase the scanning frequency.

There are indications that in the event of an increase being made that this would be some multiple of the present thirty lines—for instance, sixty or one hundred and twenty. Taking the case of the disc receiver first as being the simplest of all there would be no difficulty whatever in substituting a disc with sixty holes in it for the existing thirty, and, of course, in this case the only additional cost entailed would be a matter of a few shillings for the new disc. All the other apparatus would be quite suitable. It is doubtful whether a disc could be conveniently made for one hundred and twenty-line scanning to operate with existing apparatus, for the size would have to be increased to such an extent that it would become unwieldy and this would also mean a larger motor and general reconstruction. This, however, is a possibility that need not be discussed at the present time.

The next receiver in order of simplicity is the mirror screw, and this lends itself admirably for an increased number of scanning lines; in

fact screws are in use at present in Germany where this type of receiver is greatly favoured with a hundred and twenty-line scanning, though ninety lines is the most favoured number. The only work entailed in the conversion of a mirror screw is an addition to the number of mirrors of the screw. Modification would in all probability have to be made to the light source, but this would be quite a simple matter.

### Multiplying Devices

Finally, in the mechanical apparatus class, there is the mirror-drum receiver to consider. A mirror-drum with a larger number of mirrors than thirty becomes heavy and unwieldy and, of course, it would have to be of special construction. It is, however, possible to adapt existing mirror-drum apparatus for increased scanning, provided that this is a multiple of the present number of lines—viz., sixty or one hundred and twenty.

Such conversions can be made with multipliers according to the number of lines required. The mirrors of the thirty-line mirror-drum have an angular separation of twelve degrees. For sixty lines this would have to be six degrees, and three degrees for one hundred and twenty lines. Either of these numbers of degrees can be obtained without alteration to the drum, the most costly part of the apparatus, by interposing a ray multiplier between the drum and the screen. In the case of a fourfold increase being required, four plain mirrors are used, arranged angularly with respect to each

other. The light is reflected from these and is broken up into four rays so that each mirror on the drum produces four rays which fall on the screen; therefore one revolution of the drum on which are thirty mirrors will produce a hundred and twenty lines on the screen.

A further feature of this device is that the shape of the picture ratio can be altered.

There is one further point and this concerns the possibility of an increased picture frequency. This again is not likely to transpire immediately, but it is interesting to note that accommodation can be made in this respect also with all classes of apparatus. It merely amounts to an increase in the speed of the scanner. The only difficulty here would be whether the power of the motor is sufficient to drive the scanning device at the increased speed. The present picture speed is twelve and a half per second, and if an increase were made it would in all probability be put up to twenty-five, which would mean double the speed.

### Cathode-ray Apparatus

One of the great claims made for cathode-ray television apparatus is its adaptability for a change of scanning and frequency. Actually this is accomplished without any structural alterations whatever, merely entailing an adjustment of the controls. The only limitation is that of accommodating the lines produced by the spot within the screen dimensions, but a hundred and eighty lines can be produced within the area of the tube screen without difficulty.

## A Mains Unit for the Double Time-base

**T**HE layout of the mains rectifier unit mentioned last week is given on the right. Since the components are "stock" ones which are usually available in an experimenter's laboratory, a certain amount of variation in their layout may be permitted. It is strongly recommended that the unit be enclosed in a steel box with a well-fitting lid in order to minimise stray field from the transformer. The actual components used in the construction were:



Drilling diagram of Terminal Block

- (1) Transformer, with secondary windings 350-O-350; 2-O-2; 2-O-2; 2-O-2; 2-O-2; (Sound Sales). Two of the L.T. windings are required for the thyratrons of the time-bases, and one for the screen-grid valves acting as constant-current resistances. In the double time-base as adapted for mains operation, the thyratrons will be fed from separate windings, as their cathodes are at differing potentials and less liability to interference will be experienced. The screen grids are, however, at a common cathode potential, and thus can be heated from a common L.T. supply.
- (2) 50-henry chokes (Sound Sales). Two of

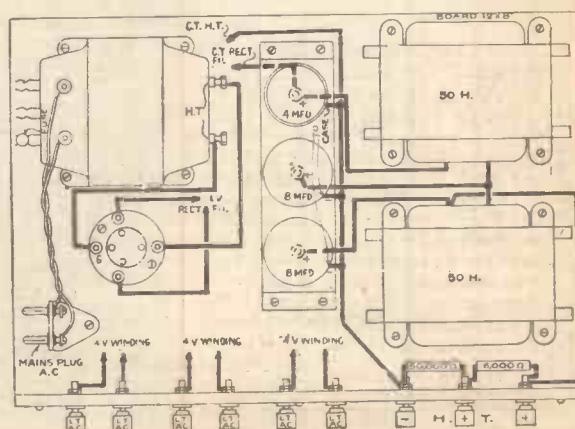
these are used in series for extra smoothing. (3) Three 8-mfd. electrolytic condensers (T.C.C.). Ordinary tubular pattern may be used, but the negative case should be insulated from the rest of the components and metal case, since either the +ve or -ve of the unit can be connected to case and anode of the tube. It will be found that one way of connection will give the least interference, and each method should be tried.

- (4) Sundries: Baseboard valve-holder. Terminal strip 11 in. by 1 in. by  $\frac{1}{4}$  in., with 9 Belling-Lee "R" type terminals marked as shown. Twin mains plug and socket (Belling-Lee); 50,000-ohm and 6,000-ohm resistance (Erie.)
- (5) Rectifier—Mazda UU.120/350.

It will be noted that a potentiometer has been connected across the H.T. terminals to permit of a lower voltage being applied to the time-base if required. The assembly of the components is simple and requires no detailed explanation. Note that the terminal strip is mounted back from the edge of the baseboard so that the terminal will not catch in the case if one is fitted.

It will not be necessary to connect the heater windings on the transformer to the case or -ve, and accordingly the centre taps should

be left isolated for the time being. If a valve is used with faulty heater-cathode insulation, interference may be reduced by making the connection between centre tap and -ve, and



The layout of the mains rectifying unit

this can be checked later. The whole unit has been designed with a view to providing a serviceable component which will have a variety of uses in the experimenter's workshop, providing as it does, extra smooth H.T. supply of a convenient voltage for testing medium and large receivers.



Will Fyffe, who recently took the part of a guard on a Scotch express

#### Monday

**F**EELING none too happy to-night. Everything, or nearly everything, gone wrong. My Uncle Andre let me down to begin with. Programme said: "You haven't forgotten that Andre Charlot presents the Charlot Hour?" I hadn't, but I've been trying to ever since.

If he, with all his vast experience, can miss the comedy bus like that, I begin to despair of ever relying on good light entertainment.

Jack Payne so good; his crooners not so good. Still, if Jack won't do anything without his crooners, I suppose we must put up with them.

Gillie Potter pottered about with his humour. For once he missed me, or I missed him. He must have thought he was lecturing the Oxford Dons, or something of the kind. Perhaps I expected too much. Anyhow, I went to bed without having smiled the whole evening.

## Listeners' Letters

#### "UNBUSINESS-LIKE METHODS"

To the Editor, AMATEUR WIRELESS.

SIR.—I read with interest letter No. 1027. The following may interest you.

During the last week of December, 1933, I ordered through my usual dealer an iron-core aerial and reaction coil and an iron-core coil pack with ganged condensers, total cost about £3 10s. (ordered from manufacturers).

After three weeks the coil pack came, but as the small aerial and reaction coil did not turn up in four weeks, I had it ordered from credit where credit is due—Peto-Scott; it came in four days.

The makers still have not sent it (the small coil), about six weeks. J. W. is not alone.

DAVID WRIGHT.

Cambridge.

[1022]

#### SUPER-HET FREQUENCIES

SIR.—I was very interested in Mr. Corbett Griffiths' letter in your issue of February 3, under the title of "Intermediate Frequencies."

Although I have had practically no experience with super-hets, I can certainly substantiate your correspondent's statement regarding the advantages of a set similar to the one he mentions.

The present set I am using utilises three Varley Nicore coils in the following sequence:

## My Programme Diary

#### Tuesday

Bernard Shaw did his best to wither Britain. My reaction to him to-night was a feeling that he was so right in most of his destructive criticism that I wished he had given us something constructive to be getting on with. "See what Baby is doing and tell him he mustn't," only leads so far and no farther. However, as a vaudeville entertainer, G.B.S. is one of the best.

#### Wednesday

A certain dullness pervaded the symphony concert. Lamond playing Beethoven's third piano concerto should have been the last word. He is supposed to be the great interpreter of that Master.

None of it sounded happy, which it should have done. As for Mahler's Ninth Symphony, honestly I cannot see what value it is to broadcasting. A dissonant, ugly work. Pain-in-the-neck sort of music.

#### Thursday

Is it feasible to pot films and make broadcasts out of them? *Email and the Detectives* as a film story was popular because it really did appeal to young and old alike.

The wireless version seemed to bring out unsuspected weaknesses. Probably this was because children's voices broadcast badly. When children lose their natural charm, one quickly tires of them. In my opinion, that occurred in this play.

#### Friday

The Adelphi version of *Songs from the Shows* gave me some surprises and a deal of pleasure. It was pleasant to hear music from the *Quaker Girl*, for instance. I had forgotten it came originally from that theatre.

Anona Winn and Toots Pounds, Raymond

Newell, Reginald Purcell and Mitchell made a strong cast.

John Watt can afford to tell us a little more about each show. He is so modest that he thinks we want to rush on to the next item. Plenty of time, John! Let us hear the history of these shows.

#### Saturday

Began with *In Town To-night*, which I thought well up to standard. People seem to be talking about this series. Probably the novelty of not knowing what is coming attracts them to some extent.

The Music Hall from St. George's was a trifle patchy. Chick Farr and his confére seemed to be shouting their lines. Even when I turned down my volume control I was no better off. I wonder whether they would consider doing their act in a more intimate fashion? I am sure it would be improved thereby.

Bertha Willmott pleased me immensely. I liked her old-fashioned Music Hall style. We might have more of her.

The sketch *Gentlemen—the King!* given by Tod Slaughter and Company, bored me utterly. Melodramatic stuff of that kind is very little use as a broadcast proposition at any time—certainly not in a show from St. George's.

Still, it was more than worth wading through it to get to Will Fyffe, who surpassed himself as the guard on the Scotch express. First-rate patter and a charming Scottish delivery. Also he sings so well! Another of whom we hear far too little.

#### Sunday

Hesitated to-night between symphony concert and poetical anthology on the other wavelength. Decided in favour of the latter. Thoroughly enjoyed the English of it.

Then a spot of Beethoven, a pipe, and so to bed!

without a short-wave set. Well, I tried my luck between three and five o'clock this morning (February 7) and I had no trouble whatever in picking up the Westinghouse station WBZ of Boston and Springfield at very strong headphone strength; no difficulty in hearing nearly every word of their news bulletin and the dance music from the Hotels Bradford and Waldorf Astoria.

I also heard three more stations—WEAF of New York; one belonging to the Columbia Broadcasting Company, about 280 metres; also a station with announcements in Spanish.

The above stations were heard on a two-valve set using Mullard PM1HL and PM22a. The set was published in AMATEUR WIRELESS several years ago—Britain's Favourite Two.

P. HAIGH.

[1024]

SIR.—*—Apropos the article "America Without a Short-wave Set," in the issue of AMATEUR WIRELESS for February 3, I should like to thank you for a very interesting article and also, as a result of reading it, an interesting few hours among the "Yanks."*

Shortly after midnight I started running over the dials and picked up EAJ8 (San Sebastian) at comfortable volume. Later I logged four Americans, but was unable to identify three of them.

I am puzzled, however, since the one I identified (WBZ) came in on my dial—no!

*Continued on page 224*

#### AMERICAN RECEPTION

SIR.—I read with interest in AMATEUR WIRELESS the article on receiving America

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# Broadcast Wavelengths

This week we give details of the principal short-wavers and the European long-wave stations. Next week we shall publish a list of medium-wave transmitters

## Principal Short-wavers

Metres	Kilo-cycles	Station and Call Sign	Country
16,86	17,790	Daventry (GSG) .....	Great Britain.....
16,88	17,775	Hulzen (PHI) .....	Holland .....
19,56	15,330	Schenectady (W2XAD) .....	United States.....
19,61	15,295	La Paz (CP4) .....	Bolivia .....
19,68	15,234	Paris (Coloniale) (FYA) .....	France.....
19,72	15,210	East Pittsburgh (KDKA) .....	United States.....
19,73	15,200	Zeesen (DJB) .....	Germany.....
19,82	15,140	Daventry (GSF) .....	Great Britain.....
19,84	15,120	Vatican (HVJ) .....	Italy.....
23,39	12,825	Rabat (CNR) .....	Morocco .....
25,00	12,000	Moscow (RNE) .....	U.S.S.R. ....
25,25	11,880	Paris (FYA) .....	France.....
25,27	11,870	E. Pittsburgh (W8XK) .....	United States.....
25,28	11,865	Daventry (GSE) .....	Great Britain.....
25,40	11,810	Rome (ZRO) .....	Italy.....
25,53	11,750	Daventry (GSD) .....	Great Britain.....
25,57	11,730	Hulzen (PHI) .....	Holland .....
25,63	11,705	Paris (Coloniale) .....	France.....
30,0	10,000	Madrid (EAQ) .....	Spain .....
31,25	9,600	Lisbon (CTIAA) .....	Portugal .....
31,28	9,590	Philadelphia (W3XAU) .....	United States.....
31,28	9,590	Sydney (VK2ME) .....	New South Wales .....
31,297	9,585	Daventry (GSC) .....	Great Britain.....
31,35	9,570	Boston (WIXAZ) .....	United States .....
31,38	9,560	Zeesen (DJA) .....	Germany .....
31,48	9,530	Schenectady (W2XAF) .....	United States.....
31,545	9,510	Daventry (GSB) .....	Great Britain.....
31,55	9,510	Melbourne (VK3mE) .....	Victoria .....
37,33	8,035	Rabat (CNR) .....	Morocco .....
38,47	7,797	Radio Nations (HBP) .....	Switzerland .....
38,65	7,765	Kootwijk (PDM) .....	Holland .....
42,92	6,880	Oslo (LCL) .....	Norway .....
43,86	6,840	Budapest (HAT2) .....	Hungary .....
45,38	6,610	Moscow (RW72) .....	U.S.S.R. ....
45,40	6,593	Bucarest .....	Roumania .....
46,69	6,425	Boundbrook (W3XL) .....	United States.....
48,86	6,140	Pittsburgh (W8XX) .....	United States.....
49,02	6,120	Wayne (W2XE) .....	United States.....
49,18	6,110	Chicago (W9XF) .....	United States.....

Metres	Kilo-cycles	Station and Call Sign	Country
49,18	6,110	Boundbrook (W3XAL) .....	United States.....
49,22	6,095	Bowmanville (VE9GW) .....	Canada .....
49,4	6,073	Skamleback (OXY) .....	Denmark .....
49,47	6,065	Nairobi (VQ7LO) .....	Kenya Colony .....
49,59	6,050	Daventry (GSA) .....	Great Britain .....
49,83	6,020	Zeesen (DJC) .....	Germany .....
50,0	6,000	Moscow (RNE) .....	U.S.S.R. ....
50,26	5,969	Vatican (HVJ) .....	Italy.....

## Long-wave Stations

Metres	Kilo-cycles	Station and Call Sign	Country	Power (Kw.)
696	431	Oulu .....	Finland .....	12
726	413.5	Boden .....	Sweden .....	6
748	401	Geneva .....	Switzerland .....	1.5
748	401	Moscow (3) .....	U.S.S.R. ....	20
765	392	Ostersund .....	Sweden .....	6
845	355	Vardo .....	Norway .....	1
940	319	Kharkov .....	U.S.S.R. ....	35
1,107	271	Moscow (RCZ) .....	U.S.S.R. ....	100
1,176	255	Oslo .....	Norway .....	60
1,224	245	Leningrad .....	U.S.S.R. ....	100.0
1,261	238	Kalundborg .....	Denmark .....	30
1,304	230	Radio Luxembourg .....	Grand Duchy .....	200.0
1,357	221	Motala .....	Sweden .....	30
1,389	216	Eiffel Tower (Paris) .....	France .....	15.0
1,415	212	Warsaw .....	Poland .....	120
1,500	200	Daventry National .....	Great Britain .....	30
1,554	193	Ankara .....	Turkey .....	7
1,570.7	191	Konigs wusterhausen .....	Germany .....	60
1,613	186	Istanbul .....	Turkey .....	50
1,639	183	Reykjavik .....	Iceland .....	21
1,714	175	Moscow (1) .....	U.S.S.R. ....	500
1,796	167	Radio Paris .....	France .....	80
1,797	166.5	Lahti .....	Finland .....	40
1,875	160	Kootwijk (Hilversum prog.) .....	Holland .....	50
1,935	155	Brasov .....	Roumania .....	200
		Kaunas .....	Lithuania .....	7

## Sorting Out the Long Waves

By JAY COOTE

IT is satisfactory to learn that a further attempt is to be made shortly at Brussels to clear up the muddle on the long-wave band; possibly at the same time some slight adjustments may be made to allocations on wavelengths below 600 metres.

There seems to be little doubt that, so long as no step is taken to placate the dissatisfied members of the Union of Broadcasters, the present trouble—at least, on the long waves—will not only continue, but may perhaps grow worse. In fact, this will inevitably prove the case if, seeing no amicable solution of their troubles, the dissenters take the matter in their own hands.

### More Than One Injustice

Whatever argument may be put forward, we cannot disguise the fact that more than one injustice was made when the channels were allocated. Holland was entitled to retain a position she had enjoyed for many years, and in view of the fact that the country was one of the very first to broadcast programmes, it was unfair to compel her to share a channel.

As it is so far, with Brasov (Roumania) only using low power, her transmissions on the wavelength she is fighting for do not suffer interference, but as it is the intention of the Bucarest authorities to erect a 150-kilowatt station for use on that wavelength—the order for the transmitter has been placed in Great Britain—it is evident that in a more or less near future the sharing of this channel by the two stations will become a matter of impossibility. We can therefore already foresee trouble in that quarter.

Radio Luxembourg, to which I referred in greater detail last week, still constitutes a problem, yet, as it is a 200-kilowatter, it

cannot be ignored and, willy-nilly, obviously must be housed in the long-wave band.

Radio Paris and Lahti, in view of the latter's arbitrary move to 167 kilocycles (1,796 metres), are sharing the same channel, thus affording France a justified grievance.

Kaunas on 1,935 metres, is actually troubling nobody in the broadcasting world, but is occupying a channel out of the allotted band. Istanbul, which should work on the London National wavelength, is found on 186 kilocycles, namely, 5 kilocycles below the Deutschlandsender. Ankara, the Turkish transmitter for which room was provided on 183 kilocycles (1,639 metres) and where Reykjavik is correctly working, has fitted itself in between Daventry National and the German high-power transmitter with a separation of 7 kilocycles from the former and only 2 kilocycles from the latter!

When we consider Warsaw, Eiffel Tower, Motala and Oslo, we again discover notable deviations from the Lucerne Plan. The Pole, refusing to work on 1,304 metres (now occupied by Radio Luxembourg), has been forced up to 1,415 metres, a close neighbour of Minsk (U.S.S.R.), now a 36-kilowatter, and is hemmed in on the other side by the Paris usurper on 1,389 metres (216 kilocycles).

Here we find three powerful stations on a section covering actually 8 kilocycles, instead of the much desired 21-kilocycle spacing. Motala, to get away from Radio Luxembourg, now works on 1,357 metres (221 kilocycles), thus leaving it distant from Eiffel Tower by only 5 kilocycles.

Here we have a true picture of the long-wave band and can safely say that the general conditions are no better than before the change over was carried out.

## LISTENERS' LETTERS

Continued from page 222

I've just discovered my error—WBZ it is, just above North National.

Further down, I logged another station, just under Rennes PTT, which I presume is WTIC, and lower still, about the setting for West Regional, another, very weak, which I presume to be WCAV.

The fourth was definitely too weak to identify at all, but was about half-way between WTIC and WCAV.

Only WBZ was distinguishable on the loud-speaker, though WTIC would have been if the volume had remained steady.

My set is a straight three-detector R.C. coupled to a Clarion LP2 transformer coupled to a Mazda PP3/250. The aerial, about 75 feet long, is in the roof.

H. T. C. HILL.

[1035]

## THAT 5s. BATTERY

SIR.—As the reader who started the controversy re 5s. battery, I should like to say a last word.

Since June 17, 1933, I have had three 5s. batteries; that is, thirty-four weeks for 15s. I get a good selection of foreign stations and some British; also Athlone.

The set has three valves and is used on an average forty hours per week. The consumption is about 7 milliamperes.

I get plenty of volume and rarely any distortion.

W. WYATT.

[1036]

SIR.—I am very interested in your five-bob battery argument, and I would say that my luck with cheap batteries has been as you say—very dear. However, I wanted a new battery, so for curiosity I bought two 60-volters at 2s. 6d. each.

I am keeping a strict log, knowing the consumption of my set, and in due course I will let you have its true history.

Yes, sir, I wholeheartedly agree with you all the way—cheap batteries are definitely very dear in the long run.

H. F. PEDLAR.

Holloway, N.7.

## DUD VALVES

SIR.—I heartily agree with Mr. Atkinson of Leeds and Mr. Curdy of Liverpool in their respective communications to your paper.

Of the makers of English indirectly-heated valves, I have only found one firm whose valves were anything like reliable over a period of three months, and this firm replaced some of my valves by return of post WITHOUT QUESTION.

Early in 1932 I bought a five-valve all-mains set, costing £25, and it functioned all right for two days and then developed a microphonic howl which built up until I had to switch the set off. The service engineer replaced one of the screen-grid valves when he came, and the set worked all right for two weeks, then died away to a whisper. To cut a long story short, I replaced seven valves in eighteen months, all of which I had to pay for.

ERNEST SHAW.

Rotherham.

## THAT DANCE MUSIC!

SIR.—Having once written to you before on the question of dance music, I feel I must write again to support Mr. Hogan's letter.

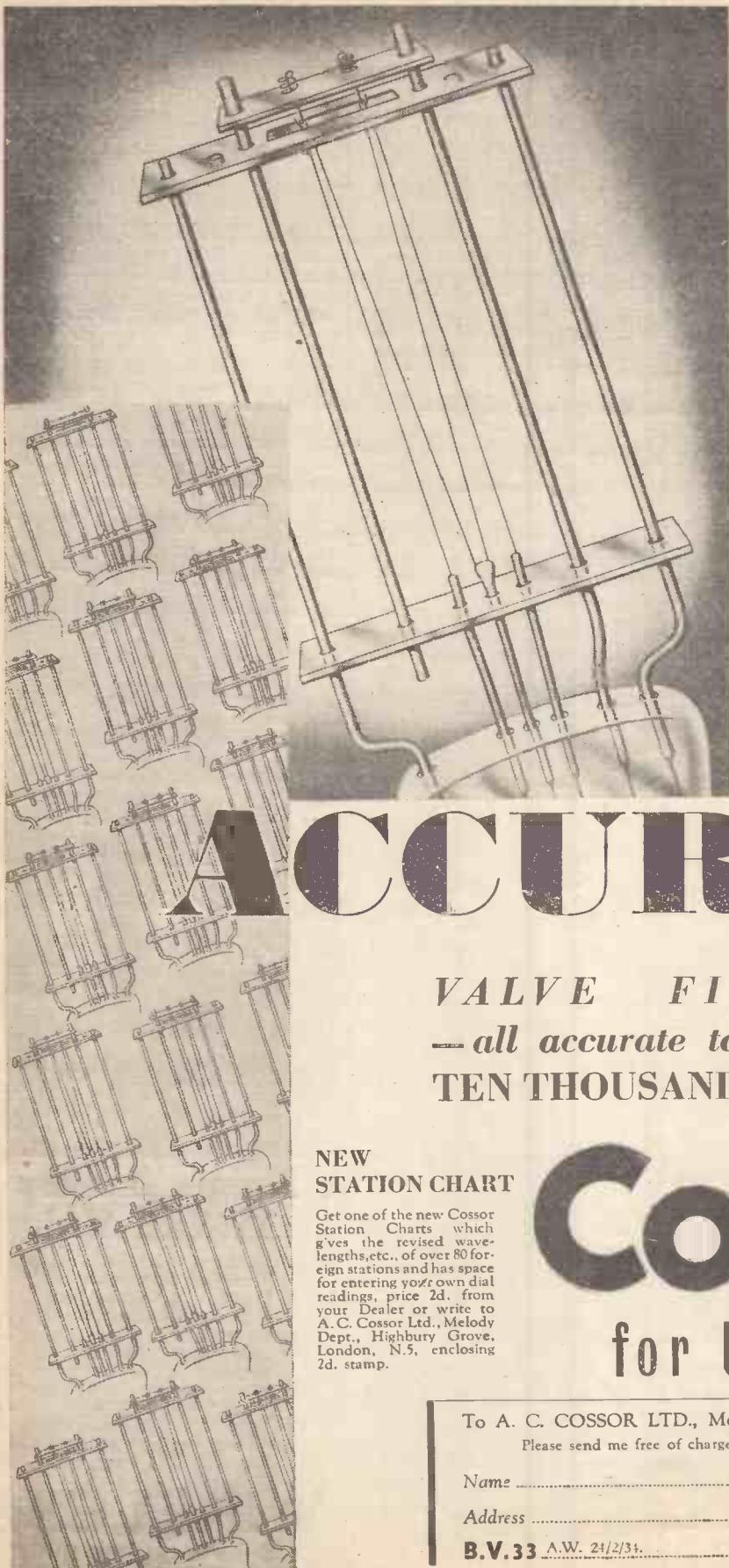
I, myself, like dance music, but I certainly do not like this "hot" stuff which has been brought over from America. This, in my opinion, is not music, but merely an effort on the part of modern composers to avoid all harmony.

But I think the worst part of modern dance music is the words; words so utterly childish that I think anybody with any brains would be glad if they were not sung.

B. O. MYERS-NORRIS.

Birmingham.

[1039]



One of the most important considerations in valve manufacture is securing and maintaining accuracy and uniformity of characteristics.

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# The World on Short Waves

By KENNETH JOWERS

SOME surprisingly good results are being obtained in the B.E.R.U. contest, which, as you all probably know, is in progress at the moment. It actually lasts for four weeks during the month of February.

I have had a nice letter from G5OQ, Tunbridge Wells, who is taking an active part in this contest. He sent me a log of the stations received on the 40-metre band during the last week-end. This log consists of forty-eight stations, the bulk of which hail from New Zealand and Australia. There are also one or two Canadians, South Americans, as well as some from Kenya.

### Excellent Reception Conditions

All of these stations were heard with a straight Schnell receiver, which proves that conditions at the moment are really excellent.

Most of these stations were heard round about 6 or 7 p.m., the latest being 9 p.m. for some of the Australian stations. G5OQ also tells me that ZL4AO, of Dunedin, has been logged practically every morning at 8 a.m. for nearly three years, while at the moment ZL4AI is now almost as good as ZL4AO.

I have received quite a lot of correspondence from Australian and American readers, and a number of them remark on the very satisfactory results obtained on the 10-metre band. This wavelength is very little used in this country, which is rather a pity considering that it is used extensively in other parts of the world. In America the DX record stands at about 1,000 miles when using a power of 300 watts.

As this waveband has proved so reliable and more successful than the 5-metre band, it is used extensively over there for medium distance "rag-chewing" and local-contact work. Two-way communication has been achieved between America and Japan, using 300 watts on the American side and 75 watts on the Japanese side. The actual wavelength was about 9.3 metres.

### Best Waveband for Television?

In Japan they are experimenting very earnestly to prove that this is the waveband that should be developed for television, as it is not badly affected by metal buildings and such objects. There is practically no possibility of hearing those Japanese stations on that wavelength, but as a matter of interest you might like to know that they are on the air every Sunday, at least from midnight until 2 p.m.

You must not think from this that we do not in this country ever use 10 metres. On the contrary, English amateurs have established two-way communication with Roumania, Italy, and numerous Continental countries on this band. It certainly appears to offer more scope than the 5-metre band.

Now for matters of more general interest. VQ7LO, of Nairobi, on 49.5 metres, is now coming over extremely well in the early evening. The programme consists mainly of gramophone records, and they are quite worth hearing. Numerous readers have commented on the extraordinary strength of this station and its reliability, after a long period of very so-so results.

W3XL on 46.49 metres is a station that has only recently come into prominence. It is coming over well after 10 p.m., and as the waveband is comparatively clear there is very little trouble from interference or jamming.

Officially, this station is only on the air on Fridays, from 10.30 p.m., but actually it appears that they are much more frequent during the week—and earlier.

That old friend W3XA1, on 16.87 metres, is still one of the outstanding stations for daylight reception.

Do not forget over the week-end to go down below 20 metres after 2 o'clock. You will be well repaid as there are a number of signals below this wavelength that are certainly well worth hearing.

A special broadcast took place on February 19 from EAQ from 12.30 until 1 a.m. It consisted of messages from the American liner *Manhattan*, which was in mid-Atlantic. In addition to greetings going to the captain and other officers, Mr. Carleton Dyer, of Philco, said a few words.

I was under the impression that all short-wave broadcasts from Czechoslovakia had ceased, but I find this week two or three readers reporting the reception of OK1MPT, of Prague, on 58.3 metres. The average signal strength was R7-8, while they all appeared to pick up the same station round about the same time, 5 p.m.

V9GW on 49.22 metres is still being well received over here, but not until 11.30 p.m. and onwards. RW59, Moscow, on 50 metres, seems to be dropping in signal strength and at the same time fading is setting in very badly. This is a pity, because this station transmits some interesting talks and programmes.



## A Simple Battery THREE VALVER

Details of the "W.M." 1934 Standard Three will be found in the "Wireless Magazine" February issue. It is a simple and efficient battery operated three-valver that will give satisfactory results under the new Lucerne wavelength arrangement. It is a real station-getter and gives a fine performance without involving high maintenance costs. The use of iron-core coils insures a high degree of sensitivity and selectivity. Get a copy today. Price 1/-

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Mazda	S215VM	HL2	Pen220A
Osram	VS2	HL2	—
Lissen	SG2V	HL2	PT2A
302	VS2	L2	ME2
Tungsram	SE220	HR210	—
Six-Sixty	215VSG	210D	230PP

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

**BASEBOARD**

1—Peto-Scott Metaplex, 17 in. by 10 in.

**CHOKE, HIGH-FREQUENCY**

1—British Radiogram, type No. 40 (or Lissen, Telsen).

**COILS**

1—Set British Radiophone, type 2RF.

**CONDENSERS, FIXED**

1—Graham-Farish .0002-microfarad (or Dubilier, T.C.C.).

3—Graham-Farish .001-microfarad (or Dubilier, T.C.C.).

1—Graham-Farish .01-microfarad (or Dubilier, T.C.C.).

1—Graham-Farish .5-microfarad (or Dubilier, T.C.C.).

2—Graham-Farish 1-microfarad (or Dubilier, T.C.C.).

**CONDENSERS, VARIABLE**

1—J.B. three-gang .0003-microfarad, type Unitone (or Utility, British Radiophone).

**HOLDERS, VALVE**

4—W.B. five-pin, type Midget (or Lissen, Graham-Farish).

**PLUGS, TERMINALS, ETC.**

- 6 Bellng-Lee wander plugs, marked G.B.—1, G.B.—2, G.B.—3, G.B.+ H.T.+ H.T.— (Clix, Eelex).
- 2 Bellng-Lee spade terminals, marked L.T.+ L.T.— (Clix, Eelex).
- 3 Telsen terminal blocks (or Lissen).

**RESISTANCES, FIXED**

- 1—Graham-Farish 1,000-ohm (or Telsen, Erie).
- 1—Graham-Farish 25,000-ohm (or Telsen, Erie).
- 2—Graham-Farish 100,000-ohm (or Telsen, Erie).
- 2—Graham-Farish 1-megohm (or Telsen, Erie).
- 1—Graham-Farish 2-megohm (or Telsen, Erie).

**RESISTANCE, VARIABLE**

- 1—Bulgin 50,000-ohm, with combined switch, type VS50.

**SUNDRIES**

- 1—Graham Farish battery economiser.
- 1—Westector unit, type W.4.
- 1—British Radiogram 1-in. metal mounting bracket. Connecting wire and sleeving (Peto-Scott).
- 6 yards thin flex (Peto-Scott).

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- 1—Lissen, type Hypernik (or Telsen, Graham-Farish).

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- 1—Lissen 120-volt high-tension, type LN.3007 (or Drydex, Ever Ready).
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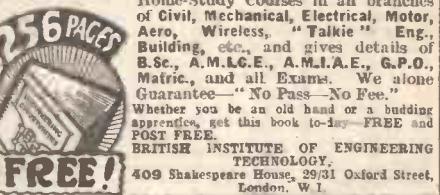
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WE are often asked whether there is any inherent advantage in the chassis type of construction, and invariably we reply that from the amateur constructor's point of view there is probably not. The plain baseboard set, as exemplified by the "2H.F." four-valver introduced to you on pages 184 and 185 last week, is much the easier type of

construction for the amateur to tackle. Partly this is due to limitations in blueprint production. It is much easier to follow a layout in one plane, or on one side of a board, than it is to trace out the interconnections of a chassis set.

Where a chassis set is the only way to make an efficient design we go to a great deal of trouble to see that the connections above and below the baseboard are simply related. Still, the fact is that a simple set such as our new "2H.F." Four is a better proposition for the beginner to tackle.

Last week, you remember, we gave a layout and wiring guide of this set on the front inside cover. From this you will appreciate how simple is the layout of this high-powered set.

If you want to take full advantage of the blueprint you can obtain it full size, price 1s. 6d., post paid from AMATEUR WIRELESS, 58-61 Fetter Lane, E.C.4. This gives every dimension, as well as the point-to-point wiring of connections. Each lead is numbered, so that you cannot go wrong.

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This is a specification we have been repeatedly asked for, and now that it has been produced by the AMATEUR WIRELESS Technical Staff, we hope all those on the lookout for a good family set will take advantage of it.

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## Postcard Radio Literature

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

## Garrard Gramophone Motors

A NY reader who is thinking of fitting up his set as a radiogram should get this catalogue of gramophone motors. Included are spring and electric motors and the automatic record-changer. There are seven types of spring motors from which you can make your selection. If you are on A.C. mains you have five models from which to choose; for D.C.-mains users there is the Universal A.C./D.C. motor.

143

## For Dealer and Service Agent

Dealers and service agents should have the new Dubilier catalogue, No. 933G; it gives a comprehensive survey of condensers and resistances manufactured by this company at the present time. Mica, paper and electrolytic condensers and resistances for radio receivers, anti-interference devices and radio suppressors, condensers for all types of transmitting circuits and power-factor improvement of A.C. power circuits are included. The catalogue will be very useful to designers of receivers, as dimensions of all condensers for use in receivers are given.

144

## A Television Secret

GREAT SECRECY has been maintained regarding the principle of the Stixograph, the invention of G. W. Walton of the Scophony Laboratory, which obviates scanning as ordinarily understood. Briefly the system enables a one-dimensional picture to be produced by an extremely ingenious method. First and exclusive details are given by the inventor himself in the March issue of TELEVISION. Readers interested in the development of television should not miss this explanation.

## FULL-SIZE BLUEPRINTS

When ordering, please send Postal Order, NOT STAMPS. Quote the Blueprint number shown below: not the number of this issue.

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1931 Crystal Set . . . . . AW308

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"A.W." Iron-core Two with Q.P.P. . . . . AW396

Consolectric Two, (D, Pen) . . . . . AW403

Big Power Melody Two, with Lucerne Coils (SG Trans) . . . . . AW338A

B.B.C. National Two, with Lucerne Coils (D, Trans) . . . . . AW377A

Screen-grid Two (SG Det, Trans) . . . . . WM.1289

A Two for 7 Metres (D, Trans) . . . . . WM.295

New-style Radiogram (D, Trans) . . . . . WM.299

## THREE-VALVE SETS (1s. each)

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S.S.3 (A.C.) SG, SGD, Pen) . . . . . AW390

"Up-to-the-minute Three" with Class B, 1/6, 10 till 8; Sundays, 11 till 2. . . . . AW384B

A.C. Triodyne (SG, D, Pen) . . . . . AW399

Home-built Coil Three (SG, D, Trans) . . . . . AW404

Fan and Family Three (D, 2LF) . . . . . AW410

L.S.5s. S.G.3 (SG, D, Trans) . . . . . AW412

A.C.-D.C. Universal Three (SG, D, Pen) . . . . . AW414

1934 Ether Searcher (SG, Det, Pen) Baseboard . . . . . AW417

1934 Ether Searcher (SG, Det, Pen) Chassis . . . . . AW419

"W.M." 1934 Standard Straight Three (SG, Det, RC, Trans) . . . . . WM.351

Emigrator for A.C. (SG, Det, Pen) . . . . . WM.352

1933 Economy S.G. Three (SG, D, Trans) . . . . . WM.306

A.C. Calibrator (SG, D, Pen) . . . . . WM.309

L6 6s. Radiogram (D, RC, Trans) . . . . . WM.318

Simple-tone Three (SG, SG Det, Pen) . . . . . WM.327

Tyler's Iron-core Three (SG, SG Det, Pen) . . . . . WM.330

C.B. Three (D, LF, Class B) . . . . . WM.333

Economy Pentode Three (SG, D, Pen) . . . . . WM.337

Three-range Three (SG, D, Pen) . . . . . WM.336

Simplicity A.C. Radiogram (SG, D, Pen) . . . . . WM.338

Duo-tone Three (SG, D, Pen) . . . . . WM.341

A.C. Transportable (SG, D, Pen) 1/6 . . . . . WM.347

All-wave Three (D, 2 LF) . . . . . WM.348

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"Words and Music" Radiogram (2SG, D, Trans) . . . . . WM.307

"Words and Music" Radiogram de Luxe (2SG, D, Q.P.P.) . . . . . WM.307a

Home Short-waver (SG, D, RC, Trans) . . . . . WM.311

Empire Short-waver (SG, D, RC, Trans) . . . . . WM.313

Merrymaker Super (A.C. Super-het) . . . . . WM.345

1934 A.C. Quadradyne (2 SG, D, Pen) . . . . . WM.349

Lucerne Straight Four (SG, Det, Trans) . . . . . WM.350

## FIVE-VALVE SETS (1s. 6d. each)

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The Etherdyne (Super-het) . . . . . AW406

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Class-B Gramophone Amplifier . . . . . AW391

Universal A.C. Amplifier (3-valve) . . . . . AW411

Five Q.P.P. Output Circuits . . . . . WM.315

Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of most of these sets can be obtained at 1s. 3d. and 4d., respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine."

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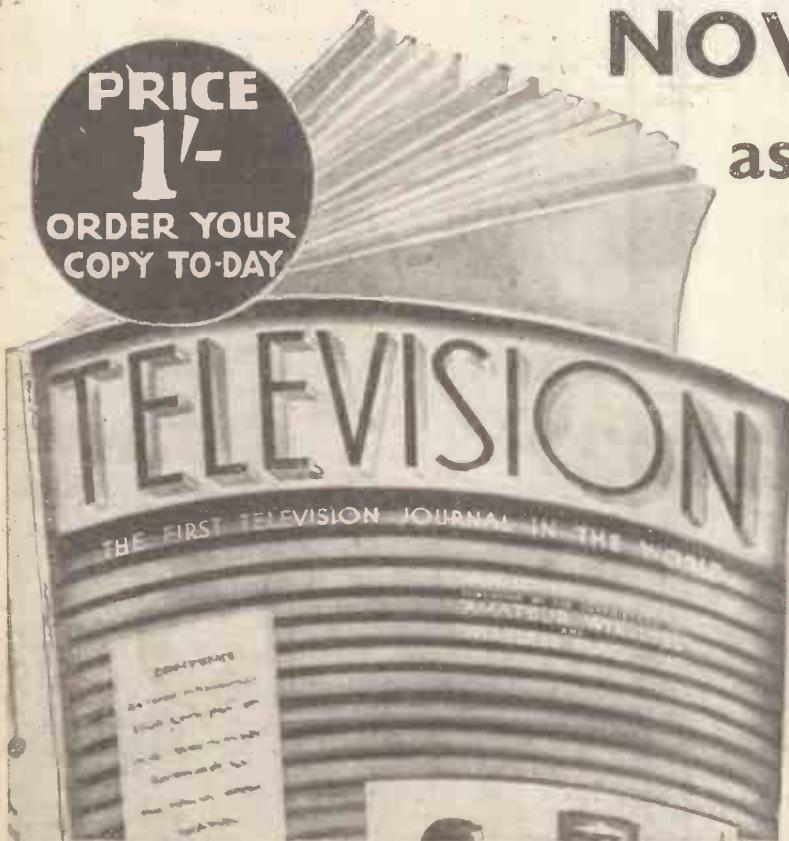
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