

WHY LIMIT YOURSELF TO ONE-ROOM RADIO? (See pages 592 - 593)

Amateur Wireless

3^d
Every
Wednesday

and
Radiovision

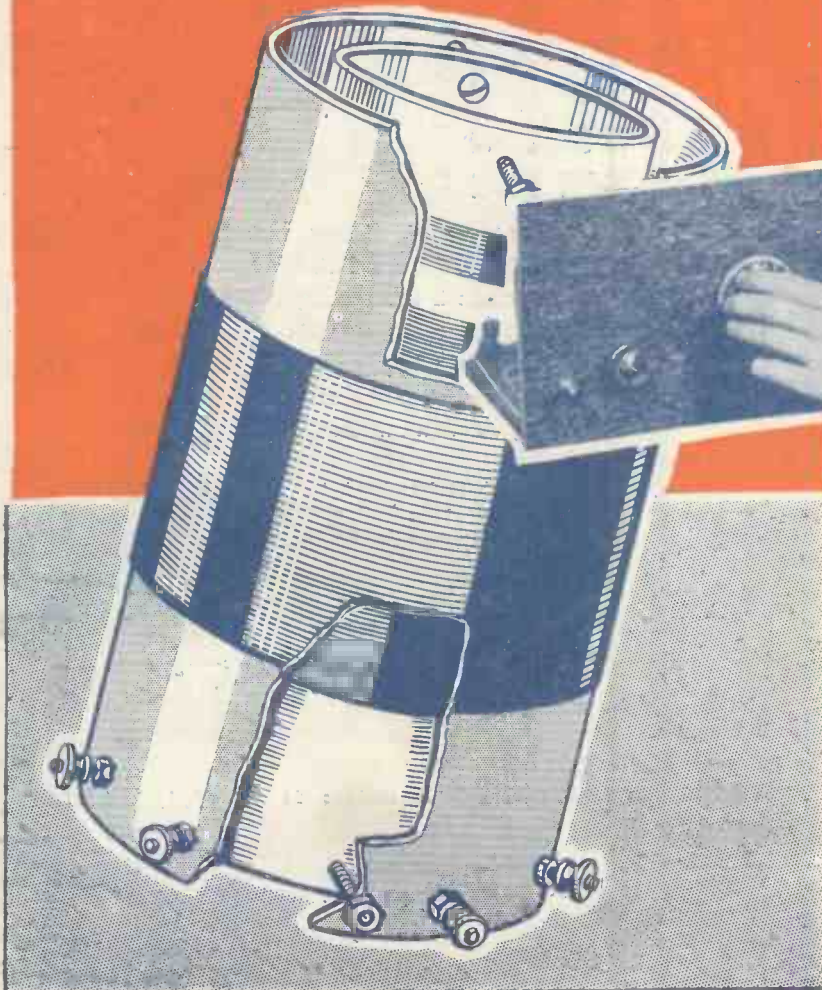
**TRUTH ABOUT THE
FIVE-BOB BATTERY**

**MAKING YOUR OWN
FULL-VISION SCALE**

**ALL ABOUT RADIO
ON THE ROAD**

**WORLD RECEPTION
with the WORLD-BEATER**

A STRAIGHT THREE for 29/6



- ★ Home-made Lucerne Coil
- ★ Home-made Low-frequency Transformer
- ★ "Detector and 2 L.F." Valve Combination



FLUID-LIGHT TUNING

to get finest results from extreme selectivity

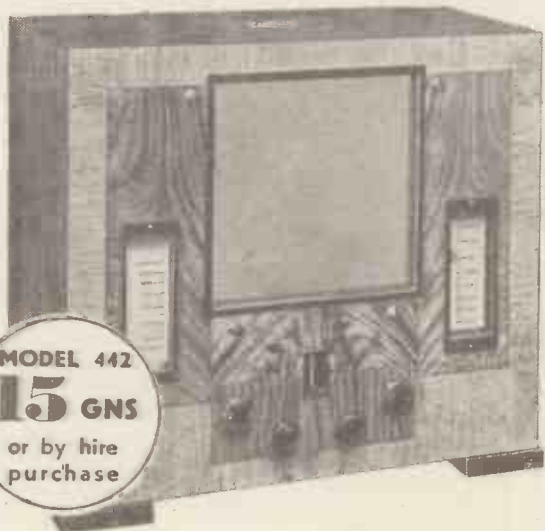
All Electric Superhet PORTABLE FLUID-LIGHT SIX

This new "His Master's Voice" Mains Portable with automatic volume control and fluid-light tuning, works off the mains electricity supply and needs neither aerial nor earth. It is the answer to all who have waited for true to life "mains reception" in a portable set. Its selectivity is so acute that it is fitted with fluid-light tuning—the sensational new device that ensures accurate tuning always. In this model, two illuminated arrows gradually approach each other until they show the exact point of perfect reception. So that by sight alone, unassisted by ear, you can tell when this set is tuned to concert pitch.

MODEL 463. Mains Portable, with self-contained earth and aerial (six valves including rectifier). Fluid-light tuning incorporated in wavelength scale. Automatic volume control. For A.C. only.



MODEL 463
16 GNS
or by hire
purchase



MODEL 442
15 GNS
or by hire
purchase

All Electric Superhet FLUID-LIGHT FIVE

A new five-valve superhet table model with automatic volume control and fluid-light tuning. It is a delight to look at, a joy to hear, and a pleasure to handle. Its range is extraordinary and every station is kept distinct. The fluid-light tuning device in this model is a thin column of light which rises and falls in a slender central window, indicating the exact spot at which perfect tuning is reached. Only by means of this fluid-light can the extreme selectivity of this set be fully appreciated.

MODEL 442. Superhet Table Model (five valves including rectifier). Fluid-light tuning in central window. Automatic volume control. For A.C. only.

"HIS MASTER'S VOICE"

Write to-day for special illustrated leaflets.

THE GRAMOPHONE COMPANY, LTD., 108E CLERKENWELL ROAD, LONDON, E.C.1. (Prices do not apply in I.F.S.)

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News and Gossip of the Week

57 Varieties!

ALL is now set for the great International Broadcasting Union meeting at Grosvenor House, London. No less than fifty-seven delegates will attend this Union "round-up."

They will have a gay time, by all accounts. The B.B.C., the Post Office and the Radio Manufacturers' Association have all dated them for banquets.

B.B.C. Shows Off

SANDWICHED in between its official work and its numerous banquets, the Union will take a trip up to Droitwich to see just how a super-power broadcasting station should be designed.

The unsung O.B. boys will also be able to show their tricks. For the delegates will attend the Ceremony of the Keys when it is broadcast from the Tower of London on June 19.

Next President

ONE of the less onerous jobs of the I.B.U. is to elect a new President. Vice-Admiral Sir Charles Carpendale looks like being re-elected.

He has held this office since the formation of the Union way back in 1925. If he can be persuaded to stand again, it is practically certain he will be retained.

Unfair B.B.C. Bias?

SOME Continental broadcasters would like to see a change in the Union's Presidency, because they maintain—quite wrongly, we think—that a British President weights the scales in favour of the B.B.C. when wavelengths are distributed.

The suggestion is that a new President should be elected each year, taking all the participating nations in turn.

Thankless Job

NOW that it is clear the various European Governments are not disposed to take up the Union's suggested modifications for the long-wave part of the Lucerne Plan, it may seem that the I.B.U.'s influence is definitely limited, if not actually on the wane.

But the Union itself regards wavelength allocation as a thankless sort of job, and will not regret relinquishing this part of its many-sided activities.

Re-shuffling Wavelengths

IN the B.B.C. wavelengths re-shuffle, after Droitwich gets going, we are inclined to tip Scottish Regional as the lucky station. It will probably get a longer wavelength at the expense of Midland Regional, which, when at Droitwich on higher power—and therefore much nearer to Birmingham—will not need its present good wavelength.

Scottish National will be retained, and this station will also get a reasonably good wavelength.

This Bureaucracy!

OVERSEAS amateurs complain that the B.B.C. does not respond with "QSL" cards as do all other broadcasting organisations in the world.

"Veri's" are not given to amateurs for three reasons:

(1) Difficulty of same programme being sent from many transmitters; (2) Empire programmes are published all over the world before transmission; and (3) no useful result is derived to benefit the service.

What of Goodwill?

WE will overlook the fatuity of the first reason—and remind the B.B.C. that N.B.C. and Columbia, who do give verifications, have infinitely vaster hook-ups than are ever undertaken in this country.

Really, the whole question centres on goodwill rather than on utility to the broadcasting service. But there you are. What else can you expect from B.B.C. bureaucracy—the soulless machine of broadcasting, and all that sort of thing.

Perfect Acoustics

IN the converted Chapel that now serves as the B.B.C. research laboratory at Clapham, engineers are trying to find the perfect acoustic treatment.

Three rooms of different sizes have been built with six-inch concrete walls. These reverberation chambers will be treated with rock wool and other compositions until the magic studio treatment is discovered.

"The Tests"

TO be certain of first-hand accounts of the test matches, the Australian Broadcasting Commission and the private stations are to spend the considerable sum of £20,000.

B.B.C. accounts from the Empire will be picked up, but not relied upon. Post-office 'phone links will also be utilised.

Improper-ganda!

FOR broadcasting extracts from speeches by monarchists at a banquet in Madrid the other day, Radio Espana has been fined

5,000 pesetas by the Government. Apparently the new propaganda law of Spain was invoked to bring Espana to heel. Oh, dear, Europe's with the muzzle on!

Liveliness At WHB!

BECAUSE the station operators wanted pay increases and a thirty-six-hour week—which the management did not see its way to grant—station WHB, Kansas City, went off the air for seven hours recently.

Plant was damaged by the rebellious operators—and it took all that time to repair it.

Better Empire Signals

AT Daventry they are getting ready to use the Daventry 5XX masts for Empire transmissions when Droitwich takes over the National service.

The zones lucky enough to receive signals from these 500 feet masts certainly ought to be able to record improved reception.

By the way, the latest short-wave aerials for Empire transmissions are beginning to have their effect. Jamaica, for example, now reports much better signals.

"In Town To-night"

TRUE to his policy of taking off good ideas before they become stale, Eric Maschwitz has decided to drop the popular "In Town To-night" series after the June 9 performance.

The series will be revived in the autumn. Meanwhile, the blank period will be filled up with light music—or organs.

Exit One Committee!

AMIDST an ever-growing glut of advisory committees for B.B.C. work, it is refreshing to hear that one at least is voluntarily retiring itself after its forthcoming July meeting.

This is the Central Council for Broadcast Adult Education—what a mouthful!—closing down because its work is now done.

This English!

ANOTHER battle has been lost by the Esperantists, who have been told by the B.B.C. that there is no time available on the air for the teaching of commercial languages.

No, all spare time seems to be taken up with trying to teach us how to pronounce our own delightfully inconsistent language.



Topical photo.

This young fan's wildest dream has come true—he is talking to the pilot of a bomber aeroplane by wireless!

World-wide Reception with the "A.W." Short-wave World-beater

Our Cornish Correspondent Logs 247 Stations at Calstock



Testing the "A.W." Short-wave World-beater in Cornwall—checking the stations by means of a wavemeter

THIS is one of the smallest and neatest sets I have seen, lending itself to short wiring. Incidentally, engine-finished aluminium is not good for one's eyesight—matt finish is preferable.

The set had survived its journey to Cornwall very well and on connecting up started straight away to do its "bit." After tuning-in to a known station I proceeded to juggle with various valves and found that far the best results were obtained by using a Marconi L21 in the low-frequency stage.

Excellent Slow-motion Dial

The slow-motion dial is excellent and very smooth in action, it being quite a treat to have only one knob to turn slowly.

The spindle of the aerial condenser was very stiff, but this was owing to it being bent, and after a little time that was overcome and it was like silk to work. The reaction was very smooth in this set and delightful to handle.

And now for actual stations received—the tests being made from Saturday morning to Monday night. I wonder how many of the staff of AMATEUR WIRELESS spent a perfect summer Sunday, with blue skies, in their wireless lab testing a set as a labour of love?

As morse not only does not interest the average listener, but even makes him swear, I will just state that I brought in, at loud-speaker strength, never below R5, 247 stations. The I.S.B. test on Sunday coming through R9—a little distorted but no echoes were heard on a quite silent background, which is a feature of the set.

And here again let me remind the ordinary listener that morse is very good to tune-in to—especially if your detector valve is "metered" and you watch the pointer.

On Sunday morning the usual crop of amateurs was heard with their

vain repetitions "like the heathen do," their "old mans" and their gabbling of their call signs, which is a pity, as they would have far more reports if they gave their call signs slowly and distinctly and didn't try to make them clear by calling themselves Canada, Australia, Turkey, etc.

Making Them Vain!

In all there were thirty-four amateurs on the air—to give their call signs would only make them vain!

And now for the really serious reception of stations of programme value. I will at once say that each station was identified beyond doubt and checked with a very accurate wavemeter before being passed:—

<i>Metres</i>	<i>Station</i>	<i>Metres</i>	<i>Station</i>
13.93	W8XK	25.25	FYA
13.97	GSH	25.27	W8XK
14.47	LSY	25.284	GSE
14.58	PMB	25.36	W2XE
16.85	PCV	25.4	2RO
16.86	GSG	25.51	DJD
16.878	W3XAL	25.532	GSD
16.88	PHI	25.57	PHI
16.89	DJE	25.6	VE9JR
19.57	W2XAD	25.63	FYA
19.65	W2XE	28.98	LSX
19.68	FYA	29.04	ORK
19.85	GSF	30.0	EAQ
19.84	HVJ	31.28	W3XAU
22.48	YVQ	31.28	VK2ME
23.39	CNR	31.297	GSC
25.0	RNE	31.32	HBL
25.16	RW50	31.36	W1XAZ

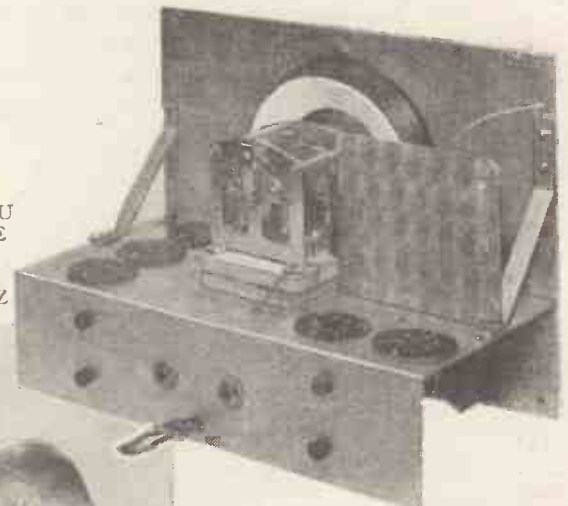
<i>Metres</i>	<i>Station</i>	<i>Metres</i>	<i>Station</i>
31.38	DJA	48.83	W8XK
31.46	W2XAF	49.02	W3XE
31.55	GSB	49.08	YV1BC
31.58	PRBA	49.17	W3XAL
32.0	T14NRH	49.20	W9XAF
32.71	WND	49.22	VE9GW
36.65	PSK	49.34	W9XAA
37.04	HCJB	49.5	W4XAU
37.33	CNR	49.586	GSA
38.47	HBP	49.67	W4XB
41.6	EAR58	50.0	RNE
42.0	YV2AM	50.26	HVJ
42.92	LCL	58.03	PMY
43.0	EAR110	62.5	W2XV
43.86	HAT2	70.2	RV15
45.38	RW72	73.0	HCJB
46.66	W3XL	76.0	YV1IAM

It must not be thought that I simply sat down and logged these stations one after another! This log represents long and patient searching (Sunday, eight hours' hard work), but once you have got the feel of this set it is very easy going.

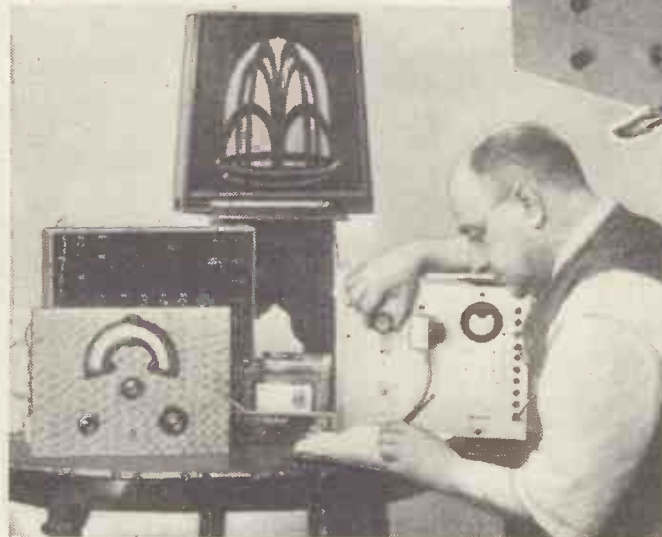
More Time Wanted!

With more time allowed I could have done better, but am quite satisfied with what results I have obtained, that this is a sound, reasonably priced set which (in my hands, at any rate) has produced results better than many high-priced receivers.

The aerial-and-earth system used for the



Full constructional details of the "A.W." Short-wave World-beater were published last week



Checking up the output of the "A.W." Short-wave World-beater during its recent special Cornish tests

reception tested with a megger gave resistance as infinity and the earth resistance was .076 ohms.

Aerial, 47 ft. 3 in. single-strand 12 S.W.G. copper wire, inverted 'L.'

Earth lead from receiver to ground, 1 ft. (lab on side of hill) and a 10-ft. copper tube driven right into the clayey sub-soil always kept moist by water dripping through the tube. With such an aerial and earth everyone should get good results.

C. H. H.

My Five-bob Battery Tests

By THERMION

At the beginning of March I started a special test on a pair of five-shilling 120-volt high-tension batteries. I have put a good many other batteries of this class through various standard tests; the special ones were undertaken in response to the claims of a reader that, using for not less than forty hours a week a three-valve set requiring 7 milliamperes of high-tension current he regularly obtained a service life of eleven weeks from these batteries.

He did not make it plain whether 7 milliamperes was the initial current when the batteries were new or the average current during their service. However, to give the batteries the benefit of any doubt, I took it as the initial load and made up two resistances each with a value of 17,150 ohms and ran the batteries through these for six hours from 8 a.m. and 2 p.m. every day for eleven weeks.

One of the Bad Points

The voltage under load was taken with a precision high-resistance voltmeter as soon as each battery was brought into action in the morning; it was taken again the moment before the circuit was broken in the afternoon. The readings were then plotted on graph paper and the curves illustrated in Figs. 1 and 2 show the results obtained.

First a word about the curves themselves. Notice that they indicate both the starting and the ending load voltage for every day. You can thus see from them just how much the voltage of the battery declined during each six hours' run.

One's first impression on comparing the curves is that these two batteries were just about as different as chalk from cheese. Yet both are of the same batch and both bear the same date. They were perfectly fresh since they were made in March and the test began on the fifth of that month.

That is one of the bad points of cheap batteries. You never quite know where you are with them, for it is unusual to find two that

behave alike. Actually, although I have tried out a good many of these five-shilling batteries, buying them always in pairs, I have never yet found any two that did not show big differences in performance.

Now let us examine those two life curves in detail and see what we can discover from them. First of all, which of the two shows the better performance? At first sight you might say unhesitatingly that of battery A. Once it has reached about 80 volts the starting voltage line is almost straight and shows no headlong plunge as does that of battery B from the seventh week onwards.

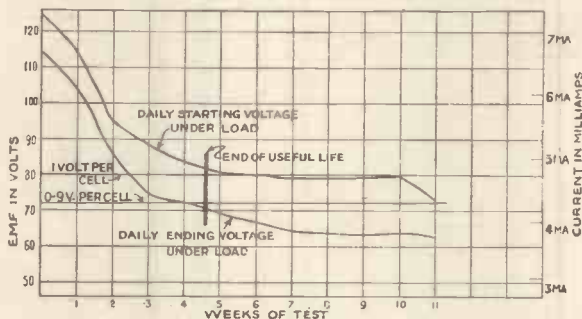


Fig. 1.—Curves showing battery A's life history. Compare this with Fig. 2 and see which you think was the better performer. Then read the article and see if you were right!

I admit that battery A would have worked a receiving set in some kind of way some weeks longer than battery B. Nevertheless, the latter battery's performance curve is the better of the two for practical wireless purposes.

Actually, the real life of either battery, if quality and efficiency were of moment, is four and a half weeks in the case of battery A and just over seven in that of battery B, for by the end of those periods each battery's load voltage came down well below 72, or nine-tenths of a volt per cell, which is always taken as the standard cut-off, both for test purposes and for practical service.

But battery B preserved an initial load voltage in the neighbourhood of 84 and an ending load voltage of just under 72 for seven weeks. The falls in E.M.F. during the six hours' run were large, but they were nothing like so great as those subsequently shown by battery A.

The performance of battery A is a very curious one. From the fifth to the tenth week it maintained an initial load voltage in the neighbourhood of 80; but the falls were enormous, averaging, as they did, over 15 volts during each six hours' run.

I hardly believe that even



Before batteries of reputable make are put into production, many exacting tests are conducted on the materials. Here is a part of the material-inspection department of the great Exide works at Clifton Junction, near Manchester

passable working can be obtained with a set containing a screen-grid valve, a detector and a small power valve in the output stage, with much less than 80 volts from the high-tension battery. Most screen-grid valves, for instance, are designed for a working plate voltage of 120 to 150 and all of their worst points are brought out if this is greatly reduced.

What must happen when the voltage is down to 65 or so on the plate and perhaps 40 on the screening-grid, a condition which would obtain towards the end of the evening were a high-tension battery such as A in use for more than six weeks?

Perhaps "The Experimenters" will make some trials on these lines with screen-grid sets and will give us the results in one of their entertaining articles.

As for the power valve—well, the LP2 is a typical example. This requires 4½ volts negative grid bias when the plate voltage is 120, 3 volts when it drops to 100 and 1½ volts at 75.

You can realise that only minute volume is possible from such a valve—unless the user does not object to distortion—when the plate voltage is such that the maximum grid bias is 1½ volts negative. With 64 volts on the plate the correct grid biasing voltage is less than 1.

To return to our life curves: These bear out a view that I have always held; that the maximum economical load for any kind of standard-capacity battery is not more than 5 milliamperes. You will see that both battery A and battery B settled down to a fairly steady output only when the voltage had dropped so far that the current drain was little over 4 milliamperes, which corresponds, roughly, to 1 volt per cell.

Batteries of Good Quality

Similar tests made with batteries of good quality show (1) that the "settling down" point is higher, the corresponding voltage being about 90; (2) that the falls in E.M.F. during each run are very much smaller, so that better performance is obtained from the receiving set; and (3) that the real service life is very much superior.

Don't imagine that I have a "down" on the five-bob battery. Far from it; I should be the first person to rejoice if they had turned out to be capable of the wonders that some readers claim for them.

The cold hard facts of the laboratory show once again that you get what you pay for. It is quite impossible to put first-rate materials into batteries whose wholesale cost works out at about a halfpenny a cell.

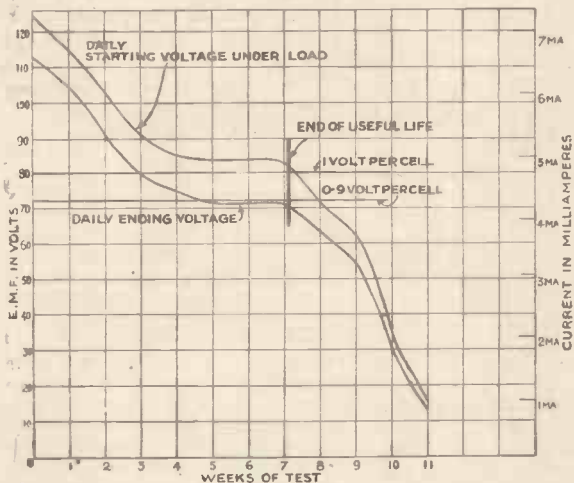
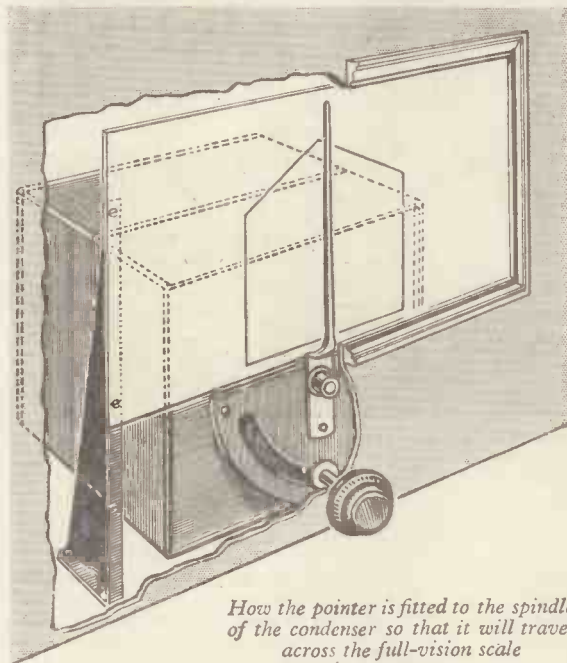


Fig. 2.—Curves showing the life history of battery B, which was put on test in comparison with battery A during Thermion's extensive tests lasting over nearly three months

Making a Cheap Full-vision Scale

Give Your Set that "Professional" Touch



How the pointer is fitted to the spindle of the condenser so that it will travel across the full-vision scale

THERE is no doubt of the popularity of the full-vision scale; one has only to look at factory-built sets of famous makes to realise that. Also to the unmechanical, a dial with station names is a decided advantage.

The dial to be described has both of these features and in addition the mechanism is as simple as it can be.

Practically any condenser drive can be fitted with it, slow-motion or plain drive, and a well-equipped workshop is not required to convert the drive.

Travelling Pointer

A glance at the illustrations will show the idea. Briefly the device consists of an oblong full-vision opening with a pointer travelling in a semi-circle over the fixed scale. The station names are set out neatly and definitely marked by small dots.

When the pointer is over a dot the set is tuned to the station indicated by the dot.

The real merit of the idea lies in the little alteration required to the condenser drive, and the fact that all station names can be easily read without having to stand on your head, as with some scales. After all, whoever turned a watch on its side to see the time?

It is unnecessary to describe how to fit a

This is the simplest and there is no risk of damaging the condenser, which might occur in drilling it for a bracket. The small illustration shows it fitted up like this.

The next job consists of making, fitting and marking the scale. Whatever material is used for this should have a hole put in to pass over the spindle and pointer, after the style of a clock dial, and be put on and bolted to the brackets with small nuts and screws.

For the scale itself good-quality writing paper can be used or, better still, a cycle rear-mudguard flap in white-celluloid can be bought for a few pence, and will be found large enough to cut a piece from the big end about 4 1/4 in. by 2 1/4 in., which is a very convenient size.

If this is slightly roughed with fine glass-paper on one side it will be found easy to make a good job of the marking with ink, or alternatively a small brush and paint could be used.

In any case a better appearance is obtained if the long-wave stations are in a different

colour. In this case the lines separating the medium and long waves on the scale could be omitted.

All that now remains is to tune-in the stations obtainable and put dots on the scale where the pointer crosses the upright and diagonal pencilled lines, which should be put on before fixing the scale.

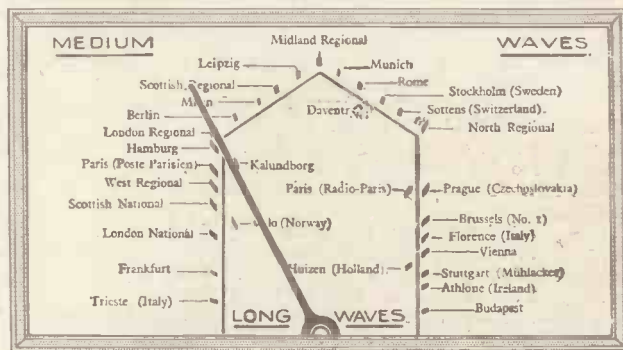
Putting on Station Names

The scale can then be removed and the station names put in, after which it can be replaced, taking care to get it in exactly the same place.

The only other point of interest is the escutcheon. If a wooden panel is used this can be formed with moulding of a suitable width tacked round the opening, or alternatively a small white-metal picture frame from one of the 6d. stores can be used; this looks very effective.

In this case it is advisable to procure this before making the scale, otherwise the scale may be too big or too small to fit.

The writer has had this idea in use since the Lucerne Plan and finds it extremely handy and convenient. Illumination can be arranged either by a fixed dial lamp or one bolted to the



Here is a typical scale for "full-vision" logging

slow-motion disc behind the scale and moving with the pointer.

The total cost is 6d. for the picture frame, 4d. for the white celluloid, and you have a real professional job. A. J.

Are YOU Getting Down to Short Waves?

OUR SHORT-WAVE NUMBER

To the Editor, AMATEUR WIRELESS.

MAY I be among the first batch of short-wave fans to congratulate and thank you for giving us a "look in" in your journal?

Although I was only an occasional reader of AMATEUR WIRELESS, I shall definitely gloat over at least three pages every week now, and I feel confident that hundreds of short-wave fans throughout the country will do likewise now that we have a corner to ourselves, so to speak.

Wishing you every success in your new endeavour,
Brighton. R. T. PARSONS. [1097]

INTERNATIONAL CLUB

MAY I take this opportunity to congratulate you on your short-wave number of AMATEUR WIRELESS? It is certainly the best yet published.

Incidentally it was through the medium of the "A.W." World-Wide Three that I was introduced to short-wave radio nearly three years ago.

I must admit I have strayed from the fold, but guess I shall return in view of your promise to devote more space to short waves.

Many thanks for the list of stations, which are exceedingly useful.

Now may I bring to the notice of your readers the existence of the International Short-Wave Club? This organisation has members in ninety-two countries, and issues a magazine each month included in which is a list of all the short-wave stations heard. These stations are reported by all members who often receive schedules from the stations, which are then published in our magazine.

We have a meeting place in London, also Manchester and Leicester, where very many radio fans meet.

Should you be good enough to publish this, I or the Secretary of the European branch, Arthur E. Bear, 10 St. Mary's Place, London, S.E.16, will be pleased to furnish further details.

JAMES E. HUNTER.
Ilford. Chairman, London Chapter I.S.W.C. [1098]

VALUE OF MORSE SIGNALS

IT gives me great pleasure to offer sincere congratulations on your special short-wave number.

I can see a big sale here in Glasgow for such an enterprising issue of "A.W." Regarding the article devoted to morse and penned by F. D. Crawley, I can only beg you to let Mr. Crawley tell us more—much more.

In conclusion, I, on behalf of the Glasgow and District Radio Club, again offer my thanks.
HENRY DUFF. [1099]

Glasgow, E.2.

The Lucerne Straight Three

By the AMATEUR WIRELESS Technical Staff



One-knob tuning is a feature of the Lucerne Straight Three, which has aerial and reaction condensers to gain maximum selectivity under all manner of reception conditions

JUST before they left for their long summer vacation, our friends "The Experimenters" pushed into our hands a grimy envelope, on which was scrawled a circuit.

"This is the last of the Lucerne sets," they explained. "We had hoped to design it ourselves and to give readers full details before we left. But there was no time—so you chaps must do it for us."

"Don't let our fans down. They expect a jolly good design from us—and it is up to you to deliver the goods by proxy. Give them all our good wishes, and tell them we'll be back again in the autumn, full of sunshine and new ideas."

Keeping A Promise!

Here we are then, trying to live up to the promise made to "The Experimenters," who seem to think they have vaguely hinted somewhere that a straight three was coming—a detector and two low-frequency combination with a Lucerne coil for tuning.

With such a coil the designing of the set was really quite as easy as falling off the proverbial log. What we have tried to do is to knock down the overall cost so that a wide public can take advantage of the well-known properties of the Lucerne coil.



As you can see from this picture, the tuning coil is mounted at the extreme end of the baseboard, with the three valve holders in line along the back.

All components that could be left out have been—there is an absolute minimum of apparatus. Such things as terminal blocks can be made at home—although there is nothing to stop you buying them.

Talking of home-built parts, you should note that in this set the Lucerne coil and the low-frequency transformer are the designs of "The Experimenters"—and can be assembled very easily from kits of parts.

Here, again, though, if you prefer to buy them already made up, you can do so—and very cheaply, too. Three firms will supply either the parts or the complete components. These are Peto Scott, Ltd., Ohmic Accessories, and McDaniel & Co.

Before going into details of the construction, a few words on the general principle of the set may be of interest.

"The Experimenters" told us that the original idea behind the design of the Lucerne coil—a coil for home assembly and experiments

—did not go over very well, as most people seemed to prefer to buy the coil and leave it severely alone.

Not nearly enough individual work was done on finding the exact number of turns on the aerial-coupling coil—with the result that many owners of Lucerne sets, even today, are not getting the very maximum efficiency.

So let us emphasise here that, although we have provided an alternative method of aerial selectivity adjustment, the Lucerne coil used lends itself to a very simple adaptation for individual selectivity needs. A turn or two off the aerial coupling part of the winding will increase selectivity.

Straight Three

As you will have gathered, this is a straight three with a leaky-grid detector, resistance-capacity coupled low-frequency amplifier, and transformer-coupled power output stage.

An old-fashioned arrangement? Perhaps it is, but with the Lucerne coil it is still capable of giving really good results even under the stringent other conditions of the present day.

By far the easiest set for constructors to make, this arrangement has the further advantage that it is very simple to operate. Anyone, no matter how inexperienced they may be, can get quite a large number of foreigners at good loud-speaker strength—without any special ganging or operating difficulties.

Due to the very powerful magnification after detection and the combination of resistance-capacity and transformer coupling, you can produce tons of volume with very nice quality. Of course, to a large extent the quality at volume depends on the power valve.



There is plenty of room to spare, even when the three valves have been fixed in their holders, as in this view of the back of the completed set. Note the two terminal blocks

We specify a small power valve, but don't overlook the advantage of a larger power valve for bigger volume—and if you have a mains unit giving up to 25 milliamperes output it will pay you hands down to put in such a valve as the Mullard PM202—a valve that gives first-rate quality in this particular set.

You need not fear the mains unit will cause instability, because although parts have been pruned down to the limit proper decoupling has been included in the first low-frequency amplifier stage.

By the way, let us say that this set is not designed for a pentode output valve. The only time such a valve could be used after two such stages of low-frequency amplification is when the set is worked a long way away from the nearest home station. Under normal conditions the pentode would be overloaded and distortion would be very pronounced.

Let us take a look at the circuit. You will see that preceding the detector is the Lucerne coil tuning circuit. Note that the aerial lead is connected to the tapping marked A on the coil through the .0003-microfarad pre-set condenser, which, by the way, is mounted on the panel.

This enables the selectivity to be varied at any position round the dial, which means that for any given reception conditions you can adjust the input so that the right compromise between selectivity and volume is obtained.

Reduced Detector Damping

Note, too, that the complete coil winding is tuned but that the grid condenser is joined to a tapping midway down the winding. By this means the damping of the detector on the tuning circuit is decreased.

Switching is standard, a make-and-break switch being connected across the inner coil winding, so that when the switch is made this section is cut out and medium waves are in tune. When the switch is broken the inner coil is automatically brought into series with the outer winding and thus the long waves are tuned in.

Detection is of the usual leaky-grid arrangement, with a .0003-microfarad fixed condenser for the grid circuit and a 2-megohm grid leak going to low-tension positive.

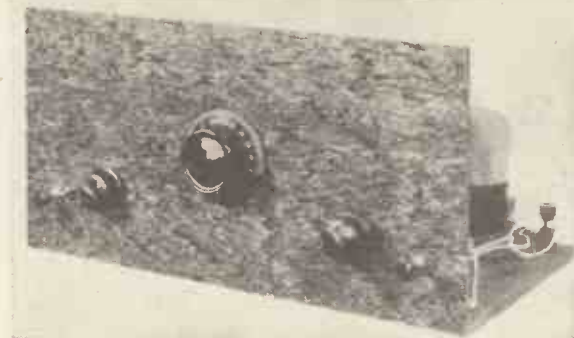
We have omitted the high-frequency choke in the anode circuit of this valve—an economy move justified by the fact that our experiments have shown it to be unnecessary.

Between the anode and earth, though, there is an all-important

fixed bypass condenser of .0003 microfarad. This is a very cheap way out of the choke problem—and don't forget that the anode resistance exerts a certain amount of choking effect.

Reaction is obtained by a separate winding on the coil, connected in series with a .0005-microfarad reaction condenser between the anode of the detector and earth, the moving plates of the condenser being at earth potential.

Coupling the detector anode to the grid of the first low-frequency stage is a .01-microfarad fixed condenser, which, in conjunction with the 1-megohm grid leak, gives just the right proportion of bass and treble.



Take a good look at this panel view before you begin to assemble the set. Note the wave-change and on-off switches, one at each end of the panel

Bias for this valve is applied through the grid leak from the grid-bias battery.

For the coupling between the first and second low-frequency valves we have used the 1-to-3.5 ratio low-frequency transformer designed by "The Experimenters."

Note specially that the connections for this transformer are the reverse of the usual procedure—in order to simplify the external wiring. The primary and secondary connections are reversed—so that you really come back to the usual relationship. But don't reverse just the primary or the secondary—it must be done to both or neither, otherwise there will be "motor-boating."

Three-point Switch

There is no special feature about the power-valve arrangement, but note the three-point switch that cuts out the low- and high-tension supplies at the same time. The loud-speaker is connected directly in the anode circuit of the power valve, though as most modern loud-speakers have integral transformers the matching problem solves itself.

From the photographs you can see how this simple circuit has been put into practice. It is the usual panel-and-baseboard arrangement, with the tuning condenser, reaction condenser and aerial pre-set mounted on the panel and the two switches for on-off and wavechanging.

A perfectly symmetrical layout has been achieved.

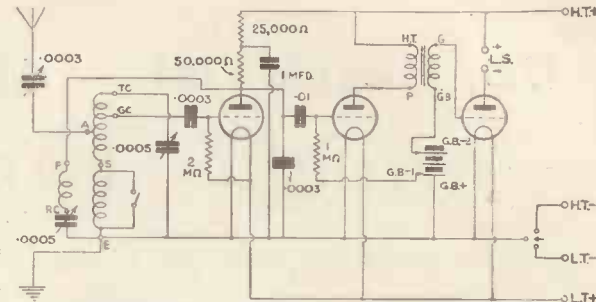
Remember that the reaction condenser is the .0005-microfarad component and that the aerial series condenser is only .0003-microfarad capacity—don't mix these two.

On the baseboard are mounted all the rest of the components, including the Lucerne coil, the low-frequency transformer, the valve holders and all the small parts.

Around the detector valve holder are five of these small but highly important components—two resistances and three condensers. By using wire-end components we save five fixing holders—and incidentally shorten and simplify the wiring.

You will see that these little components are connected by their wire ends to their appropriate terminals on the detector valve holder, the other ends going out to the nearby components, such as the decoupling condenser, grid of the second valve holder and the GC terminal on the coil.

The coil is screwed by its two metal feet to the extreme end of the baseboard, near the aerial and earth terminal block. The low-



Theoretical circuit diagram of the Lucerne Straight Three, which consists of a leaky-grid detector, resistance-capacity coupled amplifier, and power output stage

specified but don't forget what we said about the choice of a larger power valve.

Using the specified valves with a 120-volt high-tension battery and a 9-volt grid-bias battery, the anode current is 8.5 milliamperes, which is, not very much over-running the standard-capacity type of battery, though, of course, a double-capacity type would undoubtedly be more economical in the long run.

Input Control and Reaction

Operation is, as already mentioned, simplicity itself. Please do make proper use of the input control and reaction. Vary the input for almost every station you log on the main slow-motion dial. If you want closer separation reduce the input control setting and increase reaction to make up for any loss in volume.

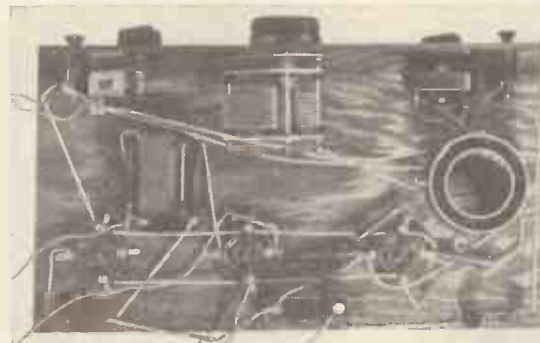
For best quality and volume you don't want to overdo the selectivity adjustments. Have the set just selective enough to give you interference-free reception—that is with the minimum possible reaction and as much pre-set capacity as conditions will stand.

Before we finish this article, perhaps a few words on the Lucerne coil that forms its nucleus will be useful. It is the grid coil of the two coils designed by "The Experimenters" that is used. This has 60 turns for the medium waves, 285 turns brought into circuit for long waves, and 35 turns for reaction on both wavebands.

This coil is quite easy to make and has terminals brought out at the base for the connections of the tuning condenser, reaction condenser, and the aerial and earth.

The long-wave portion is switched in and out of circuit in the usual way with a two-point external switch across it.

For selectivity the aerial terminal goes to a tap on the main winding and this can be varied a turn or two one way or the other, as already explained, for suiting local conditions.



From this plan view you can see just how the components are laid out on the baseboard. Compare this picture with the blueprint reproduction on the opposite page

frequency transformer is well outside the influence of the coil at the other end of the baseboard. The three valve holders are mounted in line, resulting in straight filament connections and a neat layout.

Insulated sleeving covers all the main leads and the battery connections are of flexible wire, two for the low tension, two for high tension and three for grid bias.

Suitable valves to use with this set are

COMPONENTS NEEDED FOR THE LUCERNE STRAIGHT THREE

BASEBOARD

- 1—Peto Scott, 14 in. by 7 in.

COIL

- 1—Lucerne type Grid, with reaction, as described in "A.W." dated January 27.

CONDENSERS, FIXED

- 3—T.M.C. Hydra, type tubular, values: .0003- (2), .01-microfarad (or Telsen, T.C.C.).
- 1—Telsen, type 500-volt test, value: 1-microfarad (or T.M.C., Hydra, Dubilier).

CONDENSERS, VARIABLE

- 1—British Radiogram .0005-microfarad, air dielectric, with slow-motion drive.
- 1—Telsen .0005-microfarad, type W103.
- 1—Telsen .0003-microfarad, type W354.

HOLDERS, VALVE

- 3—Telsen four-pin, type W224.

RESISTANCES, FIXED

- 4—Siemens Schukert, type SS 1/2-watt, values: 25,000-, 50,000-ohm, 1-, 2-megohm.

SUITABLE VALVES

Make	Detector (Metallised)	Low-frequency (Metallised)	Power
Cossor.....	210HL*	210Det.*	220P*
Dario.....	TB282	PB172	TB052
Hivac.....	H210	D210	PP220
Lissen.....	HL2	L2	LP2
Marconi.....	HL2	L210	LP2
Mazda.....	HL210	L2	P220
Mullard.....	PM1HL	PM2DX	PM2
Osram.....	HL2	L210	LP2
Triotron.....	HD2	SD2	E235
Tungsram.....	HR210	LD210	P215
362.....	HL2	L2	P2

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

SUNDRIES

- Wood for panel, 14 in. by 7 in.
- Connecting wire and sleeving.
- 3 yd. thin flex.
- 2—Telsen terminal blocks.

SWITCHES

- 1—Telsen two-point shorting, type W107.
- 1—Telsen three-point shorting, type W108.

TRANSFORMER, LOW-FREQUENCY

- 1—As described in "A.W." dated February 10.

ACCESSORIES

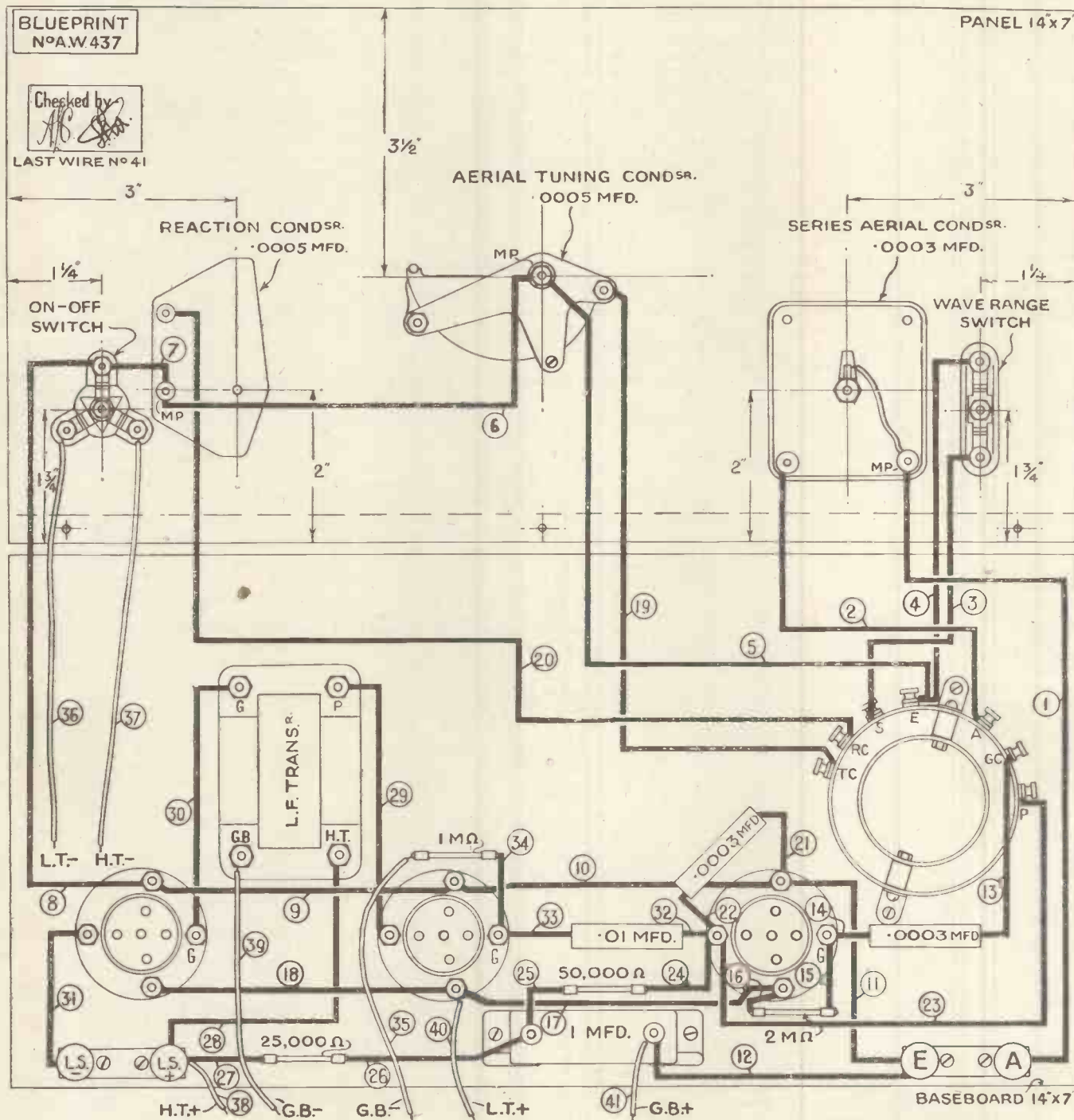
BATTERIES

- 1—Drydex 120-volt high-tension (or Lissen, Fuller).
- 1—Drydex 9-volt grid-bias (or Lissen, Fuller).
- 1—Exide 2-volt accumulator (or Lissen, Block).

LOUD-SPEAKER

- 1—Ormond, type Junior.

Half-scale Layout and Wiring Guide for the LUCERNE STRAIGHT THREE



If you are an intending constructor of the Lucerne Straight Three, you most certainly ought to have a full-size blueprint by your side. This you can obtain from AMATEUR WIRELESS, 58 to 61 Fetter Lane, E.C.4, price 1s., post paid.

We make no apology for reminding new readers that these blueprints are a part of our unique construction service to constructors. Every set designed by AMATEUR WIRELESS passes through the hands of expert draughts-

men, who make a full-size working plan from the original model.

Your blueprint comes to you as a contact photographic print on very stout blue paper—a real working plan of the component layout and the wiring-up sequence.

Every connecting lead is numbered, from 1 upwards to the last wire, the number of which is stated on the blueprint. In this way, as a constructor, you can proceed with the connection of the components in complete confidence—

having the assuring knowledge that if you follow the sequence there can be no wires omitted, nor any wires put in wrongly. From the above half-scale reproduction you can see what we mean.

As a full-size guide to the layout of the parts, the AMATEUR WIRELESS blueprints are very valuable. As a sure safeguard against faulty wiring, they are simply indispensable, particularly to the beginner who cannot follow a theoretical circuit diagram.

AMATEUR TELEVISION

Light Sources in Television

By H. CORBISHLEY

ONE of the greatest problems in producing a television image is that of providing a source of light of sufficient intensity which is capable of modulation according to the received signal impulses. Such a light must be capable of instantaneous variation, so all ordinary sources must be ruled out unless modulation can be carried out later.

Curiously enough, a light which possessed the necessary qualities was available even in the days when attention was first seriously directed to television research, but despite the amount of intensive experiment which has been conducted since little more progress has been made in the development of this, and the limitations which existed then are still present.

This lamp is, of course, the neon and it possesses all the desired characteristics except that of being able to produce a light of great brilliancy and a suitable colour. The first type of neon was developed for advertising purposes and for use where a low value of light was required, but it was soon appreciated that a different construction of the electrodes would enable it to give a field of light better suited for television purposes. Baird, therefore, developed the flat-plate neon which has one of the electrodes a little larger than

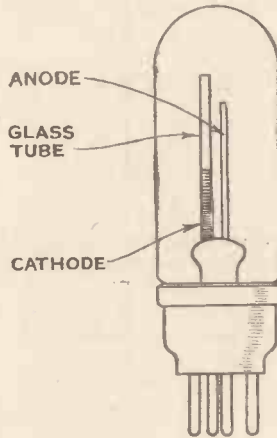
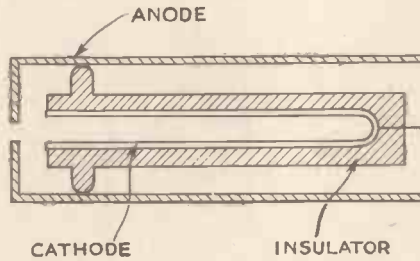
the scanning field over which it gives even illumination, and this type has been used for the light source for the disc machine ever since. A recent improvement is the substitution of a grid of fine wire in place of the plate and a polished metal plate behind this which reflects the light to some extent through the wires of the grid.

The striking voltage of the neon lamp is approximately 180 volts, so this means that the voltage on the anode of the last valve must be about this figure, unless special arrangements are made for a separate source of H.T. Current requirements are from 20 to 30 milliamperes. Many attempts have been made to alter the colour produced by this lamp, but only with partial success. A small addition of helium gives an orange pink and argon a bluish-pink. A mixture of neon helium, argon, krypton, and xenon gives an almost white light, but unfortunately the mixture is not stable and the lamps so filled do not last.

A variation of the ordinary neon is the crater-point type, so constructed that instead of a considerable field of light being produced there

is almost a point. The internal construction of a lamp of this type is shown by the diagram. This type of lamp is used in conjunction with mirror-drum scanners where the object is to produce a highly concentrated spot of light on the screen.

One disadvantage of the crater-point lamp is its liability to splutter—that is, the metal round the aperture of the anode disintegrates and tends to bridge the space between the two electrodes when the lamp becomes useless.

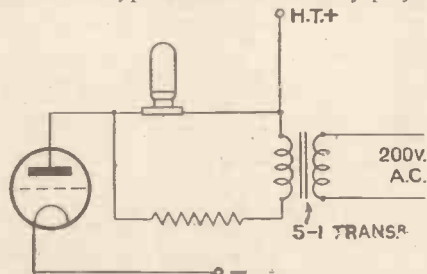


The diagram above shows the electrode arrangement of a crater-point neon lamp; note the aperture at which the light is concentrated. On the left is a diagram showing the internal construction of a mercury-vapour gas-discharge tube; the illumination is produced within the glass tube above the cathode

With either of these two types of lamps it is necessary to use a limiting resistance in series, otherwise the lamp will be damaged. Under conditions of ordinary use with a wireless set the resistance of the filament plate circuit will be sufficient.

Projection Lamps

The most usual practice with receivers of the mirror-drum type is to use an ordinary projec-



A circuit showing a simple method of starting the discharge in a mercury-vapour tube

tion lamp and modulate the light from this by passing it through a Kerr cell on its way to the screen. Lamps generally used with this system are of 200 candle power with bunched filaments. This system is not without its snags for, in the first place, only about fifteen per cent. of the light is able to pass through the Kerr cell; and, secondly, the value of the light must be limited owing to the heat which is produced and which has a deleterious effect on the Kerr cell.

Mercury-vapour Tubes

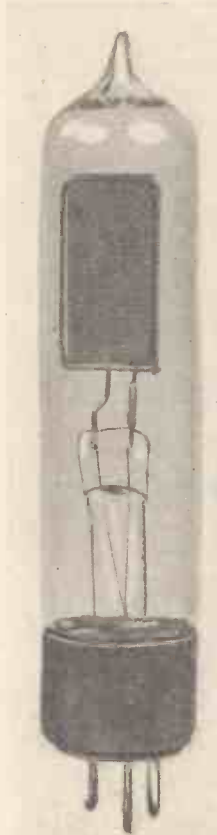
Recently, mercury gas discharge tubes have come into favour. Originally, this type of lamp was developed for sound on film reproduction, but it has been found to lend itself admirably for the provision of light for low-definition television systems. The mercury gas discharge lamp consists of a glass envelope mounted on a valve base, and inside there is a glass tube surrounding the cathode. The anode is placed just outside the glass tube and in the bulb are a few drops of mercury. The discharge takes place in the glass tube and a line of light is produced about an inch long; so in cases where it is wished to have available a highly concentrated light, the tube can be used end on and the glass masked except for a small aperture at the end.

Mercury tubes can be operated with a current of about 30 milliamperes, though the working potential is somewhat high—300 to 400 volts. The tube can be conveniently used directly in the anode circuit of an ordinary power valve. If there is any possibility of the current being more than the figure given, then a resistance of a few thousand ohms must be used in series.

The striking potential is a hundred or more volts above the working potential, and so it is necessary to employ some special means of causing the lamp to strike. One simple method is by the use of a 5-to-1 step-up transformer of which the primary is connected momentarily to A.C. mains.

The light given by a mercury-vapour tube is of a bluish-white colour and is not unpleasant. It is, of course, capable of direct modulation just in the same way as are the neon types of lamps, and this fact simplifies receiver construction considerably. A tube of the D.2 type as manufactured by the G.E.C., will provide adequate illumination for a screen measuring approximately 7 in. by 3 in.

Certain limitations are imposed in the use of the mercury-vapour tube, for it will not modulate at very high frequencies and this means that it is unsuitable for use with high definition systems. However, for systems using up to 40 or 50 lines it is an excellent source of light.



A neon lamp of new design—wire mesh is used instead of a plate



A mercury-vapour lamp of the type shown by the diagram

"THE TELEVISION POLICY THAT THE PUBLIC WANTS"
"TELEVISION" for JUNE 1/-

On Your Wavelength

Budapest Repaints

DON'T be surprised if you find Budapest quite weak just now. The reason is that the great masts of the 120-kilowatt transmitter are being repainted and that the station has to close down while the work is in progress for fear of giving the workmen shocks.

At present most of the programmes—except at week-ends—are being radiated by the old 20-kilowatt transmitter, and it is likely that this state of affairs will continue until about the middle of July.

B.B.C.'s Clocks

IT has been pointed out that the B.B.C. is far from consistent in the matter of this 24-hour clock business. All of the clocks that I have seen at Broadcasting House are of the 12-hour variety and I haven't succeeded in spotting one with a second circle of figures up to 24.

Perhaps in the studios they have timepieces with 24-hour dials. They would certainly seem to be necessary in those studios from which the news bulletins are read, for announcers make not a few bloomers when endeavouring to use the new system—a sure proof that the simple little calculations that supporters of the system talk about are by no means so simple.

Proof again that you can easily make mistakes in 24-hour time!

Radio versus Fog

HOW many of you realise that many of our giant liners sometimes cross the Atlantic without ever determining their exact position by astronomical means? Persistent fog across the ocean sometimes makes this quite impossible.

When this is so, radio in the form of direction-finding apparatus is invaluable to the navigators. The apparatus is fitted up to the ship so that zero degrees on the instrument indicates the direction of a station dead ahead.

When a bearing is taken, a position line is obtained through any station transmitting a signal from a pre-determined position. In this way a fog-bound vessel knows its position.

Finding the Distance

WHICH reminds me of the sinking of the *Nantucket* light vessel. A wireless transmitter was, of course, in operation on the *Nantucket*, sending out a series of four dashes. Approaching ships took bearings, and as already explained if the reading were zero degrees the *Nantucket* would be dead ahead.

But, of course, the bearing might not be zero. Supposing it were 5 degrees; the light vessel would then be 5 degrees on the starboard bow. If the bearing were 355 degrees, to take another example, the *Nantucket* would be 5 degrees on the port bow of the ship.

Having fixed the position, the question arises as to what is the distance between the ship and the light vessel—very important as the ship approaches the other side. Another bearing is taken north and south of the *Nantucket*, so that by the intersection of the two bearings the exact position of the *Nantucket* is found on a large-scale chart.

In fog, when the ship is very close to

By Thermion

the light vessel, a submarine bell is rung by the *Nantucket*, and the navigator notes the difference in time between the arrival of the wireless signal—considered instantaneous, of course—and the arrival of the much more slowly travelling sound wave. From this time difference the exact distance can be quickly found from another chart.

Those Guarantees

A READER sends me a glaring instance of how unsatisfactory can be the guarantees which accompany wireless sets.

Here, in a nutshell, are the facts. Set in use for just one week, then packed up. Quite beyond local service man, so returned to makers. Makers replaced free of charge (a) a condenser bank, (b) a mains transformer, and (c) a valve. For doing this they made a labour charge of a mere half-guinea.

Now it seems to me that if all these components went up in blue flames after seven days' working there must have been something just slightly wrong with them. To me that labour charge is rather like adding insult to injury.

How's Your House Wiring?

DURING the last month or two I have come across several cases of bad interference with wireless reception which was eventually traced to defects in the lighting circuits of the house.

In every instance the electric wiring had been in position for fifteen years or more and had been neither renewed nor properly tested.

Fifteen years or more ago houses were often wired in rather haphazard ways—rubber-covered leads going straight through holes in walls, or even in woodwork, without any additional protection, and that kind of thing.

Rubber, as most people know, is a perishable substance and, once it deteriorates, its insulating properties fall off to a remarkable extent.

It is a wise precaution to have old wiring tested by means of a bridge megger. Such tests should certainly be undertaken if the wireless set is noisy and no other cause can be found for its misbehaviour.

North-Scottish Regional

PROBABLY the worst served area in the whole of this country in the matter of broadcasting is the northern and north-eastern part of Scotland. Matters will be considerably

better when the new long-wave National gets going, but to provide alternative programmes a regional transmitter is required.

As soon as the work on the new Droitwich long-waver is finished the B.B.C. will get busy with the North Scottish Regional. It is, I believe, to be a 75-kilowatt of much the same design as those in use at Brookmans Park, Washford Cross and Moorside Edge.

Its coming will mean a big increase in the number of listeners in north and north-east Scotland. It is reported on the most unreliable authority that inquiries for second-hand wireless licences are already being received by the Aberdeen Post Office!

Cold—

I SEE that Professor McLennan is still busy finding out what happens to Ohm's law at the lower end of the temperature scale. By evaporating liquid helium, he has got down to within a fraction of a degree of absolute zero—or, roughly, 273 degrees centigrade below freezing point—where many of the ordinary laws of magnetism and electricity seem to give up the ghost.

For instance, metals lose all resistance and become super-conductors, so that if one starts an electric current going in a closed ring, it apparently keeps on for ever, or at least for as long as the temperature is kept within a few degrees of the zero point. Of course, we know that electric resistance generally increases with heat, at ordinary temperatures, but the fact that it disappears altogether at absolute zero—where there is no molecular movement—shows how closely the two things are bound up together.

—and Heat

STRANGELY enough, the effect of heat on magnetism is just the opposite. I think it was Gilbert in the sixteenth century who



A Marconi engineer testing a new police-radio equipment fitted into a saloon car. Two-way telephone contact can be established



"It's a most 'attractive' set," as the pilot of this aeroplane said when the loud-speaker of this Ekco model 54 set played tricks with his compass!

first discovered that one couldn't magnetise red-hot iron. A soft-iron magnet when gradually heated retains its strength practically unaltered up to about 770 degrees, and then suddenly loses it all. For steel the critical temperature is a few degrees lower. Another curious thing about a magnet is that it will



Marconiphone photo

Aristocracy takes to the radio! No wonder, when some aristocratic sets are being manufactured in this country!

not stand up to repeated blows or shocks. Even a permanent magnet loses some of its strength after being dropped—quite apart from the risk of fracture.

Atom Turned Inside Out

SCIENCE is a queer business. A year or two ago we wireless folk thought we knew pretty well what the atom was like and how the electrons performed such useful services as warming up our filaments or heaters and causing the loud-speakers, to loud speak.

Now it looks as if one more apple-cart were to be upset. New theories suggest that we know very little about the atom and that much of what we thought we knew is wrong.

That is the way with science; and a very sound way, too, when you come to think it out. It forms theories to fit in as near as possible with known facts, and these hold the field until further discoveries are made to upset them.

This kind of thing provides exercise for the brain and ensures the grey matter of the wireless enthusiast against developing sluggishness!

Indoor and Outdoor Aerials

IN last week's issue there was a very interesting letter (No. 1093) from a Chatham reader. He called attention to the fact that most sets nowadays are designed for use with outdoor aerials, though there is certainly a very big demand for apparatus that will work with indoor collectors.

I am in hearty agreement with what he says. For a long time I have regarded the outdoor wire as something of an anachronism; in fact, I pulled down my own four years ago and have since used nothing but various good indoor aerials.

Aerials For You to Try

IF you care to tackle a little interesting and very inexpensive experimental work, just try how an indoor aerial works in your own case. There are many kinds, but of them I find that there are two which are most generally satisfactory.

The first consists of a single strand of double-cotton-covered No. 18 s.w.g. wire slung round three sides of a room and so arranged that it is a foot below the ceiling and a foot from the walls. It must be well isolated by means of small porcelain insulators, but if you buy the midget type made of white material they are quite inconspicuous.

You will not get the same results from an aerial stapled on to walls or picture rail, owing to its very high capacity.

The second kind of indoor aerial is really a miniature edition of the outdoor affair. It consists of two or more parallel wires slung between spreaders in the attics of the house. Here, again, No. 18 copper wire is perfectly satisfactory.

With either kind of indoor aerial a first-rate earth is absolutely essential.

Danish Listeners Have Their Say

THOUGH I don't believe half of them, there are frequent complaints that our own B.B.C. dictates to listeners and refuses to give them what they want.

The trouble is due largely to the fact that it is so hard for the B.B.C. to discover the likes of the average listener. The disgruntled are always ready to write in, usually with destructive criticism, but the listener who likes the

fare provided seldom bothers to say so. In any case, the whole of the B.B.C.'s correspondents represent but a minute percentage of the great army of listeners.

In Denmark they have found what seems to me to be almost the ideal way of making and keeping contact between listeners and the broadcasting authorities. It is a great scheme.

Societies of Broadcasters

DENMARK has between 400,000 and half a million licensed broadcasters (I rather like that word, don't you? as an alternative to "listener"), and of these more than 200,000 belong to organised wireless societies, which are in direct contact with the broadcasting authorities.

In this way the broadcasting people at Copenhagen and Kalundborg can always discover right soon whether their programmes are the stuff to give 'em or not.

The societies hold frequent meetings to discuss the programmes. If they don't like what they are getting they say so, and they make suggestions for alterations and improvements.

He Shall Have Music . . .

THE other day Percy Harris arrived at my place, the ostensible reason of his visit being that he wanted a breath of country air, and the real one, I suspect, that he was burning to show me his new car!

I need hardly mention that it is fitted with the most up-to-date of wireless sets and we were able to make some very interesting experiments in the course of a trip of seventy odd miles, mainly through the Chiltern Hills.

We had excellent reception from numbers of stations, and it was most interesting to observe the way in which the S.A.V.C. tackled the reduced field strength as we dropped down into narrow valleys and passed through cuttings or under bridges.

At five minutes to six (or 17 hours 55, should you so prefer it) we found ourselves, after an hour or so spent in taking photographs, a dozen miles from my home. "Hang it!" I said; "we shan't get back in time for the news bulletin."

"P. W. H." just pressed the button and we heard the news as we drove along!

Would You Believe It? Asks G. H. DALY

Professor van Ardenne claims to have proved that the relaxation and particularly the contraction of the human muscles set up ultra-short electric waves which will affect a sensitive receiver. It is well known that the body is highly charged with electricity, as can be heard sometimes when a comb is drawn through the hair—a crackling noise results. There are 600,000 fibres in the biceps muscle of a man and each fibre is composed of many fibrils, and it is the movement of these thousands of fibres and fibrils that cause the waves.

The speed of a wireless wave is practically constant whatever the medium through which the wave is travelling, whether it is via the ether or guided along wires as in wired wireless. But in the case of an ordinary telephone conversation by landline the speed depends upon the length of the line. The shorter the line, the slower the current. In the case of short lines the voice is carried by speech currents which are comparatively slow, but in the case of trunk lines some hundreds of miles long the speech currents form electric waves and these travel at the same speed as wireless waves. These waves travel infinitely faster than speech currents.

The cosmic ray is the most powerful wireless ray known to science. It comes from some part of the universe beyond the Milky Way, but its exact birthplace is unknown. It will penetrate 16.7 ft. of solid lead or 190 ft. of water. Some scientists believe the ray to be caused by the destruction of matter far out in space; others believe that it is the ray created by the birth of matter.

Radio on the Road

By MORTON BARR

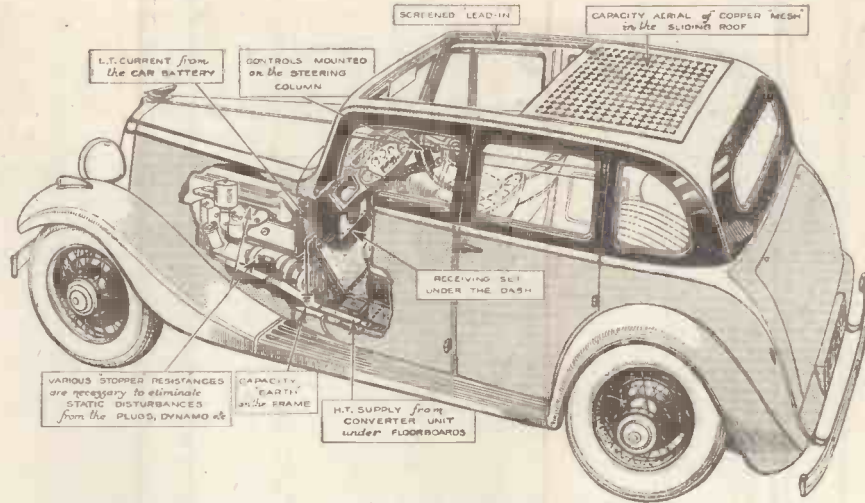


Fig. 2.—Radio on the road is perfectly delightful if you equip your car as shown above. The aerial here consists of copper mesh fixed to the sliding roof

MUCH may be said both for and against the "ethics" of listening-in whilst driving a car. Some argue that it is liable to distract the driver's attention at a time when every faculty should be on the alert, whilst others retort that true "road sense" is instinctive, and that a driver is at his best when his mind is most relaxed.

Psychology of the Individual

The real test, it seems, depends upon the psychology of the individual concerned. One driver will display the highest skill and judgment when in the state of mind induced by a pleasant background of music, whilst another may not.

But both would probably agree that a loud-speaker which can be switched off in traffic—or when it becomes too obtrusive—is less of

an evil. Conditions there are admittedly different in many ways from what they are here, but certain British manufacturers are already preparing to follow the American lead.

The design and installation of a car set raises one or two problems which are not met with in ordinary broadcast reception. For instance, there is the difficulty of cutting out "static" interference from the ignition system, which is of course located quite close to the set.

Then one must face the fact that a motor car is subject to constant vibration, both from the engine and from the road. Also there is little room for choice when it comes to selecting the best place to arrange the aerial and to accommodate both the set and loud-speaker. Finally one is up against the problem of low-tension and high-tension supply and a few other minor difficulties.

Most of the "static" trouble comes from the sparking plugs, though it also occurs at the dynamo brushes, the distributor, and the make-and-break.

Wherever there is sparking, there is bound to be "static" disturbance. This is either radiated directly or else finds its way into nearby conductors which help to spread the mischief farther afield.

The remedy lies partly in the use of condensers which are designed to "drain" the disturbing currents to earth, and partly in the use of "stopping" resistances which serve to consume or dissipate the high-frequency currents. In addition all leads should be covered with an earthed sheathing.

For instance, as shown in Fig. 1 the ignition coil is connected to earth through a condenser C, in addition to the usual condenser C1, whilst the dynamo brushes are shunted by a condenser C2. Stopper resistances R are inserted in series with all the plugs, as well as in the lead from the ignition coil to the distributor.

These "stopper" resistances, by the way, gave rise to some curious differences of opinion when they were first introduced. The pessimists argued that they cut down the "heat" of the spark and so led to poor "firing." It was also alleged that they made "starting" less easy. On the other hand there were enthusiasts who maintained that "stopper" resistances definitely cut down petrol consumption, some said by as much as one-third.

No Effect on Healthy Engine

Systematic tests have now shown that so long as they do not exceed 20,000 ohms, these resistances make no perceptible difference to the running of a normally healthy engine. There may, at first, be some tendency to mis-firing, but this can be remedied, once and for all, by a slight re-adjustment of the timing.

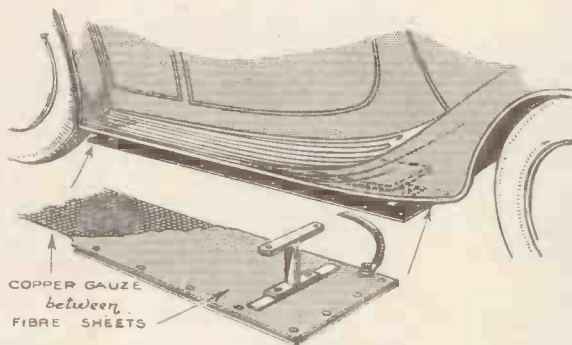


Fig. 3.—If you have a fairly powerful set, this running board aerial will be quite effective on the car

an evil, let us say, than a passenger who persists in chattering at all times.

Of course, some of the critics do not drive themselves, but are naturally quick to protest against any possible new peril to the pedestrian.

But even amongst drivers, there are relatively few who have as yet had an opportunity of realising how good radio reception can be in a car fitted with the latest type of set, properly designed for the work in hand.

Although a comparatively new innovation in this country, car radio has been the subject of intensive development in America for at least three years. Over there the standard of broadcast reception is sufficiently high to make it impossible for manufacturers to sell motor-car sets—at least in quantity—unless they were definitely in a position to guarantee high-quality results. Further, the set must be comparatively free from trouble both as regards installation and subsequent use.

If one agrees that the proof of the pudding is in the eating, the significant fact is that last year over 700,000 motor-cars were equipped for radio reception in the U.S.A.

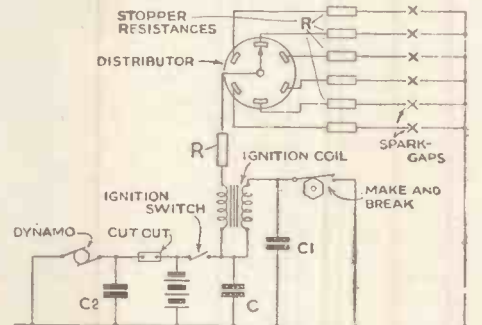


Fig. 1.—Circuit for stopper resistances to prevent interference with the car radio set from the ignition system

As regards the "heat" of the spark, the explosion of the gas mixture in the cylinder is very similar to the action of dynamite. It depends more upon the impulsive effect than upon the actual quantity of heat generated by the spark, so that the "stopper" resistance does no harm in this respect.

The favourite place for arranging the aerial is in the roof, where it is located as far away as possible from the local source of "static," and where it has also the greatest effective height. Sometimes a horizontally-coiled loop is used, and sometimes a square of wire netting hidden under the upholstery as shown in Fig. 2 for a car with a sliding roof. Naturally the lead-in is carefully screened.

It is fairly obvious that the pick-up efficiency of a car aerial must be much less than that of an ordinary outside aerial, for which reason the high-frequency side of the set should be correspondingly sensitive.

On the other hand, the higher the sensi-
Continued on page 603

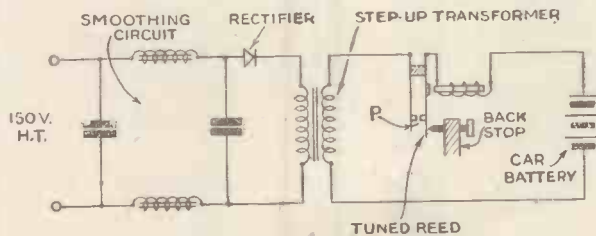
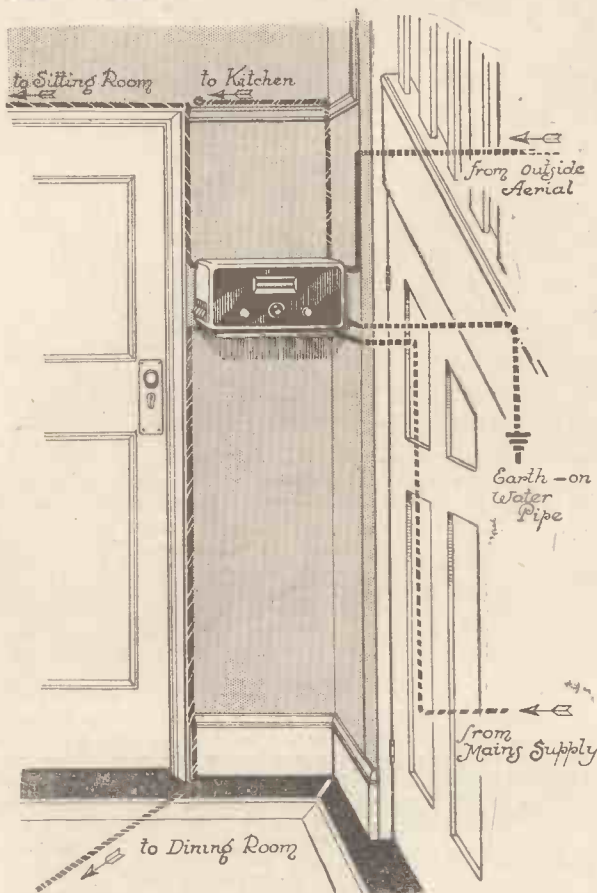


Fig. 4.—Vibrating-contact converter for obtaining the high-tension supply for car radio from the accumulator

Make Radio Fit the Home!

Extension Loud-speaker Ideas Discussed by "Westerner"



Making use of the hall as the key point of the radio programme distribution. The set is fixed to the wall bracket and the extension leads taken to the different rooms as shown by this interesting diagram

ever the estate agent's publicity makes of it—usually boils down to "three down and three up," and the occupation of it quickly boils down to the kitchen becoming the living-room (if it is large enough), the sitting-room being left to the younger members of the family (if any) to conduct their "amorous excursions," whilst the dining-room only comes into use when anyone calls; it is just a museum for the "best" furniture and the family art collection.

It was into such establishments that the new wireless sets were introduced, and then the problem arose: "which room to put it in?"

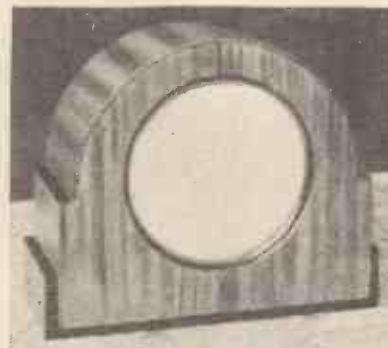
Kitchen or Sitting-room ?

Parents said "Kitchen; we are there most of our time"; the growing family said "Sitting-room," with visions of an eternal dance music accompaniment to osculation, and all had a fear that such a dazzling piece of furniture must go with the other "best," in the dining-room, for the due impressing of Mr. or Mrs. So-and-So when they called.

To say that this problem rocks

Had the designers been members of the "average listener" class, and had they given it a second thought, they would have realised that a separate set in conjunction with three or more loud-speakers in different rooms would have been much more suitable.

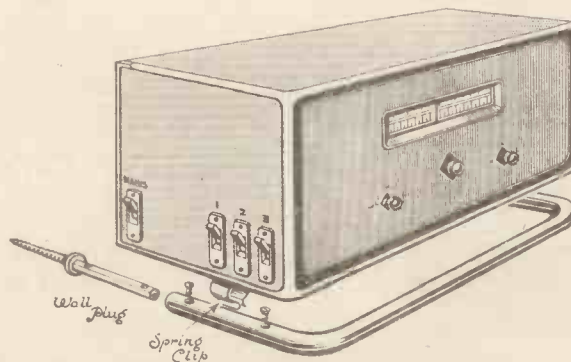
So much alike are these six-roomed homes in plan that it should be an easy matter to design a complete outfit, for sale as a whole, whether for installation by the purchaser himself or by the agent as part of the service details; such a uniform design should allow of the slight variations necessary to fit each house and the varying family whims.



Here is a very artistic loud-speaker that would go well with the most refined surroundings—the Ferranti. Just the thing for your new loud-speaker extension system!



This W.B. permanent-magnet moving-coil loud-speaker, in its neat and attractive cabinet, has won a well-deserved popularity among discriminating listeners



Modern wall-bracket idea for holding the radio set. On the left you see suggested switches for the loud-speaker extensions to the various rooms in the house

The most central point of such a house is the "hall." All three ground floor rooms are entered from it, and the three doors are grouped much as shown in our illustration; usually it will be found that there is a very convenient position adjacent to these doors where the set could be fixed up, so that only a step is needed from either room to switch it on or off.

Of the internal design little need be said; it could be of any of the prevailing types of circuits, three, four, or five valves, straight or super-het, all-mains or battery, and incorporating all the special features of the latest set design—there is no intention here to grumble with the technical details of the modern set.

Battery of Switches

The chief new item to be built into such a separate set is a battery of switches, labelled "1," "2," "3," or "Kit," "Sitt.," "Din.," which would operate the making and breaking of the output circuits of the respective loud-speakers. The advantage of being able to step to the set in the hall and switch over to either, or all, rooms is obvious.

No doubt some snags might arise, and it is for the designer to arrange for the matching of the loud-speakers, so that the use of any one does not starve any other; the question of possible mains interference from parallel leads to the loud-speakers should be easy to solve.

In the illustration, it will be seen that the kitchen lead is quite short, and that the sitting-room lead is taken at picture-rail level, whilst the front room lead is on or under the ground floor. This should prevent any induced

English households up and down the land may be an exaggeration, but to get down to fact it is a problem which causes no little trouble in some homes and all because the combined type of set does not fit into the home as it should do if listening is to be a reasonable and regular habit.

Manufacturers have concentrated on the set with the built-in loud-speaker, in mass-production terms, to such an extent that they have ousted the separate set almost entirely, such sets being only listed now as kits of parts for home constructors.

Agents' windows are full of really handsome apparatus which almost acts up to the lavish descriptions in the advertisements, and which can be relied upon to give excellent service. "Quality, selectivity, and efficiency" might be the slogan for all, the general standard being so good, but they all seem to have been designed for dwellers in mansion flats with central heating and service restaurants, where all the rooms are used equally and this small-home problem does not arise.



This Baker Extentone loud-speaker is an excellent reproducer for extension use. In addition to an on-off switch, it incorporates a tone control

THROUGHOUT this harassed and worried land of ours, homes are seething with discontent, households are riven from attic to basement (if any), and over-worked (or unemployed) heads of households are driven to despair by the dominating shadow of a blunder—a fault—an error in judgment, largely outside their own control.

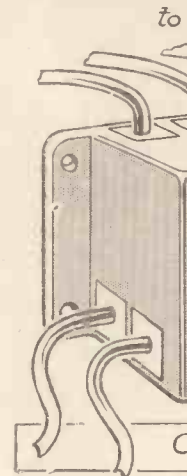
Some way back in the near, or distant, past there arose in these homes an overwhelming desire to listen to the attractive and entrancing programmes put on the air by the B.B.C., and a modern wireless set was purchased at considerable financial strain—one of those handsome enclosures of all that is needed to obtain unceasing melody and entertainment and instruction; for a while enthusiasm reigned, and the homes rocked with sheer delight.

In the Other Room !

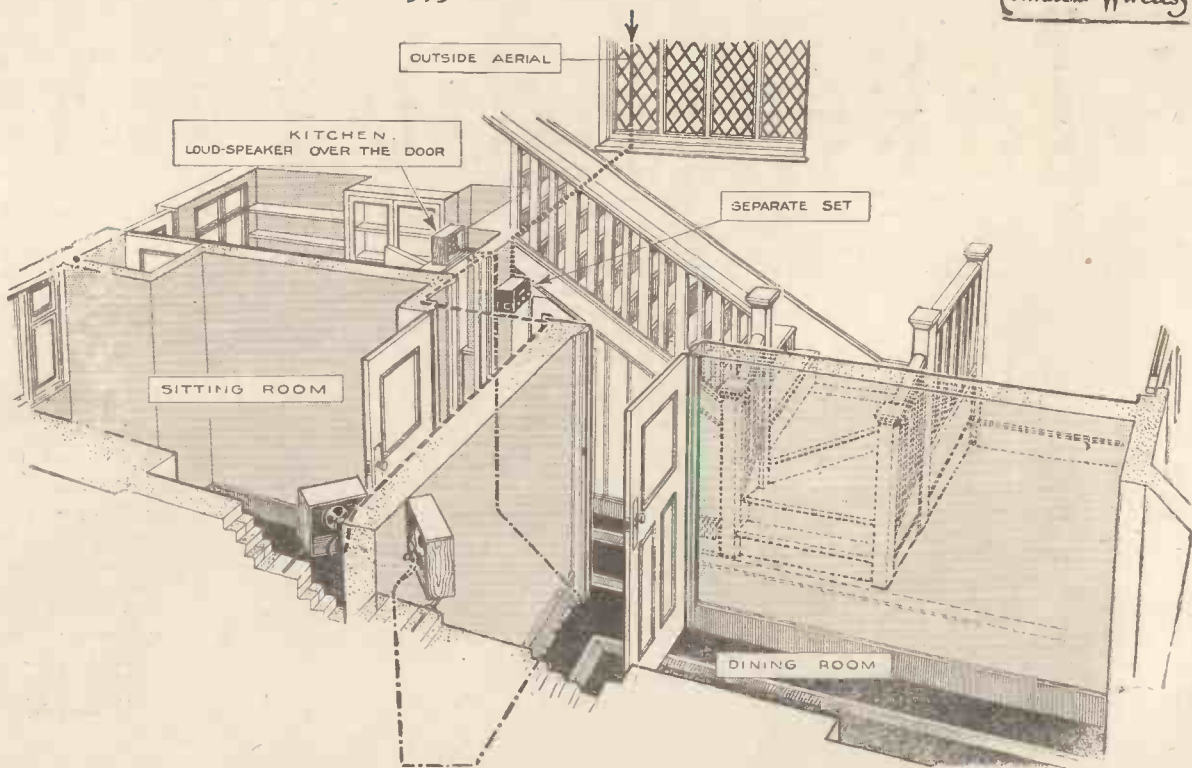
"Our new wireless set" ruled everything and everyone; but slowly the shadow crept, the blunder became evident, and the keenness for radio became dulled; the set was always "in the other room" when wanted.

Of the six or seven million listeners a very large proportion live in that type of home that condemns them to the occupation of one room and the keeping of the others to look at occasionally.

The modern villa residence—what-



For adapting a extension system recommended. right for



Our artist takes you into a typical modern villa and shows how a separate set could be arranged in the hall, with loud-speaker extensions to the dining-room, sitting-room, and kitchen. Why not adapt the idea for your own home?

effect from one loud-speaker to another, which may happen if the leads are close together.

The fitting of corner loud-speakers as shown is, of course, a matter of personal preference, but the designing of some smart type of wall-bracket, such as chromium-plated tubing carried on a Rawlplug fitting, should be capable of adapting to any house and easy of erection by the service depot or agent.

Using an Aerial in the Roof

The use of an outside aerial may present some difficulty where the house is not detached or semi-detached, but an aerial in the roof should be good enough for all ordinary listening.

In semi-detached houses, a short lead can be made from a vertical aerial mounted between the sill of the staircase window and the eaves above, standing about a foot away from the wall. Generally speaking, such a set should

be arranged quite shortly to the water main which is often "under the stairs," or close thereto; indeed, viewed from almost all points this position for the set seems very suitable.

Another matter arises—the adaptation of existing sets. That could be met



Specially designed for extension systems is this Bluespot permanent-magnet loud-speaker. Note the jack for the remote volume control

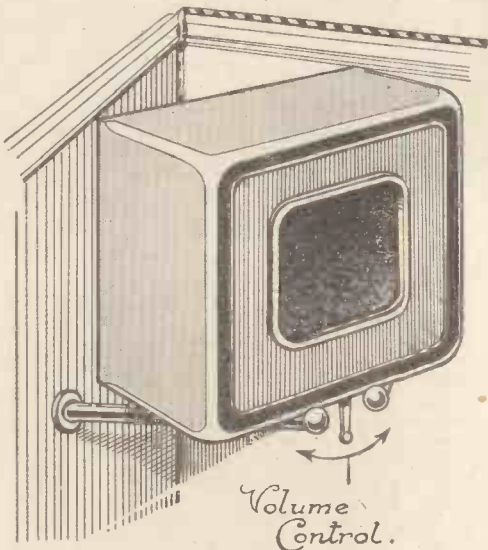
by the supply of a separate switch unit, of three or four switches with appropriate connections, to be affixed to the side of the set, and needing only a plug to the existing loud-speaker output points or, in the case of a combined set, to the extra loud-speaker points.

Small-scale Radio

The separate set should be as small as possible, and in view of midget-set development and of car radio, the scheming of an attractive exterior and an efficient interior on a small scale is quite feasible. It should be mounted at about an average eye-level, within reach of all but the very small members of the house.

Such a group of set and loud-speakers could be provided by the builders of new houses as an additional attraction, and the wiring be done whilst the house is being erected, so doing away with the cutting of walls, etc., afterwards.

Another small but essential point would be to fit each extension loud-speaker with a separate volume control.

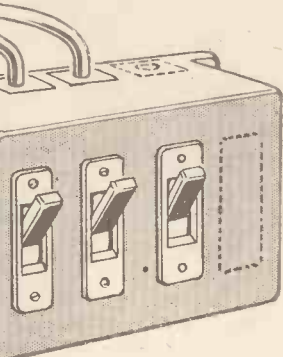


Plated tubing and spring clips form the basis of this bracket for the loud-speaker corner

work quite satisfactorily without an aerial.

The mains lead is very easy, as the usual habit is to fit the electric-supply meter and fuse box in the space under the staircase, only a few feet from the set; also the earth can be

Loudspeakers



Output from Set

on existing set to a multi-switch of this sort of switch box is Note the spare space on the fourth loud-speaker

Sets of the Season Tested

Ekco B54 Four-valver

WE have just completed our tests on one of the cheapest four-valve battery sets of the year—the Ekco four-valve model B54. It is similar in appearance to the standard range of Ekco receivers, and is housed in their now famous moulded bakelite cabinet. There are two models, an inexpensive one at ten guineas with a walnut type of cabinet, and the super model with a black cabinet and chromium-plated fittings, etc., for eleven guineas. The two models are entirely the same as regards the receiver chassis, the only difference being in the external appearance.



Could anything be simpler? The Ekco B54 has a large tuning scale and three small knobs underneath the main tuning control

As is usual with Ekco receivers, the controls are simple, there are no fine adjustments, or additional switches to bother about. Station selection is by means of an oversized dial which causes a light beam to appear behind the name of the station to which the receiver is tuned. As almost every European station is calibrated on the tuning scale, it is an extremely simple matter to tell from where the programme to which you are listening originated.

Removable Tuning Scale

Another point about this tuning scale is that it can be removed in a matter of moments and a new one put in its place. This is not of great importance at the moment, but when there is another change in wavelengths similar to the Lucerne Plan, it will save about a guinea, because there will be no need for the receiver to be sent back to the makers for a new scale.

There are three control knobs, horizontally spaced at the base of the cabinet. These are so arranged to give a symmetrical appearance. On the extreme left there is a selectivity control which, when it is used in conjunction with the volume control in the centre, stations only separated by a very few kilocycles can be received without any mutual interference.

On the extreme right is the wave change and on-off switch. This enables the receiver to be switched to either the medium or long waves, and cuts off the high-tension battery simultaneously. This switch knob is marked with a red and a green spot. The medium waves are brought into circuit when the green spot is opposite the moulded arrow, and the long waves when the red spot is opposite. All batteries are disconnected when the knob is turned to the third position or when both spots are at the bottom. The chassis is unusually compact. Looking from the back,

on the extreme left-hand side is the first valve, a Mullard SP2 high-frequency pentode. Then comes the detector valve, a Mazda H2, followed by a Mazda L2 used as driver, and finally the Mazda class-B output valve.

At the rear of the chassis is an ebonite inset into which is fitted the aerial and earth sockets and the two sockets for the gramophone pick-up. When the pick-up is in circuit it is advisable to decrease the volume control to the minimum or tune the receiver to a silent point. With the pick-up that we used we found that better reproduction was obtained by biasing the first low-frequency valve by means of a separate $1\frac{1}{2}$ -volts grid bias battery. The volume control only acts on the radio side, so an additional volume control is necessary for controlling the output from the pick-up. As the majority of pick-ups already have a volume control as an integral component, this point is immaterial.

Incidentally, it is essential to remove the gramophone pick-up when it is desired to receive radio. The receiver is supplied complete with a 130-volt combined high-tension and grid bias battery and a non-spill low-tension accumulator.

The total current taken by the four valves in the receiver and the dial lamp is approximately .65 of an ampere, so that the receiver will run for a little over thirty hours before the accumulator need be recharged.

It is not possible to estimate the actual anode current, as this varies according to the volume. With the maximum output of between 1,200 and 1,400 milliwatts the anode current rises to as much as 14 milliamperes but decreases when the volume is reduced to normal room strength to as low as 8 milliamperes. Actually when the receiver is run at full volume the high-tension battery should last about two hundred and fifty hours, or equal to three months' normal use.

Considering the exceptional quality and the high output, this receiver is really very economical and quite in keeping with its initial cost. Quite often we have reviewed inexpensive receivers which proved very costly to run, so we are glad to see that the Ekco people have devoted no little attention to the running costs of this receiver as they have to the purchase price.

Our first test of this receiver was in London on a short indoor aerial and a very poor earth connection where, under these conditions, the



When you take the back off the Ekco B54 you see a clean metal chassis, with moving-coil loud-speaker chassis above

selectivity was of the highest order. Quality, always a high-light with Ekco receivers, was exceptionally good. In fact, we are of the opinion that the quality from the B54 is almost as good as from the A.C. model 64, which is saying a great deal. Of course, the volume level is lower, but altogether the receiver is very close to a mains driven set.

On the indoor aerial we were able to hear approximately thirty stations at good loud-speaker strength. Numerically this is not a very great feat, but one must bear in mind that the conditions were abnormally bad.

Our laboratories, forty miles north of London, were selected as being the best

IN A NUTSHELL

Makers : E. K. Cole, Ltd.

Model : B54.

Price : £10 10s., with walnut case.

Valve Combination : High-frequency stage (Mullard SP2 pentode), triode detector (Mazda H2), driver stage (Mazda L2), class-B output (Mazda PD220).

Power Supply : Self-contained combined high tension, and grid-bias battery, and low-tension accumulator.

Type : Entirely self-contained table model receiver.

position for our second test. There we used an aerial of 60 ft. total length, with one of the new Wright and Weaire earth tubes. With this aerial system the selectivity was, of course, much flatter, but by adjusting the selectivity control we were able to tune out the local National station, so that only three channels were lost on either side. This is a good performance when one considers that we were only twenty-five miles from Brookman's Park and in an exceptionally good position for radio reception.

Long Waves Without Interference

All of the long-wave stations were receivable, with the exception of Eiffel Tower and Zeesen, without any interference whatsoever, and this includes such stations as Heston and Croydon. During an evening's test we were able to tune in the bulk of the more reliable Continental stations. For example, the first station that was really worth hearing was Fécamp, followed by Trieste, Frankfurt, Copenhagen, and then the London National. With a little juggling Horby could be tuned in, followed by Belfast, Bordeaux and then Heilsberg. Hilversum was free from North National, as was Poste Parisien from West Regional. Eight stations were heard between West Regional and the London Regional, while between this station and the Scottish Regional there were four more stations.

No difficulty was experienced in receiving the remaining stations on the medium wave-band, including Katowice and Toulouse, Langenberg and Sottens—all these stations you will notice are close to a powerful English transmitter—and Athlone. This was heard in daylight, making a total bag of over sixty stations.

Budapest was receivable with approximately five degrees to spare, so that the tuning range is in practice between 200 and 560 metres. As is to be expected with a straight set, there is no background noise or second channel interference, so that there is a lot to be said for this combination, that is a screen-grid high-frequency stage, detector, driver and class B.

There can be no question that the receiver is one of the simplest of its kind, and for the reader who requires a good family set at a reasonable price it will take a great deal to better it.

World's Biggest Battery Set!

By Our Lancashire Correspondent

THE world's biggest battery set recently left the Exide Battery Works at Clifton Junction, near Manchester, and a few hours later underwent its first test in its new home—the residence of the managing director, Mr. D. P. Dunne.

Impressive Results

The results were impressive to a degree. Highest expectations were realised. It should at once be stated that the Exide factory is *not* about to manufacture sets. That special big beauty was the first and final; hence its name, like the cost, remains as *x*; but Mr. Dunne, with the generous spirit typical of the company, has arranged that blueprints or working drawings shall be available to anyone seriously contemplating the production of a duplicate.

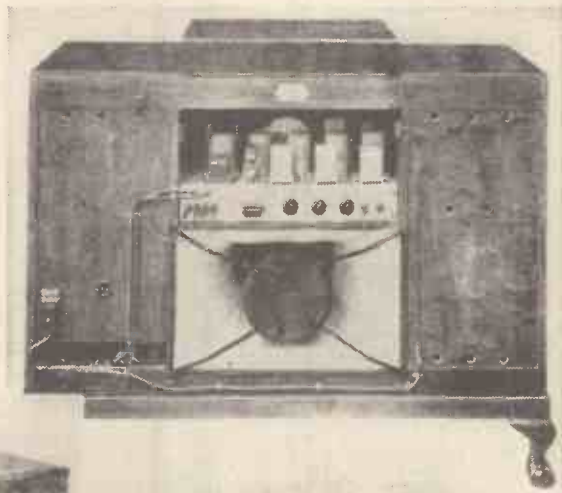
Applications should be addressed to the works' Engineering Department, where this super set has been conceived and constructed.

Mr. Dunne naturally wanted a battery set for several good reasons, such as "practising (and using) what the firm preaches," and not only to demonstrate how good battery sets in general can be, but as a special evidence of how they are available in isolated country houses, large and small alike.

as well as the recharging. The *total* weight of batteries in this set is only about 120 lb. and, being made up in five sections, each is easily movable—as is done with the millions of batteries already used with success by battery-set owners.



Front view with the sides open to show disposition of the equipment. On the left can be seen the batteries, the total weight of which is 120 lb. But they can easily be moved in sections when desired



Rear view, showing, among other things, the loud-speaker baffle. Now this is something like a set, isn't it?



Front exterior view. An exquisite burr-walnut cabinet houses the equipment, and includes in its three compartments a special chamber for the batteries. This is thought to be the world's biggest battery set—do you agree?

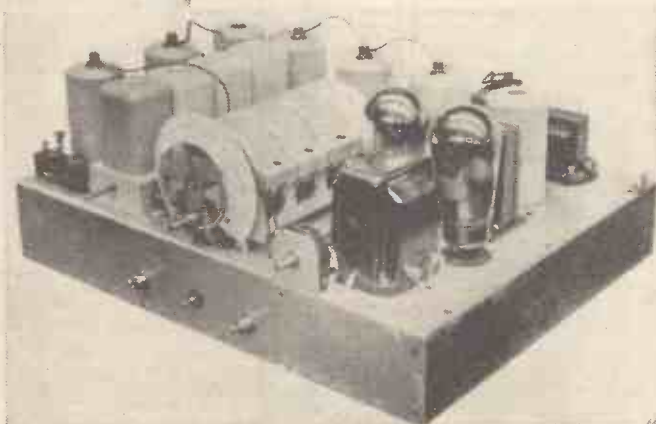
Many castles, mansions and other big residences have their own plant for supply of electric current for lighting, etc. They can have a set like his "Anonymous," and re-charge on the spot three or four times per annum; or, if they would prefer to avoid the trouble of disconnecting and re-assembling, they can get one of Britain's six hundred Exide service agents to do that work

Mr. Dunne's set, in its size (like a drawing-room cabinet) and choice walnut panels, externally absorbs all the superlatives in the lexicon—superior, recherché, majestic, luxurious.

In performance, it will get all European stations—and all Americans on medium waves after midnight.

comprises three 60-volt high-tension batteries and two 2-volt 50-ampere-hours low-tension.

An important feature is that a battery-operated set like this is workable even where "outsizes"—uncommon, bastard, low-volt current—now obtain. The charging equipment is negligibly cheap. Thus, if at any time the electricity supply be changed on to the mains, the alteration would cost approximately £1. There would be nothing to scrap. Wireless-set owners who have had the bitter and expensive experience of A.C. being changed to D.C. will appraise that point readily.



On the left is the special super-het coil and on the right the tone-corrector valve. All the latest refinements have been included in the circuit, including a 3.5-kilocycle heterodyne filter

Actually, this unique set has been made to hitch up to electric current—one thin connecting wire suffices. The plain reason is that wet high-tension batteries give a bit of trouble in case of having to be transported to a charging station if the owner has not re-charging facilities. Still, that is merely the position of millions already referred to—and they don't worry!

The batteries (stored in the left-hand front compartment of Mr. Dunne's masterpiece) can just as easily be housed in a separate cupboard or room or in attic or cellar, if not desired in one comprehensive cabinet with the other apparatus.

All that is Required

In the case of anyone with no electricity supply (either own plant or public service), the batteries, of course, provide all that is required, with three or four months' periodical re-charging.

The set in Mr. Dunne's case

The set in Mr. Dunne's case comprises three 60-volt high-tension batteries and two 2-volt 50-ampere-hours low-tension. An important feature is that a battery-operated set like this is workable even where "outsizes"—uncommon, bastard, low-volt current—now obtain. The charging equipment is negligibly cheap. Thus, if at any time the electricity supply be changed on to the mains, the alteration would cost approximately £1. There would be nothing to scrap. Wireless-set owners who have had the bitter and expensive experience of A.C. being changed to D.C. will appraise that point readily.

Superhet Circuit

It is a superheterodyne receiver embodying a pre-selector high-frequency stage, heptode oscillator, two intermediate-frequency stages and a double diode-triode second detector, the output of which feeds through a tone-corrector valve into two PX4 valves in push-pull. With the exception of the last two valves, all of them are standard 2-volt battery types and a maximum undistorted output of 4 A.C. watts is obtainable.

The "x set" is probably the biggest battery set ever made, certainly for household use.

Its sensitivity and power as might be imagined are definitely outstanding.

Commercial Telephony—

Compiling a Short-wave Log

CONVERT YOUR SET

We offer to convert any type of Battery set into a modern type

"UNIVERSAL" A.C./D.C. ALL-MAINS RECEIVER

fitted with the famous Ostar-Ganz High-voltage Mains Valves. Numerous manufacturers and home constructors have secured marvellous results from receivers built with these latest types of valves.

"Amateur Wireless" has on several occasions designed and described receivers embodying these valves.

The cost of conversion is most reasonable and splendid results are guaranteed. Conversion charge is only 10/- per valve holder, plus cost of Ostar-Ganz valves.

Converted sets can be used on either A.C. or D.C. without any alteration.

For further details, write

UNIVERSAL HIGH VOLTAGE RADIO LTD.
28-29 Southampton Street, Strand, W.C.2
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AMATEUR WIRELESS

POSSIBLY the best piece of advice which can be given to the short-wave listener is to suggest the keeping of a log book, or register, in which all transmissions picked up are carefully entered with full details at the moment they are tuned in and identified. It is not a difficult matter to acquire the habit and the information so collected will be found invaluable at a future date when it is desired to explore the same section of the waveband.

One-day-page Diary

For this purpose, either a one-day-page diary—and they can be obtained cheaply—or a fair-sized ruled copybook should be kept in close proximity to the wireless receiver. Make a point also of seeing that a pencil is always handy, as nothing is so annoying when some new capture has been made to be compelled to search for pencil or pen when the call is given.

The log book should preferably be ruled in columns bearing the following headings—Condenser dial reading; date; time; call; wavelength; kilocycles; station (town and country), and under "observations" some details of the transmission heard.

Personally, I am in the habit every evening when using my short-wave receiver, of taking a sheet of loose foolscap paper roughly ruled and headed in this manner, and on it I enter every broadcast heard. The reason for so doing is that later when such receptions have been identified the entries can be made in the log in order of wavelength, thus facilitating reference to the condenser dial readings at a later date.

If you wish to carry out the matter in a more scientific manner, you can add the kind of weather obtaining at the time, a barometer reading, and so on—facts which you will notice affect reception and soon show you the nights most favourable for listening to distant stations.

Searching a Simple Matter

With such a log at your elbow, coupled with a list of short-wave stations in order of wavelengths and frequencies, and the "hour-by-hour" table published in the recent short-wave number of AMATEUR WIRELESS, will make searches a very simple matter.

They cut out the "ire" in wireless! Don't make notes on scraps of paper or on the backs of envelopes; invariably they get lost and it is always these "unfindable" records which are badly wanted later; neither is it wise to trust to memory as one might for transmissions on the medium or longwave bands.

In addition to the many stations already

detailed in previous issues of this paper and to which reference has been made in sundry articles, there are a number of commercial telephony transmitters from which, during hours spent with your receiver, you are bound to hear speech. Occasionally from some of them you will pick up musical entertainments.

The list includes some typical stations dealing with commercial telephony transmissions, namely, transatlantic or other public telephony services and also international relays of broadcasts by which distant states can effect an interchange of radio programmes.

It should be borne in mind that such telephonic conversations you may pick up are not intended for the ears of the general public; they are classed by international treaty as communications of a private nature and consequently if such a message is intercepted by any unauthorised person, he may not divulge "its contents, its origin or destination, its existence or the fact of its receipt to any person (other than a duly authorised officer of His Majesty's Government or a competent legal tribunal)" and so on, as it is not only a violation of the secrecy provisions of the International Radio Convention, but is also an infraction of Clause 3 of your listening licence. This does not prevent your hearing them but precludes your revealing anything you may have heard in this manner.

"Scrambled" Speech

In most instances, however, where secrecy is desired, the authorities use a special device which causes the speech to be "scrambled," its effect being that the high notes become low and the low notes high, with the result that the words are unintelligible. At the receiving end this inverted modulation is unscrambled and restored to its original and normal condition.

Where the communication is not one of any great importance the device is not used and consequently on most days you will pick up scraps of conversation between shore stations and ships, between operators of transatlantic telephony services and in particular innumerable tests which in themselves are matters of great interest.

Some of the commercial stations, as already stated, carry out relays of programmes—details are given in the list. Fairly regular exchanges of programmes are carried out between Germany, Great Britain and the United States, and it is, as a rule, through these channels that the transmissions are passed over the individual networks.

It is well to make a special note of these wavelengths or frequencies, as through their agency topical items are often available.

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—on the Short Waves

By J. GODCHAUX ABRAHAMS

Metres	Frequency	Call	Station	Observations
14.12	21,240	WOJ	Rocky Point (N.Y.)	
14.25	21,060	WKA	Lawrenceville (N.J.)	Works with Great Britain.
14.38	20,860	EHY	Madrid (Spain)	Works with South America.
14.49	20,700	LSY	Monte Grande (Buenos Aires)	Works with Europe.
14.72	20,380	GAA	Rugby (Great Britain)	Works with Argentine and Brazil.
14.87	20,180	WQX	Rocky Point (N.Y.)	
14.896	20,140	DGW	Nauen (Germany)	Works with Mexico.
15.08	19,900	LSG	Monte Grande (Buenos Aires)	Works with Paris and Berlin.
15.369	19,520	IRW	Rome (Italy)	Works with Argentine.
15.5	19,355	FTM	Ste. Assise (France)	Works with South America.
15.576	19,220	PPU	Sepetiba (Brazil)	Works with Europe.
15.62	19,200	ORG	Ruyssedele (Belgium)	Works with Congo.
15.92	18,740	PLE	Bandoeng (Java)	Works with Holland and U.S.A.
16.10	18,622	PLT	Bandoeng (Java)	
16.11	18,620	GAU	Rugby (Great Britain)	Works with New York.
16.3	18,410	PCK	Kootwijk (Holland)	Works with Java.
16.36	18,340	WLA	Lawrenceville (N.J.)	Relays U.S.A. programmes to Europe.
16.56	18,115	LSY3	Monte Grande (Buenos Aires)	Works with Rugby.
16.72	17,940	WQB	Rocky Point (N.Y.)	
16.81	17,850	PLF	Bandoeng (Java)	
16.94	17,710	CJA9	Drummondville (Canada)	
16.99	17,660	LQC	Monte Grande (Buenos Aires)	
17.12	17,523	DFB	Nauen (Germany)	Works with South America.
18.44	16,269	WLK	Lawrenceville (N.J.)	Works with England.
19.88	15,090	RKI	Moscow (U.S.S.R.)	
20.03	14,980	KAY	Manila (Philippine Islands)	Works with Berlin.
20.27	14,800	WQV	Rocky Point (N.Y.)	Relays European programmes.
20.31	14,771	WEB	Rocky Point (N.Y.)	Relays U.S.A. programmes to Berlin.
20.56	14,590	WMN	Lawrenceville (N.J.)	Works with Rugby.
20.73	14,472	WMF	Lawrenceville (N.J.)	Works with Rugby.
21.53	13,930	WIK	Rocky Point (N.Y.)	Relays programmes from Great Britain.
21.58	13,900	WQP	Rocky Point (N.Y.)	Tests with Moscow.
21.82	13,750	CJA8	Drummondville (Canada)	Works with Great Britain.
22.26	13,480	WAJ	Rocky Point (N.Y.)	Relays to Europe.
22.684	13,225	DHB	Nauen (Germany)	Relays to U.S.A.
23.32	12,865	IAC	Coltano (Italy)	Works with ships.
24.41	12,290	GBU	Rugby (Great Britain)	Also relays to U.S.A.
24.46	12,260	FTN	Ste. Assise (France)	
24.69	12,151	GBS	Rugby (Great Britain)	Works with U.S.A.
24.9	12,048	PDV	Kootwijk (Holland)	Works with Bandoeng.
25.13	11,940	FTA	Ste. Assise (France)	Works with Morocco.
28.49	10,530	GBX	Rugby (Great Britain)	Works with Egypt.
28.5	10,525	VLK	Sydney (N.S.W.)	Works with Great Britain.
29.04	10,331	ORK	Ruyssedele (Belgium)	Relays Brussels programmes.
30.64	9,790	GCW	Rugby (Great Britain)	Works with U.S.A.
30.77	9,750	WOF	Lawrenceville (N.J.)	Works with GCW.
31.71	8,460	WKJ	New Brunswick (N.J.)	Relays U.S.A. programmes to Europe.
31.9	9,405	PLV	Bandoeng (Java)	Works with Kootwijk (Holland).
32.33	9,280	GCB	Rugby (Great Britain)	Works with Canada.
33.26	9,020	GCS	Rugby (Great Britain)	Used for relays to U.S.A.
33.52	8,950	WEL	Rocky Point (N.Y.)	Relays U.S.A. programmes to Continent.
36.92	8,125	PLW	Bandoeng (Java)	
37.69	7,960	VLZ	Sydney (N.S.W.)	Works with GBX, Rugby.
40.54	7,400	WEM	Rocky Point (N.Y.)	Relays programmes.
40.96	7,325	DHE	Nauen (Germany)	Works with Japan.
43.8	6,849	RKF	Moscow (U.S.S.R.)	Works with Rocky Point (N.Y.)

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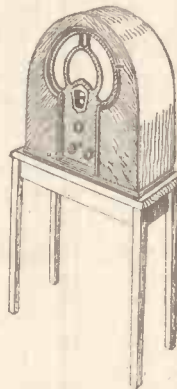


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These Men Know REAL QUALITY!

On page 547 of the issue of AMATEUR WIRELESS dated May 26 we published a letter from James Moir, Grad.I.E.E., criticising Noel Bonavia-Hunt's series of articles on real-quality reception. Mr. Bonavia-Hunt preferred to make no comments, but there is no lack of champions willing—and even eager—to take up his defence. Indeed, the letters we print this week are a better vindication of Noel Bonavia-Hunt's theories than the author could have put forward on his own behalf. Thousands of our readers will regret that the real-quality series have now come to an end, and will look forward eagerly to further contributions from Mr. Bonavia-Hunt's pen.

To the Editor, AMATEUR WIRELESS,
"MORE TRIPE, PLEASE!"

I KNOW nothing of the technique of wireless but I know faithful reproduction when I hear it. Through following Mr. Bonavia-Hunt's circuits precisely I have obtained a greater fidelity to the original than in years of patient following of other and possibly less musically minded experts.

Your correspondent James Moir, Grad. I.E.E., describes Mr. Bonavia-Hunt's articles as "tripe." Very well, let's have more "tripe," please; unless, perchance, Mr. Moir, Grad. I.E.E., has something more palatable to offer. The proof of the "tripe" is in the "hearing."
EDGAR F. CARR.

St. Albans, Herts. [2000]

GREATEST LIVING AUTHORITY

IF Mr. J. Moir's letter had been couched in more moderate language, it might have been a little more convincing. As it is, it is simply an outrage against the Christian law of good manners.

I, for one, certainly intend, when I have the time, to try out Mr. Bonavia-Hunt's circuits.

Those in the musical world who have read his books on the organ realise that he is one of the greatest living authorities we have at the present on sound reproduction, and there is no reason to believe that he is any less proficient in wireless matters.

Let's have criticism by all means, but criticism, if it is to be convincing, must assign reasons and be in good taste.

AN OXFORD M.A.

Oxford. [2001]

DECIDED ADVANCE

AS a reader who has followed this series of articles by Noel Bonavia-Hunt with much interest I think the letter from Mr. Moir needs some comment.

As the Editor remarks, "the proof of the pudding is in the eating," and I would suggest that if Mr. Moir built a set as recommended he might be amazed to hear something better than the noise which he calls "high-quality sound-producing equipment."

As an experimenter who has built most of the amplifiers recommended by well-known writers on quality design in recent years, I think that the theories put forward by Mr. Bonavia-Hunt are a decided advance towards

the attainment of perfection in sound reproduction.

No doubt your readers would be interested to know what Mr. Moir's version of a quality amplifier would be. I would suggest it would peak at 1,000 cycles, cut off at 500 and 2,000 cycles, be devoid of transients and bass, and give a distorted output of 25 watts!

ORGANIST.
[2002]

Malvern.

CONSTRUCTIVE CRITICISM

WHILST I cannot subscribe to Mr. James Moir's somewhat vitriolic remarks on Mr. Noel Bonavia-Hunt's articles on real quality, I must say I think Mr. Hunt excels in straining at gnats and swallowing camels.

Points of minor importance receive extravagant notice and real essentials scant attention.

To take one or two examples from his article on the output stage. In dealing with the output transformer he makes no mention of the important point that it must have a very low leakage inductance between primary and secondary turns, if high notes are to be reproduced properly.

If this leakage is only .05 henry (a very small amount) this will offer an impedance of 1,500 ohms to a 5,000-cycle note. If the ratio is 1-1 and the speech coil impedance 2,000 ohms there will be a loss of some 60 per cent. (4 decibels down) in the power supplied to the loud-speaker at this frequency.

Incidentally, this makes a good case against the use of high-resistance moving-coils when good high-note reproduction is required. It is much easier to design a 20-1 transformer to have a low leakage than a 1-1 or 2-1.

His suggestion that an A.C. filament transformer makes a good output transformer is ludicrous. Leakage is likely to be very high and the matching of the secondary to the speech coil mere guesswork.

The quality seeker will do well to reverse Mr. Bonavia-Hunt's procedure and work back from the loud-speaker and output stage to the detector. He should carefully consider grid swings and see that there is an ample margin of safety.

Shunt capacities of valves, valve holders and wiring will attenuate very high notes if anode and grid impedances are very high, and so, too, will the "Miller effect" (Mr. Bonavia-Hunt entirely disregards this point).

Diode detection is, of course, essential if the high-frequency output is large (as in superhets). But where only one stage of high-frequency with a moderate gain is used, the despised leaky-grid detector is still probably the best. Moderate values of leak and condenser should be used and as much high tension on the anode as can possibly be spared. A meter in the anode circuit will enable correct operating conditions to be obtained.

With regard to tone correction for treble and bass, this is only desirable if the loud-speaker will really reproduce both high and

low notes without any false effects (resonance or colourisation).

Many loud-speakers have prominent resonances around 2,500 cycles and an improvement can be effected by reducing the middle register in relation to the top and bottom. The sketch shows a very simple method of doing this if two stages of low-frequency are used.

In A.C. amplifiers the decoupling of both grid and anode circuits must be generous. Nothing so easily upsets a response curve as back-coupling. Finally, push-pull (mid-point bias) is still the best yet when high quality is sought with only moderate voltages available.

P. L. THORNE.
[2003]

Tunbridge Wells.

EXCEPTIONALLY GOOD REPRODUCTION

AS an amateur of over ten years' experience in the building of many sets, both battery and mains, I think the criticism of Mr. James Moir on the article of such an experienced musician and radio designer as Mr. Noel Bonavia-Hunt is uncalled for.

No one who has read Mr. Bonavia-Hunt's articles on couplings both in *Wireless Magazine* and *AMATEUR WIRELESS*, and who has tried them, can dispute the fact that they get quality of reproduction exceptionally good, not a cut-off at 4,000 or 5,000 cycles which is so common in the majority of commercial sets and which some designers tell us produces that mellow tone, but an amplification at all frequencies from about 40 or 50 to 10,000 cycles.

Few sets fail to give satisfactory reproduction in the bass and it is the treble which is responsible for much of the poor quality we hear.

I think Mr. Moir would be well advised, in his spare time, to give up criticism, especially of an expert who probably has forgotten more than he ever learned, and devote his time to designing a real-quality receiver.

If he can give us anything near like the "tripe" we have got from Mr. Bonavia-Hunt I am sure the Editor would be only too pleased to pay for the contribution.

WM. TULLOCH.

Edinburgh.

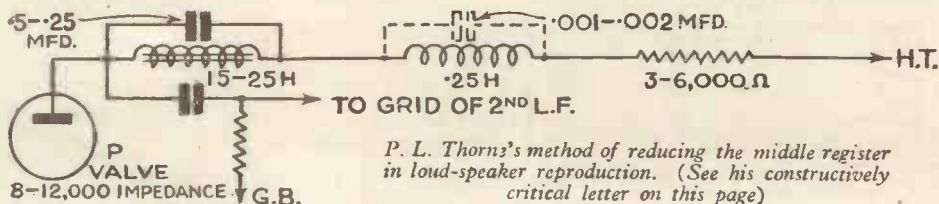
[2004]

THE "OLD SCHOOL TIE"

AFTER reading the series of articles on real quality by Mr. Bonavia-Hunt, I was very surprised to read Mr. James Moir's letter in your May 26 issue condemning the contributions as absolute "tripe."

Your correspondent apparently bases his point of argument on his experience as a sound-film engineer and does not disclose any definite reason for disagreeing with Mr. Bonavia-Hunt's theories.

It must have been a great blow to readers of your paper to find that, having digested the series of articles on the subject, the whole secret



P. L. Thorne's method of reducing the middle register in loud-speaker reproduction. (See his constructively critical letter on this page)

of real quality was hidden behind the "old school tie" of a sound-film engineer.

If the Sound Film Engineers' Union would grant Mr. James Moir permission to write his suggestions on the subject, I am sure, Mr. Editor, you would give him one or two pages in your valuable paper to express his exclusive theories.

I don't suggest that he should receive any remuneration for any such contribution, for he would be readily repaid by the scope available to further widen his reputation.

2-VSG-I-B.
[2005]

Stroud, Gloucester.

PRACTICAL PROOF

I AM writing to refute the irrelevant letter of James Moir in your valuable paper of May 26.

Has the above-mentioned person taken the trouble and expense to test out Mr. Bonavia-Hunt's theories? I, for one, have, after trying most so-called quality amplifiers, and can only say Mr. Bonavia-Hunt's circuits are to a private user what that wonderful set therein installed is to the Science Museum.

I am an old experimenter from Writtle days and a keen amateur musician, and claim to know quality when I hear it.

Anyhow, who ever heard any real quality from talkies?

ARTHUR P. EDDY.
[2006]

Falmouth, Cornwall.

P.S.—Should be obliged if you would print this in defence of Mr. Bonavia-Hunt, for whose articles I have the highest respect.

QUESTION OF "CUT-OFF"

HAVING followed with interest the series on real-quality reception, one or two queries arise.

Firstly, to what extent can the quality aimed

at by the author be appreciated by the ordinary non-musically trained listener?

For Mr. Bonavia-Hunt apparently considers as hopeless circuit arrangements common to practically every commercial and home-constructor's receiver and, whilst I admit that many sets one hears are certainly not worth listening to, there are some that appear to give very good reproduction and do not use the special circuits recommended.

Again, assuming one has a receiver as described by Mr. Bonavia-Hunt, capable of reproducing up to 8,000 cycles or higher, how can this be used under present-day conditions?

I find that with my own set, a straight four-valve all-mains one designed primarily to give good reproduction, it is often necessary to adjust the "cut-off" filter to as low as 4,000-4,500 cycles in order to cut out heterodyne whistles, even on the London stations, and this using an indoor aerial and band-pass input, both not recommended by Mr. Hunt.

Perhaps listeners who have tried out some of the circuits given in the series will let us know their experiences.

F. RAMSAY WESTON.
[2007]

Beckenham.

TO THE PATENT OFFICE . . . ?

THE hysterical outburst of Mr. James Moir (Grad.I.E.E.) would be most amusing if it were not in such very bad taste. His vulgar diatribe reminds one of a little urchin who for want of argument calls his opponent a silly ass and thinks thus to finish him off.

Mr. Moir may be a professional electrician, but his qualification for judging tonal values is far from impressive, for it is impossible for any discriminating person to infer anything but complete incompetence in this direction from his association with film-sound reproduction.

In fact, if I were Mr. Bonavia-Hunt, I would pay an early visit to the patent office and protect his real-quality circuit, in case Mr.

Moir, repentant of his hasty criticism, incorporates it in his firm's next design; although, personally, I rather hope that for the sake of cinema patrons he will not be debarred from so doing.

Finally, to label theories as "ridiculous" and articles as "tripe" without adducing any evidence whatsoever in support of these statements is so characteristic of a petty and spiteful disposition that Mr. Bonavia-Hunt is obviously justified in making no comment.

The truth is, as you, sir, very sagely suggested, that the value of theories lies solely in their practical application.

A. H. PARKIN.
[2008]

London, N.W.10.

FROM A SOUND PROJECTIONIST

MR. MOIR certainly seems very satisfied as to his own capabilities, but after all, as his experience should prove, practice and theory often turn out to be very different.

I should also like to point out to Mr. Moir that although Mr. Bonavia-Hunt's articles may seem somewhat heretical at first sight, they are very greatly removed from the wanderings of a lunatic and I think it will be found that Mr. Bonavia-Hunt does not make any extravagant claims for his theories other than that they work, and they certainly do.

I may say that, whilst not being a Grad.I.E.E., I too have had quite a lot of experience in handling sound equipment, being a sound-film projectionist by profession, and I must admit that Mr. Bonavia-Hunt's articles struck me at first as being—well, shall we say a little queer?

But out of curiosity I tried his circuits out and my advice to Mr. Moir is to do likewise. After all, as you remark in your editorial comment at the end of Mr. Moir's letter, "the proof of the pudding is in the eating."

J. J. COLLINGWOOD.
[2009]

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Criticisms by WHITAKER-WILSON

My Broadcasting Diary

B.B.C. Doldrums :: Holiday Noise! :: The Grand Opera
Touch :: Clever, Nasty Play :: Amazing Mills Brothers

Sunday (Whitsun)

EITHER I've got the doldrums to-night or the B.B.C. has. Tried the symphony concert about twenty past twenty-one and listened to the slow movement of the Schumann C Major. The dullest Schumann I know. They played it as though they thought the same.

I went over to the Park Lane Hotel for Albert Sandler and found him rather on the dull side, too. Strange for him.



Leslie Sarony

Tried Wagner's *Feast of Pentecost* in the second half of the symphony concert, but thought it too heavy altogether for broadcasting. My set wouldn't take more than half of it. Doubt the wisdom of these heavy choral works at any time.

Whit-Monday

AS radio critics don't have Bank Holidays to themselves, I listened to John Southern's Hour. Quite a good show of the old style. Not too sure we can do with them quite so rackets—but this is Whit-Monday, of course. Some good stuff in Stanley Lupino's effort called *Sporting Love*. Leslie Sarony's lyrics certainly stood out. Also I liked Billy Mayerl's music.

The holiday news-reel was what I feared it would be—noise. At all events, it cured me of wanting to spend my Whit-Monday at Hampstead or Blackpool.

As a holiday programme, to-night's definitely the best I remember. Confess I turned into Strauss's opera *Arabella* with a little relief, having done my duty. Viorca Ursuleac in the name part made up for everything I didn't like in the other programmes.

Tuesday

WHILE waiting in a queue by myself for Covent Garden and the *Mastersingers* to-night, I fell in with some acceptable piano playing by Dorothy Hildreth, who is new to me. I feel inclined to tell her I want to hear her give a Chopin recital. That, Miss Hildreth, is the highest compliment I can pay your playing, because I am a very hard critic of Chopin players. Tell them at the B.B.C. and see what happens.

The opera pleased me. Rudolf Bockelmann made an amazing Sachs. There was another voice amongst the *Mastersingers* which I liked immensely, but I'm not sure whose it was. There were ten of them, and I had no score.

Wednesday

THE Puritan Lullaby quite a success. I don't think the tunes



[Studio Portrait photo
Billy Mayerl

were quite so good—in fact, I'm sure they weren't—as in *Love Needs a Waltz*, but there was some splendid writing, all the same.

Mark my words! Young Kenneth Leslie-Smith is going to make a name for himself at this sort of thing. He has a grand opera touch about some of his thoughts.

Thursday

LISTENED to Lance Sieveking's new radio play with interest because he has a technique in these things. Going to be very candid with him. Idea excellent and quite original in its way. A man plays a game in the fourth dimension and contrives to know what is to happen during a given half-hour a year hence. He spends the half-hour murdering someone and endures hell until that half-hour actually recurs in the ordinary course of events. Realistic and doubly tragic.

Don't agree with Lance a bit. Why couldn't the man have done something better than that? The play was *morbid*. I am definitely against morbidity by wireless or by anything else. Morbidity makes bad entertainment, because it leaves a nasty taste. A very clever, *nasty* play.

Friday

DID you listen to the Bartok concert? No? Nor did I. I let the valves get warm and then found I couldn't stand it. Hyper-modern music, especially called *Cantata profana*—dear, dear and the B.B.C. so respectable, too!

Saturday

JOHN OLIVERE and Morey Wicks, whom I do not remember having heard before, appealed to me because they sang real comedy songs. I liked Little Miss Muffet especially.

Comedy songs which are really funny, particularly when they are rhythmical and catchy in the musical sense at the same time, are always welcome in vaudeville. I wish there were more artists who can offer them.

Muriel George has a style of her own. I was not keen on her as an impressionist, but she had an amusing comedy song to offer. It was called something like *Oo, what a death to die!*

Alexander and Mose as funny as I ever heard them. I liked their definition of a herbaceous border. *A lodger who won't eat meat*.

The hour ended with a perfectly amazing performance by the Mills Brothers. *Lazy Bones* took my fancy as they rendered it. Altogether a good entertainment.

I have been looking at the foreign programmes and comparing them with ours. At this time of the year the B.B.C. keeps up its standard of variation in a greater degree than any foreign station whose programmes I have examined.

Even so, the greater attention paid to the transmissions at the hour of dusk in these summer evenings the greater will be the service rendered to the public.



[Collins photo
Dorothy Hildreth

With the Amateurs on the Short Waves

By KENNETH JOWERS

WHILE I was waiting for the 20-metre amateur band to liven up a little before eight on Monday evening, I switched on a second set to pick up W2XAD of Schenectady, whose first test record is radiated at five minutes to eight, or should I say 1955? I was just in time to hear the broadcast of the two French airmen who had just landed at the Floyd Bennett flying field, after crossing the Atlantic.

The transmission was very interesting, as first-hand information was given on the flight and a few words from Maurice Rossie in English and from Paul Codos in French with an interpreter were highly amusing. At 2015 the normal transmissions were resumed, but meanwhile I had obtained quite a lot of useful information which was not available until the daily papers arrived on the following morning,

On 20 Metres

During the past week reception conditions have again been very good, but on the 20-metre band, unless you are using a powerful receiver, there is very little doing before 10 o'clock. On my short-wave super it is quite usual to hear between 70 and 80 'phone stations from 8 o'clock until midnight.

The peak period is round about 11 o'clock, when such stations as K4SA of Porto Rico, W9BHT of Canton, Illinois, W8CPC of Buffalo and the majority of the first- and second-district American stations come in with a real punch.

W. A. Clemenson's record log of 114 stations hasn't stood as long as I expected. W. Shelley, of Hucknall, Nottinghamshire, has just sent me his log of stations received during a period of five days. Mr. Shelley uses screen-grid high-frequency amplifier, screen-grid detector with one low-frequency stage only with short indoor aerial, and all of the stations were logged on the 20-metre band.

His log totals 127 stations, including III W's, or Americans; four SU's, Egyptians; six VE's, Canadians; three LU's, Argentinas; two PY's, Brazil; and one HC, Equador. Certainly a very good log and just shows what can be done. Anybody who can beat Mr. Shelley's log, kindly let me know. I am now using an eleven-valve short-wave super so I think I had better try this myself.

H. H. Gent, of Harlesden, comments on the exceptionally good conditions on the 20-metre band on the night of Saturday, May 26. In the Harlesden locality the 20-metre stations usually trail off about 0100, but on that evening stations were still R8 at 0310.

He uses a two-valve receiver, detector and low-frequency, with a 50-ft. aerial. Amongst the stations heard were K4SA of Porto Rico, on the loud-speaker LA1G of Norway, W8BOG, W2BY, W3NK, W5OM and W3DQ—a very satisfactory log for a two-valve set.

R. D. Everard has sent me a QSL card, a photograph of W8CPC and its operator. Unfortunately the photographs are not suitable for publication, so I shall not be able to let you see the amazingly compact gear of this station. It is undoubtedly one of the most efficient on the 20-metre band at the present time.

Mr. Everard seems to do very well on the short waves. He uses a Murphy A8 superhet in conjunction with an R.I. anti-nodel short-wave

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1 British Radiogram variable condenser, .0005-mfd., with S.M. drive	5 0
1 Telsen .0005-mfd. type W.193 variable condenser	2 6
1 Telsen .0003-mfd. type W834 variable condenser	2 6
3 Telsen 4-pin valve holders, type W224	1 6
2 Telsen terminal blocks	1 0
4 Siemens Schukert fixed resistances, type 98, 1-watt: 25,000, 50,000-ohm, 1-megohm, 2-megohm	2 4
Wood for panel 14 in. by 7 in., connecting wire, flex and wood screws, etc.	2 0
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converter. He has so far logged stations from almost all over the world, including Porto Rico, Argentine, Equador, and, of course, all the local stations in America, Canada and the Europeans. Of course, stations such as CT1GU, Portugal, FZS, Indo-China, VWY of Poona, India, and YVR of Maracay, of Venezuela, have also been logged.

Jack Wilson, of Newmains, still reports good conditions on the 20-metre band, so it looks as if for the first time for many moons the conditions over the entire country are making it well worth while for short-wave fans to get down to some serious listening. Amongst Jack Wilson's log this week—actually he heard fifty-three stations in five hours—are PAOKV, LA1G, K4SA, CM2WV of Cuba, CM2S of Cuba, V2BG of Canada.

As the habit of obtaining verifications from

all parts of the world is increasing in popularity, it is well worth remembering that some of the American stations in particular receive hundreds of letters a week from Europe, the postage on most of which is 2 1/2d. Not many of you would take the trouble to reply to unstamped letters because the postage bill runs up to a very considerable amount. It is surprising how generous the amateur stations are.

Ensuring A Reply

If you want these verifications it is surely well worth the trouble to send an International Reply Coupon. It can be obtained from any Post Office at an average price of 6d. At any rate, it will make sure that you receive a reply to your letter. If you want verifications from the commercial stations, such as W1XAL, all letters without a stamped-addressed envelope or a reply coupon are promptly dropped into the wastepaper basket.

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PUTTING VISION on the RADIO PROGRAMMES

This is an exclusive article and the first ever written by Mr. Eustace Robb, who is the B.B.C. television production director. In it he reveals many remarkable facts of the studio and of television which are of interest to every television enthusiast.

For the experimenter this issue also contains details of the construction of a high-class quality de luxe amplifier which has a 4-watt output and has been specially designed for high quality picture production.

Amongst many other fine features in this issue there is also a review on the Government Commission which is to inquire into the whole question of television.

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SOME of the OTHER CONTENTS

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Is the Crystal Set Coming Back?

Asks JAY COOTE

A QUESTION which I have often heard put by listeners is one relating to the number of crystal sets still used in the United Kingdom. So far as I know, no actual census can be made, inasmuch as applicants for a licence are not required to declare the kind of receiver in use.

Many continental countries, however, are able to obtain these important statistics. Denmark recently, following an investigation, demonstrated that, where in 1929, 79,440 crystal sets were used in the country, at the end of 1933 the number was reduced to 24,046. Now Denmark only possesses one longwave and one medium-wave transmitter; I do not take the Skamlebaek short-waver into consideration for this purpose.

It would therefore be very interesting to know how many listeners in the United Kingdom are still satisfied with the primitive crystal detector.

Local or Foreign Broadcasts

Bear in mind that we possess several 50-kilowatt transmitters and a number of small relays. As their signals are stronger and they cover a greater area, is the crystal coming back into its own for local reception or are listeners keen on also hearing broadcasts from abroad?

That everything is being done abroad to secure a larger ether audience is clearly proved by the news that a number of stations are to see their power increased. Plans have been drawn up to boost Radio Paris up to 150 kilowatts. Breslau on 100 kilowatts will start up in July; Beromünster this year will also be of the same energy, and if the list be studied it will be found that competition between countries is being intensified.

To acquire a preponderance of listeners, some countries are taking curious steps—as witness Germany, which, not content to enlarge

her network, has now decreed that every home must have one receiver to enable the owner to hear official pronouncements! And, whether the purchaser pays his instalments or not, the instrument cannot be seized for debt.

I learn that the city of Bologna, in Italy, has approached the E.I.A.R. with a request that it may be given a broadcasting station if only to commemorate the fact that it is the birthplace of the Marchese Marconi. Bologna is roughly 180 miles south-east of Milan and about 50 miles, as the crow flies, north of Florence, which are both served by transmitters.

Further news is forthcoming regarding the Eiffel Tower. A plea had been put forward to allow this station to work on 514.6 metres, the channel allotted to Riga, and also now occupied by Radio Agen, just under Stuttgart. A Paris report states that the French Ministry has turned down this proposal and that F.L. must abide by the Lucerne decision.

Radio Toulouse, since its change in wavelength, has been better received in the British Isles; moreover, it has again been permitted to carry out relays via the telephone network and gives regularly broadcasts of concerts from its two principal cafés.

Two Kilowatts—and How!

It is surprising how well Juan-les-Pins is now heard. If you tune in to just below the old Belfast channel, and clear of Trieste, you should pick up its transmissions at full loud-speaker strength. Although advertised as 2 kilowatts, I feel sure the power must be greater.

Should you pick up a call from Heilsberg, you may notice that it has been altered. The announcer now tells you that it is Reichssender Königsberg and Landessender Danzig.

Meet the P.M.G.'s Television Committee!



As already announced, the Postmaster-General has got together a very expert technical advisory committee, whose onerous task is to discover whether television offers in its present stage of development a basis for a public service. From left to right, the members are: Sir John Codman (vice-chairman), the Rt.-Hon. Lord Selsden (chairman), F. W. Phillips, J. Varley-Roberts (secretary), O. F. Brown, Vice-Admiral Sir Charles Cappendale, Noel Ashridge, and Col. A. S. Angwin. All these men are well equipped to seek out the truth of a very complicated set of clashing interests. They will probably take many weeks to reach a decision.

Television Merger

WHAT promises to be a very important development in television is the recent merging of television interests by the Marconi Company, Ltd., and Electrical and Music Industries, Ltd.

The new company, called the Marconi-E.M.I. Television Co., Ltd., is the result of an agreement between Marconi's and E.M.I. to form a television merger on a fifty-fifty basis. Only high-definition television systems are involved.

On the board of the new merger company will be His Excellency the Marquess Marconi, the Rt. Hon. Lord Inverforth (chairman of the Marconi Co.), Mr. Alfred Clark (chairman of E.M.I.), Mr. Louis Sterling (managing director of E.M.I.), Mr. H. A. White (managing director of the Marconi Co.), Mr. I. Schoenberg (of E.M.I. research), and Mr. H. R. C. Van de Velde (acting general manager of the Marconi Co.)

If there is any immediate possibility of commercialising high-definition television this new technical line-up certainly ought to be able to discover it. The two companies involved in the merger have vast research and manufacturing resources at their disposal. They will avoid with special interest, as we all shall, the findings of the Postmaster General's recently convened television committee under Lord Selsdon. (Picture on page 602.)

News for DX'ers

COME along you West of England DX fiends! Bill Warner, of 56 East Grove Road, St. Leonards, Exeter, Devon, is anxious to hear from you.

He is the newly appointed Assistant Director of Publicity of the International DX'ers Alliance. At the moment he is helping out Richard L. Rawles, the hard-working—and at the moment sadly overworked—Publicity Director.

Mr. Wiseman has given up the European representative job owing to the call of other duties, and while the Alliance is looking around for someone else to take over our friend Rawles is deputising.

He sends us some dope that ought to interest all DX fans. Even if you don't belong to the International DX'ers Alliance, you can now obtain the *British Globe Circular*—the chatty little bulletin of short-wave doings the world over. The *Globe Circular* can be obtained, post paid, for 6½d., but remember there is no July number.

As we have mentioned several times in preceding issues, the International DX'ers Alliance is an organisation of special interest to those who go in for long-distance logging on the medium waves. The headquarters are in U.S.A. but you can get in touch on this side.

For further details, write to Richard L. Rawles, Blackwater, Isle of Wight, England.

Radio on the Road Continued from page 591

sensitivity, the more troublesome it becomes to exclude static interference. One must accordingly take a reasonable attitude and not expect too wide a "reach" when listening-in on the road.

In cars of the open or touring type a favourite place for the aerial is under the running boards as shown in Fig. 3. To minimise "static" pick-up some makers use a strip aerial with a centre tapping to the set, the idea being that the static is to some extent automatically balanced out in this way. Another suggestion is to incorporate the aerial wires inside the tyres, though this appears to be more ingenious than practical.

The obvious solution to the problem of high- and low-tension supply is to use the car battery for the filaments, and to pack a separate battery for the anode supply. A more up-to-date plan—which is probably cheaper in the long run—is to drive a motor-generator set from the car battery so as to step up the voltage to say 150 volts for the high tension.

Another popular outfit is the vibrating-contact converter which has been specially adapted for this particular purpose. As shown in Fig. 4, the car battery feeds a vibrating-reed contact filled with special tungsten points. The reed is carefully tuned and the back-stop permanently adjusted and locked to give a constant make-and-break frequency of 300 cycles a second.

The interrupted current is stepped up across a transformer, rectified, and passed through a filter circuit, which gives a smooth D.C. output of say 40 milliamperes at 150 volts for the plates of the valves. The whole high-tension unit measures roughly 10 in. by 8 in. by 4 in., so that it can be tucked away under one of the seats or in any other convenient position.

Naturally if the car battery is used to supply both high- and low-tension voltages, in addition to performing its normal duties, care must be taken to keep it in a fit condition to stand up to the extra load. Otherwise one may have to face the possibility of ignition and starting troubles.

Two Separate Units

In American practice, the set itself is usually divided into two separate units, one containing the high-frequency valves and detector, and the other the low-frequency amplifier stages.

In some cases, however, the complete set is built as a single unit, and is placed either behind or below the dashboard. Naturally the more accessible the set, the better, and above all it must not be placed where it will interfere with the "servicing" of the car.

Remote-control knobs may be fixed to the steering shaft, though direct tuning is possible when the set is mounted behind the dashboard.

One American manufacturer has adopted the plan of mounting the set inside one of the arm-rests, the control knobs being deliberately located in a position where it is not too easy for the driver to "play" with them whilst sitting at the steering wheel.

Long-wave Broadcasters

Metres	Kilo-cycles	Station and Call Sign	Country	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Country	Power (Kw.)
1,107	271	Moscow (RCZ)	U.S.S.R.	100	1,442	208	Reykjavik	Iceland	21
1,132	265	Madona	Latvia	15	1,442	208	Minsk	U.S.S.R.	35
1,181	254	Oslo	Norway	600	1,500	200	Daventry National	Great Britain	30
1,239	242	Leningrad	U.S.S.R.	10	1,570.7	191	Deutschlandsender	Germany	60
1,250	240	Vienna (Exp)	Austria	3	1,621	185	Istanbul	Turkey	5
1,261	238	Kalundborg	Denmark	30	1,648.3	182	Radio Paris	France	50
1,293	232	Kharkov	U.S.S.R.	35	1,724.1	174	Moscow (1)	U.S.S.R.	500
1,304	230	Radio Luxembourg	Grand Duchy	200	1,807.2	166	Lahti	Finland	40
1,312.9	229	Ankara	Turkey	7	1,875	160	Kootwijk (Huizen prog.)	Holland	50
1,339	224	Warsaw	Poland	12	1,875	160	Brasov	Roumania	20
1,389	216	Motala	Sweden	30	1,935	155	Kaunas	Lithuania	7
1,395	215	Eiffel Tower (Paris)	France	8					

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Will every querist please observe the following revised rules?
Please write concisely, giving essential particulars. A fee of one shilling, postal order (not stamps), a stamped, addressed envelope and the coupon on this page must accompany all queries.
Not more than two questions should be sent at any time.

The designing of apparatus or receivers cannot be undertaken.

Slight modifications of a straightforward nature only can be made to blueprints. For more serious alterations the minimum charge is 2/6.

Blueprints supplied by us will be charged for in addition, but, of course, readers may send their own blueprints for alteration.

Modifications to proprietary receivers and designs published by contemporary journals cannot be undertaken. Readers' sets and components cannot be tested by us. Queries cannot be answered by telephone or personally. Readers ordering blueprints and requiring technical information in addition should address a separate letter to the Information Bureau and should see that their remittance covers the price of the blueprint and the amount of the query fee.

We do not answer queries in cases where the fee is omitted.

Queries should be addressed to the Query Dept., "Amateur Wireless," 58/61 Fetter Lane, London, E.C.4.

My Ideal Set

By Capt. E. H. ROBINSON

THERMION certainly started something when in AMATEUR WIRELESS for May 5, he asked: "Is there an ideal set?" He was thinking particularly of the manufacturer, eager to put something on the market which will keep his works going to full capacity for at least six months.

In common with a large proportion of listeners I look at the question from my own personal point of view and, considering what I want, I am afraid very few will agree with me.

First of all the ideal set must not cost a lot of money. That is a statement which will make me no enemies. I should put £15 as the outside limit for an all-mains set and quite agree with Thermion that a really high-class battery set ought to be purchasable for the sum of £10.

To clear the air let me say first of all what I don't want. Since the last Olympia show I have had through my hands a large number of commercial sets. The greater number of them were super-hets and most of them had some form or other of self-adjusting volume control.

Against S.A.V.C.

I have come definitely to the conclusion that I do not want a super-het and that I loath self-adjusting volume control.

Let me say what I do want before a host of indignant readers come tearing after me intent on spilling my blood.

I want the whole of the frequencies which our excellent B.B.C. sends out. They should be present in the anode circuit of the first valve and they should stay put until they come out of the loud-speaker in the form of sound waves again. To my ears the result of attenuating the high frequencies and then trying to put them back again with tone control is an abomination. That is one of the reasons why I do not like a super-het.

But what about selectivity? It is not necessary in my ideal set, for on the medium waves it only brings in London National and London Regional at full strength with one or two of the more powerful foreigners quite faintly.

Excellent quality is the first consideration and, starting the design from the output stage, I demand a valve, either triode or pentode, capable of giving 5 watts of undistorted power.

I don't want to use 5 watts, of course. That is far too much in an ordinary living-room, but I do want somewhere about 3 watts and the only way of getting excellent quality is to work your output valve nowhere near its limit.

The coupling to the output valve must be resistance-capacity and a valve with an amplification factor of about 40 will give all the output-power loading I require.

Diode Detection Essential!

Diode detection is also an absolute essential. It can be a double diode-triode valve or one of the new type of metal rectifier working into a valve of the MH type, that is to say a valve having an A.C. resistance round about 10,000 ohms and the already desired amplification factor of 40.

To finish up with I require iron-core tuning coils and, situated, as I am, just over forty miles from Brookman's Park and wishing to use an indoor aerial, a high-frequency pentode is indicated.

The set must, of course, be a radio-gramophone, but I am not asking for that additional pleasure for £15.

There should be a visual-tuning indicator, which to my mind is even more important on a straight set than on a super-het.

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- B.B.C. National Two, with Lucerne Coils (D, Trans) AW377A
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- Fan and Family Three (D, 2LF) AW410
- £5. 5s. SG. 3 (SG, D, Trans) AW412
- A.C.-D.C. Universal Three (SG, Det, Pen) AW414
- 1934 Ether Searcher (SG, Det, Pen) Baseboard AW417
- 1934 Ether Searcher (SG, Det, Pen) Chassis AW419
- Lucerne Ranger (SG, Det, Trans) AW422
- P.W.H. Mascot (Det, R.C, Trans) AW337A
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- Mullard Master Three with Lucerne coils AW424
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- Signpost Four (SG, D, LF, Class B) AW398
- "A.W." Ideal Four (2SG, D, Pen) AW402
- 2 H.F. Four (2SG, Det, Pen) AW421
- Lucerne Major (2 H.F., Det, Trans) AW433

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

- The Etherdyne (Super-het) AW406
- Super-quality Five (2 HF, D, RC, Trans) WM320
- Ideal Home Super (Super-het) WM280
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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." Address letters:

Amateur Wireless Blueprint Dept., 58-61 Fetter Lane, London, E.C.4

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These are just some of the splendid contents of Friday's issue of Radio Pictorial. Don't forget to get your copy—the folks at home will enjoy it, too.



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The causes of interference in radio reception may be classified under three principal headings, as follows:

- 1. Atmospheric. 2. Supply Mains. 3. External.

Atmospheric troubles are usually static, and cannot be eliminated by means of condensers.

In the case of No. 2, trouble may be experienced through the interference being conveyed over the Supply Authorities' distribution system.

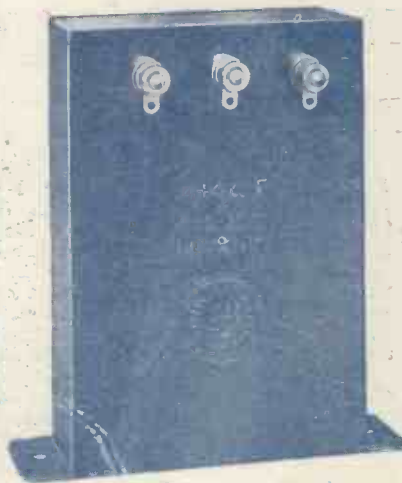
In the case of No. 3, external interference, this is caused by direct radiation, and originates in electric motors, vacuum cleaners, and any other electrical apparatus in which sparking takes place during operation—for example, violet-ray apparatus, or even when switching on or off any kind of electrical plant.

In attempting to overcome such interference it is necessary to try the application of the remedy at the source.

In many cases the use of condensers alone is sufficient to minimise very largely, and often entirely suppress, the interference.

The Condensers employed must be suitably designed for the working conditions, and should have a 5-ampere fuse inserted between the mains and the condensers.

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