

Amateur Wireless,
July 1, 1933

HOW TO INSTALL RADIO IN YOUR CAR

BUILDING OUR BIG-VOLUME PORTABLE

**EXPERIMENTING
WITH
NEW DETECTORS**

Amateur Wireless

and
Radiovision

Every
Wednesday

3^d

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Saturday, July 1, 1933

YOUR HOLIDAY PORTABLE



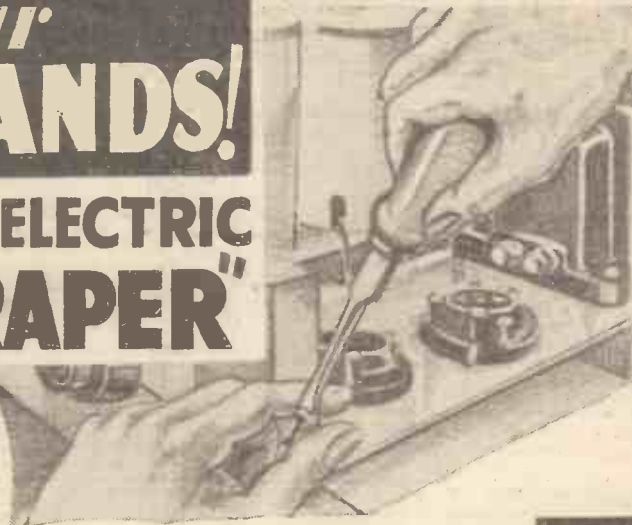
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Use these lighter evenings to build with your OWN HANDS!

The NEW ALL-ELECTRIC "SKYSCRAPER"

THE FIRST COMPLETELY SAFE - COMPLETELY PRACTICAL ALL-ELECTRIC RECEIVER FOR THE HOME CONSTRUCTOR!

MOST POWERFUL 3-VALVE SET YOU CAN BUILD - SUCCESS A CERTAINTY!



Now the lighter evenings are testing your old radio set. In these summer evenings signal strength is reduced and foreign stations fade when you are using an ordinary set. Now is the time you need the power of "Skyscraper" radio—and now you have the longer, lighter evenings in which to build it.

If you want to build yourself all-mains radio, go to your radio dealer and ask to see the new All-electric Safety "Skyscraper." Get the FREE CHART from which you will see that Lissen have made it easy for you to build this All-electric Receiver and have also made it SAFE.



This is the most powerful, most sensitive, most modern All-electric Set ever put into the hands of the home-constructor. To make SUCCESS and SAFETY CERTAIN, unique features and right-up-to-the-minute developments are incorporated in the All-electric "Skyscraper" which you could not get even in very expensive factory-built mains sets.

Self-contained Safety Power Unit—Special Universal Safety Fuse Plug—Four matched Valves with Variable-Mu Screen-grid H.F. Stage and brilliant Power Pentode Output—One Dial Tuning with Single Knob Volume and Reaction Control—Triple Aerial Selectivity Tapping and alternative Mains Aerial—All-metal Chassis and Under-baseplate wiring—beautiful Walnut Cabinet which you put together yourself, and complete full-power Moving-coil Loud-speaker.

Chassis Kit, complete with four valves £7 19s. 6d.
Kit, complete with Table Model Cabinet, £8 15s. 0d.
With Console Cabinet and Moving-coil Loud-speaker, as illustrated above, £10 12s. 6d.

COMPLETE WITH 4 VALVES

£7.19.6

Advertisement for the Lissen A.C. Skyscraper, including a diagram of the receiver and a coupon for a free chart.

LISSEN SKYSCRAPER BATTERY DRIVEN OR ALL-ELECTRIC

Lissen have published two fascinating Charts—one of the Battery "Skyscraper" and one of the All-Electric "Skyscraper." So clear and so detailed are the instructions and photographs that SUCCESS is CERTAIN. Ask your radio dealer for the Chart of the "Skyscraper" in which you are interested—or post coupon below.

THE BATTERY "SKYSCRAPER"



COMPLETE WITH VALVES 89/6

The Battery-driven "Skyscraper" is the most powerful battery set ever put into the hands of the home-constructor. It is the ONLY battery set kit employing Metallised S.G. High-Mu Detector and Economy Power Pentode Valves, and is sold complete to the last nut and screw, including these three valves. Yet the current consumption of these three powerful valves is less than that of an ordinary three-valve set—less than 9 m/A.—and makes the "Skyscraper" economical to work off ordinary H.T. batteries.

Lissen have published a Constructional Chart which enables everybody, without any technical knowledge or skill, to build this most powerful battery receiver with COMPLETE CERTAINTY OF SUCCESS. Why be satisfied with whispering, fading foreign stations when you can build with your own hands this "Skyscraper" that will bring in loudly and clearly distant stations that will add largely to your enjoyment of radio?

Chassis Kit, complete with three valves. £4 9s. 6d.
Kit complete with Table Model Cabinet £5 5s. 0d.
Kit complete with Console Cabinet and Pentode Matched Balanced Armature Loud-speaker £6 5s. 0d.

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Amateur Wireless & Radiovision

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

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NEWS & GOSSIP OF THE WEEK

RADIO FOR YOUR CAR!

THOSE "Experimenters" are at it again this week—telling you all about their trials, troubles and final achievements with radio on cars. You will find much practical data in their chatty article this week, whether you are a two-seater merchant or a plutocrat with a large saloon! Then don't forget we carry on this week with another practical article on our mirror-drum television, which really does give recognisable pictures of entertainment value when used in the B.B.C. service area of London and Midland Regional stations.

THE OXFORD EXPEDITION TO THE ARCTIC

BY the time you read these notes, the Oxford Expedition, under Mr. A. R. Glen, will have left England to carry out survey and research work in the arctic regions. There will be two sledging parties and to enable them to keep in touch with each other and with the base camp they will carry complete short-wave

transmitting and receiving gear. This apparatus has been designed specially for the expedition by Mr. R. F. Loomes and his partner Mr. N. E. Read, who are perhaps better known to amateurs as G6RL and G6US. Although they are only very simple sets, running from a 100-volt battery, they have been able to get in touch with other stations over 1,000 miles using a power of only 3 watts!

LUCERNE PLAN REVEALED AT LAST

FRANKLY, we are not very impressed with the results of the Lucerne Conference. The decision, as recorded elsewhere in this issue to squeeze stations on the medium waves up to a general separation of 9 kilocycles is bound to cause some interference among high-power stations. On the long waves it looks even more ominous, with stations only 7 kilocycles apart. Perhaps the best feature of the plan is the extension of broadcasting into the shipping wavelengths. This should certainly ease the situation, though outside the actual service areas of the inland stations allocated to ship-

ALSO IN THIS ISSUE

- Installing Radio in Your Car.
- Experimenting with New Detectors.
- A Home-built Mirror-drum Television Receiver.
- Your Holiday Portable.
- What We Have Gained from Lucerne.

ping wavelengths reception will probably be marred by more interference. The fairest thing we can say of the new plan is that it seeks to minimise inevitable interference, not to work a miracle and cure that interference.

OUR OWN WAVELENGTH PROBLEM

WITH the eleven wavelengths given to the B.B.C., some of them shared by distant foreigners, we shall certainly have fun in the near future! Much will depend on how successful are the experiments now going on at dead of night with the synchronisation of London and West Nationals. If that works there is no reason why we should not do quite well with our new allocations.

TWO NEW REGIONALS!

WHAT a surprise to most people that the B.B.C. is considering two new regional centres—one for North Scotland and the other for North-eastern England! This development of the regional scheme must follow the opening of the Droitwich long-waver, which will, of course, release much-needed wavelengths used in the meantime by the medium-wave Nationals, some of which would not be needed with a high-power National. In the end the minority claims of the "great open spaces" of this country will be satisfied!

THERE'S HOPE YET

The P.M.G. on Interference

SOME M.P.s have been tackling the Postmaster General in the House of Commons about the interference bugbear—particularly the noises set up by trolley buses. Perhaps because Sir Kingsley Wood knows he has a capable staff dealing with interference complaints from radio listeners, he rather hedged



The latest idea for lazy listeners! This arm-chair fitted with wireless is an American invention which will appeal to those who like to take their radio sitting down!

NEXT WEEK: PRACTICAL PICTORIAL LAYOUT FOR OUR HOME-MADE RADIOVISOR

NEWS & GOSSIP OF THE WEEK — Continued

the-question put to him at Question Time in the House. But he gave one gleam of hope, he said he hoped it would soon be necessary to get legal power over wilful radio interference makers.

THE I.E.E. TACKLES ELECTRICAL INTERFERENCE

WE are pleased to hear that the Institution of Electrical Engineers, representing the whole of the electrical industry, has set up a committee to tackle the problems of interference with broadcast reception caused by the operations of electrical plant. The first meeting was held on June 16, and four sub-committees were set up to deal with the following main types of interference: (a) domestic apparatus, including electrical refrigerators, vacuum cleaners, etc.; (b) large electrical plants, such as generators, motors, lifts and mercury rectifiers; (c) traction, including trolley, buses, trams and electric railway; (d) automobiles and aircraft.

These four sub-committees are now at work and will eventually supply data to the main committee so that it can prepare a recommendation to the whole electrical industry, and thus provide a real solution to the bugbear of man-made static, that so frequently mars broadcast reception to-day.

NOT TOO MUCH ORGAN

AFTER the recent official "opening" of the organ in Broadcasting House concert hall, it will be used only infrequently until next month. As a matter of fact, it will not be heard at all until the thirty-first of this month, when Sir Walter Alcock will give a recital. And after that it will be used for the midday Friday broadcasts throughout August.

AMATEUR DIRECTION-FINDING COMPETITION

KEEN radio enthusiasts will be interested to know that on Sunday, July 2, the Annual Direction-finding Competition of the Golders Green and Hendon Radio Scientific Society will be held in the St. Albans-Watford-Berkhamsted area. The fixed transmitting station will be operated by G5RD near King's Langley. The wavelength used will be 164 metres. Six valuable prizes are offered and the competition is open to all readers.

THE HALLÉ SOCIETY

AFTER some months of negotiations, the B.B.C. has come to arrangements with the Hallé Society which should be of benefit to the orchestral amenities of Manchester and the North generally. The arrangements include the broadcasting of ten of the Hallé Society's concerts during the next season and the release of such members of the B.B.C.'s Northern Studio Orchestra as the society may require for their full season of Thursday concerts in the Free Trade Hall, with special facilities for the further release of these members on certain other occasions.

WHAT THE "MIKE" HEARD

WHAT famous dance band was it, the vocalist of which committed the following radio bloomer during an afternoon broadcast? Announcing a new number, he said, "We are now going to play 'Somebody Stole My Girl'—by special request!" We are not offering any prize for the answer!

THE MANCHESTER EXHIBITION

MANCHESTER radio enthusiasts who cannot visit Olympia will be interested to know that the dates have now been fixed and arrangements are now being made for the National Radio Exhibition in the City Hall, Deansgate, Manchester. The Manchester show will be open from September 27 to October 7, and will thus be several weeks after Olympia which, of course, is from August 15 to 24.

RADIO AT THE R.A.F. DISPLAY

RADIO, as usual, played a vital part in the R.A.F. display at Hendon. A special transmitter was installed at Hendon, enabling the display authorities to keep in touch with all other service aerodromes in Great Britain. The flying boats on their passage from the coast to Hendon were thus in constant radio touch with the display officials. Two air units—Nos. 19 and 54 fighter squadrons—flying Bristol Bulldogs, used radio during the aerial battle in the set piece.

BIG PUBLIC ADDRESS

ANOTHER side of the radio activities at Hendon was the immense public address organisation. For the ninth year in succession Marconiphone carried out the huge loud-speaker installation. Sixty of the well-known



Trying out the new organ in the Concert Hall of Broadcasting House. Sir Walter Alcock is at the console with Dr. Adrian Boulton, the B.B.C. Music Director, at his left and Mr. Berkeley Mason on his right

public-address speakers were used and the running commentary given by Flight Lieutenant Helmore was heard all over the aerodrome ground. A public address coach was used in the Sunny Hill fields adjacent to the aerodrome at Hendon, and by means of huge searchlight speakers the commentary was relayed to the large crowds which always gather at this spot.

ANOTHER AMERICAN RELAY

SO successful have been some of the recent transatlantic relays that the American reception superhets will soon be buzzing with new programmes to be relayed on both sides of the Atlantic. Transatlantic conversations on the World Economic Conference will be broadcast. An American economist, talking from the United States, will give his views to listeners on both sides on July 10, and on the following night a British expert will reply. Further talks will be given on July 17 and 18. Listeners should also note that the B.B.C. programmes may be revised from time to time at short notice, as and when the opportunity presents itself for a special broadcast from the Geological Museum.

RELAYED FROM WIMBLEDON

BROADCASTS from Wimbledon will again this year provide listeners with a day-to-day account of the progress of the lawn tennis championship matches. Colonel R. H. Brand will give the commentaries.



The latest in radio pianos. A French radio enthusiast, M. Despeyroux, with his curious instrument which produces sounds as the result of low-frequency oscillation, the tuning being controlled by keys



INSTALLING RADIO IN YOUR CAR

These are many snags in connection with the installation of radio in a car and in this article our Contributors, the Experimenters, show how the difficulties may be overcome

UNTIL recently we, in common with most other car owners, have not bothered about radio in the car, having contented ourselves with ordinary battery-operated portables when we felt a crying need for wireless entertainment during our jaunts into the country. Then we had a remarkable experience—very illuminating, in fact! Mr. Paul Brewster, of Philco, took us out in his Hillman car fitted with a Transitone car radio equipment. We were immediately converted—"sold," as the Americans would say. From that moment we determined to give our

noises caused by the electrical interference generated by the car's ignition system will absolutely drown even the strongest of wireless signals.

Having heard about the special resistances for inserting in series with the sparking plugs to stop this awful noise, we thought we would be clever and wired up some spare resistances we happened to have in our junk box. On switching on the engine we were amazed, not to say delighted, to find that all the noise was suppressed and we were able to bring in programmes on our portable while the engine was running.

SPARK SUPPRESSORS

Feeling very pleased with ourselves we let in the clutch, but what had happened to our acceleration? We soon realised what was wrong—the values of the resistances were too high for our particular car and were badly affecting the car's performance. When we put 15,000-ohm resistances in the sparking-plug leads, instead of the 50,000-ohm resistances we had put in on trial, we found that the engine behaved normally and the noise was suppressed. In practice you will find that resistances between 7,000 and 25,000 ohms will do the trick, the higher revving engines

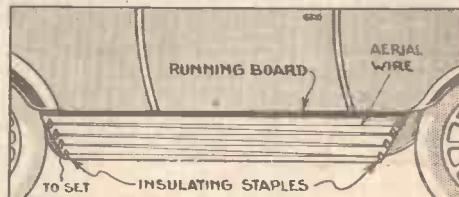
had been working with a normal portable. *Not* a car radio! Begging the question, rather! We cannot possibly use a frame aerial, for example, because the container for the proposed set is not big enough, and we cannot tell you which of the aerial systems we tried will suit you best. Here are the results of our experiments, anyway.

For a start we'll handle the most difficult—a two-seater car, which so far as we know is very rarely considered for car radio, owing to the aerial trouble. The results we have obtained are not so good as with a large saloon, but three or four stations can be heard quite easily, which is all we wanted to get.

Our two systems may sound rather amusing, but they do certainly work, which is the main thing, after all. We got hold of some Pix



Positions of the spark-plug suppressor resistances are shown in this photograph of a Riley car



Staples can be fixed under the running-board to hold the aerial wire, which is stretched taut from one end to the other in as many lengths as possible

patent invisible aerial and stuck it round the back of the seat on the woodwork. This is a fairly large area and you can get quite a reasonable length—say 30 ft. If you have any wire to spare continue it round the coachwork.

At this point we came across some natty little staples called RACS, made by Electro-Technical Products, Ltd. They cost only a penny each, and if you fit these things under

experimenter friends some inside dope on how to fit up radio in their cars with the minimum of expense.

We would like to emphasise right away that our experimental efforts are in no way a reflection on commercial practice which, as exemplified by the Transitone, is indeed well-nigh perfect. What we feel is that before commercial car radio can become a big success in this country the ordinary man in the street with his little nine-horse-power car will have to be converted to the idea, and for a start there is no better way than to fit up some simple equipment.

How do you think car radio differs from radio in the home? At first sight you might think that the only problem is accommodation, which in a car is usually limited. Actually, with a little ingenuity you can always find odd spaces in even small cars for the necessary equipment. *That is not the real problem.* Take an ordinary portable into your car, drive away and then get your friend to switch the set on. You will hear the problem for yourself! The terrible tearing and rushing

requiring the lower value resistances. It is a question of using the highest value resistance possible, that is the highest value for suppression that will not affect the engine's performance.

We then obtained a set of commercial plug resistances for the job made by Centralab.

Other makes include Erie, Dubilier and Varley. You can see how these resistances are fitted from one of the photographs. So far, we



Suggested position for the set box under the bonnet, actually screwed to the dashboard

INSTALLING RADIO IN YOUR CAR (Continued)

the running board, four at each end, about 2 in. apart, you can then run your aerial wire backwards and forwards, giving between 25 and 30 ft. of wire for the total length of the aerial.

Still on the small-car fitting, we now have to think about the set and the loud-speaker. In a modern two-seater it is now usual for the petrol tank to be fitted at the back. If so, you simply screw your receiver box under the bonnet to the dash, where the petrol tank used to be fitted.

Perhaps you haven't a new car and you may have the petrol tank in the front. You will, then, have to screw the receiver box under



Special control box for operating the set's knobs from the car's steering column. Below can be seen a suggested position for the loud-speaker and on the facia board are the low-tension points from the car accumulator

the facia board over the passenger's feet. In the little Morris car we experimented with there was just enough room on the running board, clear of the opening door, to fit the receiver box at one end and the battery box at the other end. On this car the apparatus has to be fitted to the driver's side, as there is a spare wheel on the passenger side.

This position has what some people might think is a bad snag—the set, though close to the aerial system, is a long way from the operator. This means that for remote control to work the set while the car is in motion, a long piece of special cable is needed—and it is rather expensive stuff.

As the set can be tuned without the driver leaving the car, simply by opening his door, perhaps it will not be thought too much of a bother to adjust the set before the car gets going and to make most of the adjustments, altering the tuning or volume, that is, when the car is stationary. It is quite ideal for picnics, anyway!

AN AERIAL SUGGESTION

Suggestion: we seem to remember last exhibition an aerial that was made up like a tape measure, being very compact, coiled and uncoiled at a moment's notice; this sort of aerial would be ideal as an auxiliary for this set to enable you to get greater range when the set is at rest.

So much for the installation of the set in the small car. But there is still the loud-speaker to consider. Its position depends very much on the type of car, of course. If the petrol tank is at the back the set can go under the bonnet, leaving ample room for the speaker to be screwed to the footboard just above the

passenger's feet. If you buy the special "Fonochorde" car-radio moving-coil loud-speaker it can be fitted easily with the single-hole screw attachment.

If your car has the petrol tank at the front the space previously used for the speaker under the passenger will be wanted for the set, and you will have to use your brains to find a nook for the speaker. We found such a nook in a rather surprising place. By removing the back portion of the seat in the two-seater we found that the front of the driving seat was separated from the interior of the dickey by a thin piece of plywood. We cut a hole in the plywood and fixed the speaker to it, so that the sound from it actually percolated through the top part of the seat into the car. This may seem rather impracticable, but as the seat is not a tight fit as a rule, plenty of sound manages to get through.

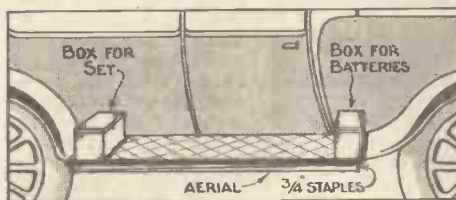
CONTROL

If you are good with tools you can easily cut a grille through the front floorboard and fit the speaker below, so that the sound comes upwards. Make sure, though, that the speaker is well boxed and that the grille is robust, or you may put your foot through it!

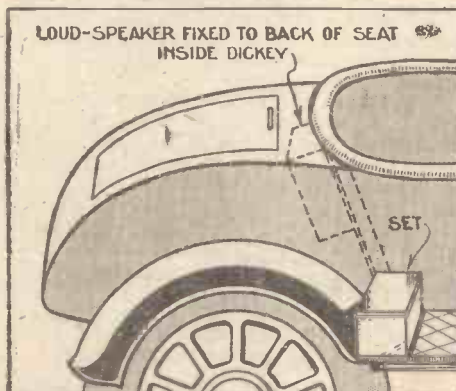
We have mentioned that when the radio is fitted on the running board a long piece of cable is needed if you want remote control, but as this is expensive we do not advise it. When the set is under the facia board, though, the distance between the set and the steering column from which the control is to be done is fairly short and the remote control cable is used.

We have just obtained from Rothermel's a special control box, consisting of a tuning dial, a key switch and a volume control. The receiver, no matter where it is, can be coupled up to this control mounted on the steering column and the set worked while the car is in motion, its controls being no more arduous than those usually worked on the car, such as the light dipper.

We have talked about a battery box, but



The boxes for the batteries and the receiver can be fitted to each end of running-board on a two-seater or other car with only two doors



The loud-speaker can be fitted behind the driver's seat so that the sound percolates throughout the car

so far you don't know what batteries to use. We tried two types of battery, which seemed designed for the job. Firstly, the Pertrix Ultra, type 323. It is almost square in shape, voltage 159 maximum, and can be fitted on the running board or even in the dickey seat. The second battery we tried consists of three super-capacity 45-volt blocks, specially designed for car radio by Siemens'. These are fitted with clips instead of sockets for the connections, so that wires cannot fall off while the car is in motion. The battery is carried in a special box. Peto-Scott can supply the battery box, as indeed they can supply the radio-set box we shall talk about next week.



Operating the special control box on the steering column, showing the volume control and the key switch

Of course, you can use other batteries if you like, but make sure they have the two car radio special features of ample current capacity and compact construction.

We haven't mentioned the low-tension supply. What we use is the car battery of 12 volts. The set is arranged to work direct from this battery voltage, but if you have only a 6-volt battery the filament circuit must be altered as we show in one of our diagrams. As we write, by the way, we remember that Messrs. Tungsram have a 6.3-volt filament mains valve, designed for car radio. So you can run them in parallel off a 6-volt accumulator.

That fairly well covers everything we can tell you about radio for small cars. We have had some fun with a medium-size saloon, actually a Riley nine.

RADIO ON LARGE CARS

On a larger car there is a greater facility for the aerial equipment. By the way, as most saloon cars have four doors, anything on the running board is ruled out, so room must be found inside. Fortunately, there is plenty of space if you look around.

The set can be fitted under the facia board over the passenger's feet—not the driver's—or underneath the bonnet. Where neither of these ideas is practicable it can be fitted in a small cradle between the cross-members of the chassis. The loud-speaker in a Riley, for example, can go on the slanting footboard behind the gearbox, or over the passenger's feet, or underneath the floor boards. One enthusiast we know has a speaker in place of the roof lamp.

(Continued on page 14)

What We Have Gained from Lucerne

Some authoritative details, gathered by ALAN HUNTER, about the new wavelength plan for European broadcasters, which comes into operation next January.

AT last, after more than a month of discussion, the B.B.C. delegates are back from Lucerne, with eleven wavelengths for British broadcasting. As I write twenty-seven countries have signed the new wavelength protocol, leaving seven remaining dissentients, namely Finland, Greece, Holland, Hungary, Lithuania, Poland and Sweden. They will no doubt sign in the end—out of self defence, if for no other reason.

To understand what has happened you must cast your mind back a moment to Madrid, where, last Autumn, after many acrimonious discussions, it was agreed that the waveband from 200 to 2,000 metres should be revised to accommodate as far as possible the conflicting requirements of the various army, naval, commercial and broadcasting interests.

The Lucerne Conference was the logical outcome of Madrid, the idea being to deal in detail with rather more parochial problems than the world gathering had time or inclination to handle.

What you want to get firmly fixed is that Lucerne was a meeting of plenipotentiaries, of Government delegates, that is, with power far above that of any broadcasting official. The British Government sent out Mr. F. W. Phillips, an Assistant Secretary of the Post Office, and he was, of course, backed by expert advisors from the B.B.C., the team including Noel Ashbridge, Chief Engineer of the B.B.C., and other highly informed members of its staff.

Two Men Decided It

The Conference, it was realised before Lucerne was convened, would prove something in the nature of a dog fight. Actually it took five weeks of patient discussion by sub-committees appointed to deal with broadcasting, commercial and maritime demands. The broadcasting sub-committee consisted of only two men, Herr Geiss, the President of the German delegation, and M. Raymond Braillard, the President of the Technical Committee of the International Broadcasting Union.

You might say that these two men between them carved up the European ether for the next three or four years! On the results of their joint labours will depend the success or failure of broadcasting in Europe after next January, when the "Plan de Lucerne" comes into action.

Reduced Separation

One of the most important concessions arising out of the Lucerne discussions was the agreement to sandwich certain broadcasting stations in the wavebands now held exclusively by shipping. Only in this way could the claims of the many new stations that have come into the ether be satisfied.

On the long waves, so pressing are the claims and so few the available channels, that there will, under the new plan, be many shared wavelengths. Moreover, and this is rather an ill-omen, there will be only a 7-kilocycle separation between most of the stations. On the medium waves the usual separation will be 9 kilocycles, although where a wavelength is adjacent to a shared channel there is to be a 10-kilocycle separation.

The new line-up will be heard next January, as mentioned, and but for one or two trifling adjustments the wavelengths that then come into action will be fixed for a number of years, probably until the next World Telegraphic Convention, which I understand meets at Cairo in 1937.

Well, it's a plan of reduced frequency separation, of very much greater wavelength sharing, of potentially greater interference in reception. Yet it is a plan that takes everyone into account, and not only stations but power is controlled. In future it will be illegal to work a long-waver in Europe of over 150 kilowatts, and on the medium waves the limit is to be 120 kilowatts. Many stations, particularly those sharing wavelengths, will have to be on much less power than this to avoid mutual heterodyning.

The B.B.C.'s Share

The B.B.C., as I mentioned at the beginning, comes out of the fray with eleven wavelengths, not all of which are exclusive. Perhaps our greatest bit of good fortune is Daventry National, which will be on about 1,500 metres, and will have Königswusterhausen 9 kilocycles away on one side of it, and Minsk, a medium-powered and relatively innocuous Russian 7 kilocycles away on the other side.

On the medium waves we have not done too badly, though we have lost our best wavelength—North Regional's. The best medium



wave we shall hold under the new plan will be 449.1 metres, but it is by no means sure North Regional will get this; then come the following wavelengths: 391.1 metres, 373.1 metres, 342.1 metres, 307.1 metres, 296.2 metres, 285.7 metres, 267.4 metres, 261.1 metres, and 203.5 metres.

A Prophecy

At the Conference our delegates referred to a North Scottish wavelength and also to a North-Eastern wavelength. My long shot in the April 15 issue of AMATEUR WIRELESS, when I suggested a station might be coming for North Scotland and one for North Wales, may not prove very wide of the mark. In fact it now seems certain that North Scotland will get its long-delayed regional, somewhere around Inverness. This will render Aberdeen redundant, and so one at least of our lost wavelengths will not matter. North-eastern Regional can only mean a new high-power station to serve Newcastle, but it seems likely to me that the B.B.C. will try to kill two birds with one stone and to put up a station fairly inland so that the North Welsh will get some sort of service.

Even so, our domestic problem can be solved only by quite extensive synchronising. Bournemouth, Plymouth—what about them? Synchronised with one of the Nationals, presumably.

Meanwhile the B.B.C. is busily deciding how to share out its Lucerne wavelengths, and in a week or so I expect the full list will be published, probably coinciding with the complete "Plan de Lucerne" coming from the International Broadcasting Union headquarters at Geneva.

INFRADYNING

IT is now common practice to adapt an ordinary broadcast set to receive short-wave signals by inserting a local oscillator valve before the first H.F. amplifier. This heterodynes the incoming short wave and converts it into a longer wave, i.e. one normally within the broadcast range, in which form it can be handled by the first H.F. valve of the standard circuit.

Most American sets are tuned to receive the medium wavelengths only, but they can be similarly adapted to handle the European long-wave stations by adding a local oscillator. In this case the adaptor valve is called an infradyne, because it reduces the long-wave signal to a shorter (medium) wavelength.

B. A. R.

JACK HYLTON TRIES A CATKIN!



Here's a bit of a test! Jack Hylton trying his best to break a Marconi Catkin valve, during his recent visit to Dublin. The Catkin valve survived its ruthless ordeal!

EXPERIMENTING WITH DIODE DETECTORS

J. H. Reyner describes some simple experiments you can make in diode detection, using ordinary valves

WILL the diode come into its own this next season? It is an ideal detector for it gives straight-line rectification and will not overload. Its greatest drawback is that it gives no amplification, but on the other hand, it is quite inexpensive.

Diodes are incorporated in several of the new multiple valves, but it is possible to experiment

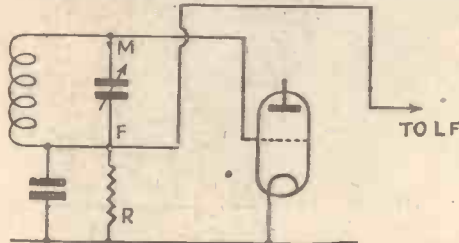


Fig. 1. Here is a simple circuit with which you can experiment, using an ordinary valve as diode detector

with diode rectification without using a special valve. An old, discarded triode can be employed and many of my own experiments have been conducted with such a valve. The grid of the valve is used as the diode anode and the anode proper is left disconnected.

The simple diode circuit is shown in Fig. 1. When the anode is positive, current flows through the diode and produces a voltage across the resistance. When the anode is negative no current flows. We thus obtain rectification, the average value of the voltage on the resistance depending upon the strength of the signal. The voltage varies in accordance with the modulation, so that we have low-frequency voltages which can be transferred to the low-frequency amplifying stages in the ordinary way.

The Fig. 1 circuit is not always convenient because the tuning condenser is "up in the air." In this case, the Fig. 2 circuit can be used equally well. It introduces a little more damping but is practically as efficient. Note that the leak R is taken to L.T.+. This gives better results on weak signals.

Both these circuits are limited in output by the voltage they receive from the high-frequency carrier. If we have a carrier voltage of 1 volt at the detector modulated 30 per cent. then we only have .3 volts out. The diode has to be followed, therefore, by an amplifier—an ordinary L.F. valve will do—before reaching the output valve. Usually this is sufficient, but in some instances the amplification is still not great enough. I felt that it should be possible to increase the amplification by using a transformer coupling following the diode, despite the fact that the normal diode resistance is of the order of $\frac{1}{2}$ megohm.

A little experiment showed that the arrangement was feasible and the Fig. 3 circuit shows the connection finally adopted. The diode resistance was reduced to .25 megohm and a transformer was parallel-fed across this resistance. The transformer must be one having a primary inductance of at least 100 henries with no direct current flowing. This sounds a tall order but fortunately it can very easily be obtained with some of the small nickel-alloy transformers on the market. I used a Bulgín Senator transformer very successfully.

With this circuit the voltage developed across the secondary is several times that developed in the diode circuit even at quite low frequencies. I found that the diode efficiency was about 80 per cent. at 1,000 cycles and fell to 65 per cent. at 128 cycles. This is a much smaller drop than was anticipated and it shows that, contrary to one's first expecta-

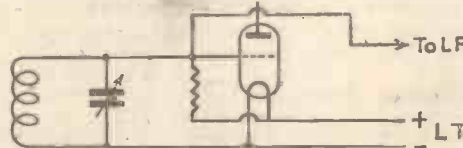


Fig. 2. An alternative circuit with diode detection

tions, the bass will be well reproduced, as was found to be true in practice.

The actual voltage is obtained by multiplying by the step-up ratio. If we assume a carrier voltage of 1 volt as before, and a

modulation of 30 per cent. then with an efficiency of 80 per cent. we should expect .24 volt low frequency across the primary of the transformer. If the transformer has a step-up ratio of 4 to 1 we should expect .96 volt low frequency across the secondary and measurements show that this expectation is realised.

One application of this circuit is to class-B

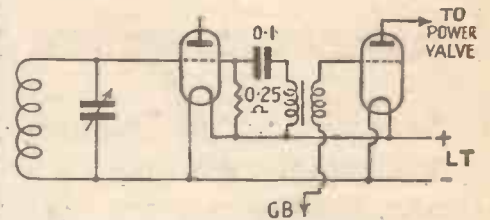


Fig. 3. Transformer coupling with a diode

valves. By using a diode detector feeding through a step-up arrangement of this sort into a pentode driver valve it is possible to obtain remarkably sensitive results and the arrangement has the advantage over using an ordinary triode detector in that no extra decoupling is required for the detector stage.

This is only one of the possible applications of the circuit. I suggest that those readers who are interested should try a few circuits for themselves. The damping introduced by a diode, even of the crude type obtained by using the grid and filament of an ordinary valve, is distinctly less than the usual triode grid detector. Your selectivity will therefore be increased and your sensitivity also will improve, so that replacing your existing detector with a diode will at once give you a marked improvement in the tuning.

You can use the valve originally employed as detector for low-frequency amplification after the diode. Either use a plain resistance-coupled arrangement as shown in Fig. 2 or, if you find this does give sufficient amplification, try the effect of a small step-up transformer as shown in Fig. 3. The modification is easily carried out and usually proves well worth while.

MAKE the most of Monte Ceneri, the Swiss (Tessin) high-power transmitter, whilst its broadcasts can be well heard on 1,145 metres, as I understand that there is little likelihood of Switzerland retaining a long channel and the station may be required later to work in the lower portion of the waveband. So far, for the announcements, I have only picked up a woman's voice, and with but few exceptions the Italian language was used. As the transmitter "takes the air" at 8.30 p.m. B.S.T., the first item is preceded by a stroke on a gong, and the interval signal imitates the chimes of a church in the immediate vicinity of the studio. Radio Svizzera Italiana at present is offering good signals, and you would do well to log it whilst you can.

Recently, I spent a short week-end on the Belgian coast, and as the weather was peculiarly unpleasant, I had every opportunity of confirming the popularity of the B.B.C. programmes on the other side. Most of the sets I examined were mains-fed, and from conversations I had with the permanent residents I found that in the majority of instances, during the evening the British stations were tuned in for the sole reason that in the general opinion they offered better programmes than their Continental colleagues. Apart from a certain amount of morse

OUR LISTENING POST

By JAY COOTE

interference from ships entering or leaving Antwerp, Flushing or Ostend, reception of a large number of European transmissions was secured with ease; doubtless for the reason that the locality was sufficiently removed from the swamp area of any station. Although roughly the difference in distance between London and the Belgian coast and Vienna would be only a matter of a hundred miles or so, the new Bisamberg station there could be heard at full loud-speaker strength from about 6 p.m. onwards.

VOLUME AND DISTANCE

It is an interesting study to test out receivers in various districts, as it will be found that actual mileage from the transmitter does not influence to the same extent as might be supposed the volume of the signals tuned in. As a case in point; I heard small stations which, although then farther from me, I could not pick up in London.

It would appear that Huizen is to have a new and more powerful station; tests on 1,875 metres have been recently carried out after

programme hours. As regards the wavelength, however, there is every chance that Holland may not be able to keep it, but the final decision in the matter has not yet been taken.

I learn that the struggle at Lucerne has been a severe one and that most European broadcasting organisations will fail to get anything like their claims. Russia, for instance, wanted five "long" waves, but has had to make concessions; France wished to retain channels for both Eiffel Tower and Radio Paris, and has also had to give way. As to Luxembourg, I am told that it will not be allowed to use its present channel. So far, at present, in view of the number of stations needing wavelengths, there may be none to spare for the French private transmitters, and the outlook for St. Agnan (Radio Toulouse) and Radio Normandie is far from being a particularly bright one.

Whatever final plan is evolved, whether affording satisfaction or not, it should show some improvement on present conditions, but we shall not be able to judge until at least the end of the year of its practical efficacy. It is not likely that the "general post" will take place before January, 1934, as if chaos is to be averted it is essential that this complete change-over should be carried out on one and the same date.

Mullard Class "B" amplification . . .

a low mean anode current over
a representative period of broadcast

From the most powerful volume down to the faintest whispered word, the new Mullard Class "B" valve, the P.M.2B, takes an average H.T. current consumption of exceptionally low value over a representative period of broadcast. Thus, Mullard Class "B" amplification comes to give you battery performance comparable with that of an all-mains receiver, with no more drain on your H.T. battery than that taken by a small power valve.

So if you are seriously contemplating the incorporation of Class B amplification, we would be glad to assist you in any way, and would suggest you write to T.S.D. for any technical information you may require.

The P.M.2DX is the driver valve for the P.M.2B. Other valves to be used in the earlier stages of battery receivers are the P.M.12M, variable-mu H.F. amplifier (or P.M.12A Screened-Grid H.F. amplifier) and the P.M.1HL detector.

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



Mullard

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The Mullard Wireless Service Co., Ltd., Mullard House, Charing Cross Road, London, W.C.2

Arks

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'Stability' summarises in one word, the chief superiorities of Marconi Catkin valves—their mechanical stability, both interior and exterior, renders them practically unbreakable—their constructional stability guarantees uniformity of performance from one valve to another—their electrical stability eliminates microphonics, lengthens life and reduces hum.

Marconi Catkin valves, with their rigid, interlocked metal construction, eliminate at one stroke the weaknesses inherent in all glass valves—the instability of fragile bulbs—bent-wire electrode assemblies and many delicate welded joints. Yet with all these advantages they cost no more than ordinary glass valves!

The types at present available are:—

- VMS₄ A.C. Variable-Mu S.G. - - - 19/-
- MS₄B A.C. Screen Grid - - - 19/-
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** With or without screening cover.*

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UNBREAKABLE

CATKIN

VALVES

*Write to the Marconiphone Company Ltd.
210 Tottenham Court Road, London, W.1 for a
folder describing these remarkable new valves.*

Don't Forget to Say That You Saw it in "A.W."

On Your Wavelength!

WHEN LIGHTNING THREATENS THE B.B.C.

THE Comic Uncle was singing at the microphone in the Children's Hour. He was singing, "Shall I have it bobbed or shingled?" (the song will give you an inkling of how long ago this was.) At that moment the B.B.C. transmitting aerial half a mile away was struck by lightning. The high-voltage charge leapt down the wires, flashed into the transmitting room, and threw great blue sparks all round the place. An engineer cut off the power. The station closed down. Then the engineer phoned through to the studio and suggested that the Comic Uncle should come and have it singed!

That is the only case to my knowledge of a direct hit by lightning on a B.B.C. aerial. It occurred at Leeds.

The anxiety of the listener who fears that his puny stretch of wire across the backyard is going to attract the wrath of the heavens seems rather ludicrous when you consider the remarkable rarity of lightning flashes on the mammoth aerials of the B.B.C., some of them slung 500 feet high above the ground.

PRECAUTIONS

EVERY B.B.C. broadcasting station nowadays is provided with a lightning arrester. If a storm is so heavy that sparks are continually flashing across the arrester, and so making the transmission unintelligible, the engineer-in-charge has authority to close the station down and not to start up again until conditions are quieter. The aerial is then earthed and any charge that did strike it would be led harmlessly to the ground. In the absence of this precaution, thousands of pounds worth of damage might be done in an instant by lightning striking the aerial and entering the transmitter. The metal aerial masts of the latest stations are mammoth affairs, but as they are earthed at the base they form quite effective lightning conductors.

MERE FANTASY

ONE needs a lot of imagination to keep pace with modern physics. Look, for instance, what Sir James Jeans has done to the poor over-worked electron in his latest book, "The New Background of Science." There he says bluntly that the electron can only be objectively considered "when it is anchored to a proton or some other frame of reference." Otherwise it merely fills all space uniformly. My hat! and to think how I used to lap up all sorts of fascinating figures—as given in the best text books—stating exactly how many million electrons could sit comfortably on the head of a pin, without jostling—and how there were as many electrons in a drop of water as there

are drops of water in all the oceans. And now it seems that was all bunk, and the electron is just a sort of a kind of a phantom. Honestly, Sir James, you make me feel I dunno where I are!

DOWN TO TIN-TACKS

ISUPPOSE the fact is that the electron never does succeed in getting rid of its anchorage to the proton "or some other frame of reference," and that so long as it is so harnessed it will continue to behave properly and in accordance with the rules laid down in the text books. We may therefore expect the H.T. and L.T. supply to function as usual, and all the H.F. and L.F. oscillations to carry on as before, in spite of Sir James's revolutionary notions. And I wouldn't mind betting that even our most eminent physicist will find there is something most unphantom-like in the kick still to be had by making casual contact with a 220-volt A.C. mains lead which is all due to electrons in bulk.

THE NEW WAVELENGTHS

THE new wavelength allocation to this country has many points of interest. One of the most important is that we receive eleven channels in place of the twelve at present in use. Somehow or other fourteen home stations have to be fitted into these channels, always assuming that it will be found necessary to continue operating Bournemouth, Newcastle, and Aberdeen as at present. Just how the new channels will be employed the B.B.C. has not yet stated, but it is interesting to speculate upon the possible reshuffle that will have to be made. A good deal, I imagine, depends upon whether the forthcoming experiment of working the West National and the London National upon the same wavelength turns out to be satisfactory. Myself, I hardly think that it will. It may work fairly well in summer time, but I have my doubts about the winter.

SIZING THEM UP

A GLANCE at the new wavelengths shows that without exception every one of our stations suffers a reduction. The Midland National, for instance, is down by 55.4 metres, the North Regional by 30.9 metres, and the London Regional by 13.9 metres. The only wavelength which is almost unaltered is that which will certainly go to the London National. This is 261.1 metres, as against the present 261.6. The worst wavelength of the lot is 203.5 metres, for right down at the bottom of the medium band service areas are not as a rule great and fading on the fringes of the areas is generally something more than a nuisance. On the whole, we have been pretty well treated.

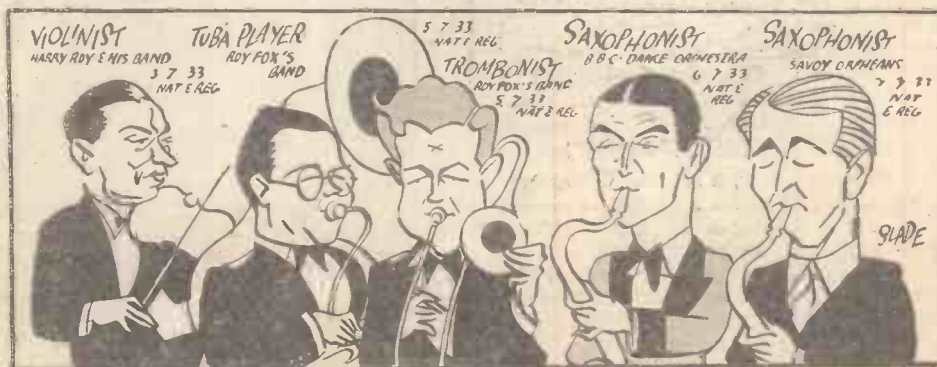
The reductions in the wavelengths, with the exception of the lowest of all, are not sufficient to cause any very great diminution in service areas and all of our stations are well separated from each other. The only fly in the ointment is that quite a few of the British channels will be shared with very distant stations in Asia Minor, Egypt, or Siberia. Time alone can show whether this kind of sharing will work out well or not. It is one thing for two stations using the same wavelength to send out the same programme, but quite another for them to send out different programmes.

THE LITTLE RIFT

LOOKING at the Lucerne Plan as a whole, we can congratulate those responsible for it on the successful outcome, on paper at any rate, of the hard work which they have put in. It evolves some order out of the present chaos.

I must say, though, that I am rather disquieted by the news that the delegates of Finland, Greece, Holland, Hungary, Lithuania, Poland, and Sweden have not signed the Convention. Of these, Greece and Lithuania are not at the moment of any great importance, since the only Lithuanian station is Kaunas, a 7-kilowatt with apparently a very short range, and I do not know of any Greek stations. Finland,

ARTISTES IN THE WEEK'S PROGRAMMES



On Your Wavelength! (continued)

however, has a considerable number of broadcasting stations, including the 40-kilowatt Lahti, the 10-kilowatt Helsinki, and the 10-kilowatt Viipuri. Holland possesses those splendid stations, Huizen and Hilversum, both of which are likely to increase their power before long. Hungary has the two Budapest stations, one of which is very soon going up to 100 kilowatts, and a number of fairly powerful relays. Poland has big stations, such as Warsaw, Lwow, and Katowice, all of which cover very big areas. Sweden has a number of high-powered stations, including Motala, Stockholm, Gothenburg, and Hörby, in addition to innumerable relays.

WILL THEY DO IT?

IN the B.B.C. report upon the Conference it is stated that all of these seven countries are expected to adopt the wavelengths allocated to them. So far so good; but as they have not signed the Convention they have, apparently, not bound themselves to stick to those wavelengths and goodness only knows what bother they might cause if they indulged in experimental wanderings. A single non-complying country might well upset the working of the whole plan; if there are seven who have not signed upon the dotted line every effort must be made to bring them as quickly as possible within the fold.

GOOD FOR PORTABLES

SCORES of owners of portable sets have written to ask me whether they can fit class-B into their apparatus. Hitherto I have had to reply that they probably couldn't, because there wouldn't be sufficient room for the necessary bits and pieces. Now the position is altered by the coming of the class-B converter units. Has it occurred to you that these can be used just as well with a portable as with any other kind of set? It doesn't matter the proverbial two hoots whether there is room inside the cabinet or not, since the unit itself stands outside. All that you have to do is to remove the last valve from its holder, to insert the adaptor plug, and then to replace the valve in the sockets provided for it in the plug. The class-B unit then operates the existing loud-speaker without any alteration whatever in the wiring of the set. During the last few days I have been trying out one of these units with battery sets of many kinds, including portables, transportables, and stationaries, including both big "straights" and super-hets. It works admirably and you can make the change-over in two ticks.

WORTH REMEMBERING

IF, by the way, a set which you propose to use with a class-B converter has two stages of low-frequency amplification, you may quite likely find that you don't want the second. In that case you put the adaptor plug into the last valve holder but one and then there is a special wander plug which goes into the

plate socket of the last valve itself. Unless your last-but-one valve is of a type suitable to act as a driver, you may find it better to use the output valve for this purpose. But don't forget to apply plenty of grid bias to it, for if you don't do this you will be using far more H.T. current than you need and for battery users milliamperes cost money.

CLASS-B AND MAINS

SOME people tell me that you can work a class-B set from an ordinary eliminator. I have tried one or two myself without very good results, and I don't think that you can get respectable working unless the eliminator is capable of supplying far more milliamperes than the set normally takes without the class-B unit in action. Actually, if you are working off the mains through an eliminator and can, therefore, obtain cheap H.T., there seems to be no special point about using class B. Myself, I should use ordinary push-pull in these circumstances, with a couple of medium-power valves.

A "QUALITY" YEAR

THE big thing about wireless sets in general this year will be—or at any rate it ought to be—the wonderful quality of their reproduction. Mains sets have been very good for some little time now, but the battery set has lagged sadly a long way behind. In fact, there were many who held that there must be two kinds of wireless quality: mains quality and battery quality. Now that we have class-B and Q.P.P., there is not the least reason why the standard of the battery set should not be enormously improved. And what must be remembered is that at least 60 per cent. (and I should put the figure a good deal higher) of the sets in use are battery-operated. This means that hitherto comparatively few people have been getting any approach to perfection in their reproduction. I have always been a staunch supporter of the battery set and have been grieved to see its development so neglected by many of our makers. This year I do believe that there will be very big advances, and once people realise how good

Never fix a set in a cabinet so that it cannot be easily moved for inspection. It is a good plan to fix small ball castors underneath the baseboard, so that it can



be withdrawn quite easily. As many modern cabinets do not have lids at the top which open, this tip is of particular importance

the battery set can be there should be something like a boom in them.

A CURIOUS POINT

ONE rather queer point is that such a large proportion of listeners who have mains-run sets designed for battery operation work them by means of eliminators. I haven't actually taken a census, but in my own district I must know at least fifty or sixty households in which this is happening. The eliminator is a very fine thing so far as it goes. It cuts running costs right down and it means that there is no falling off in performances from week to week, or even from hour to hour.

But there is literally no comparison between the performances of the small set run off an eliminator and those of a set with a similar number of mains valves working through its own power pack. For some queer reason, there are those who regard the eliminator as "safer," which, of course, it isn't. It is precisely as safe as a power pack. Then there are people who purchased eliminators some time ago and don't like the idea of scrapping them. Hence when a new set is required they don't go for mains apparatus, but purchase yet another battery receiver. This is somehow rather like purchasing a new pair of boots to fit your old laces! If you have mains, make full use of them by running a set designed for mains operation.

JARGON

ALWAYS have I loathed the baser forms of wireless jargon, and particularly some of those very uncouth terms that we are wont to import from America. One name that I hate beyond all words is a hum-bucking coil. It is so completely unnecessary and so meaningless in English. In U.S.A. slang, "to buck" does, I believe, mean to hinder or to prevent; in English it has no such signification. The hum-bucking coil is an inductance used to minimise loud-speaker hum in mains sets. Surely its English description might very well be hum-stopping pure and simple. Ours is a beautiful language, but we do make an unholy mess of it at times by grafting on to it these hideous words of foreign origin.

ANOTHER COMPLAINT

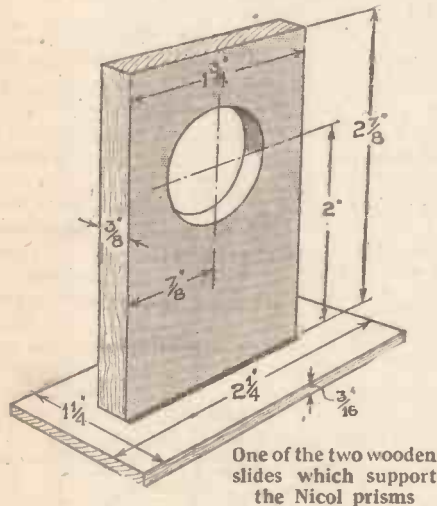
AND whilst I am on the subject of wireless and English, I would like to make my little protest about the singing by thoroughly English dance bands of refrains in the vilest form of Americanese. I hate this singing anyhow, but to me and many others it becomes doubly, trebly, and quadrubly offensive when blue is turned into "blyew," can't into "cannt," time into "tahme," me into "mah," and so on and so on and so on. Yet if these refrains must be sung—and apparently they must—could they not be delivered in the King's English instead of in a travesty of the President's American?

THERMION.

A Home-built Mirror-drum Television Receiver

Further constructional details of the home-built television receiver with which you can obtain good reproduction of the B.B.C. broadcasts.

THE drawings of the woodwork of the television receiver shown here are self-explanatory and need little comment. Constructional details of the mirror drum were given on page 875 of last week's issue and when you have made this part of the outfit



you will find that the rest of the construction is quite straightforward.

The various wooden parts need to be made with care, of course, and good hard wood should be used. Accurate dimensions are given of the various wooden parts in the actual television receiver made up and illustrated. But these dimensions need not be slavishly followed. Sizes in many cases will depend upon the dimensions of the lenses, mirror and other optical parts used in the construction.

But the perspective drawings of the various woodwork parts shown on this page and page 17 give you a good idea of the simplicity of this part of the construction. The parts shown, with the exception of the brass clip lens holder, are mounted in the slide on the baseboard.

There is the Kerr cell holder, the two holders for the Nicol prisms, the condenser holder and mirror mount. The actual positions are determined when you first test out the receiver. The Nicol prisms, the condenser and the mirror mount are moved along the slide until a definite modulated light point is projected on to the mirror. But this will be more definitely dealt with in the operating notes to be given later.

The lenses and other optical parts used in this receiver are mostly from disused photographic and optical apparatus. With the wide range of adjustment provided in the baseboard slide, there is no difficulty in using lenses of any reasonable focal length.

It is essential, when you have made up the various holders, that the sliding

bases should be sand-papered smooth, so that they move easily in the baseboard slide. When the correct positions have been found after trial the various slides can be secured in position if required by a single screw in each.

The Path of the Light

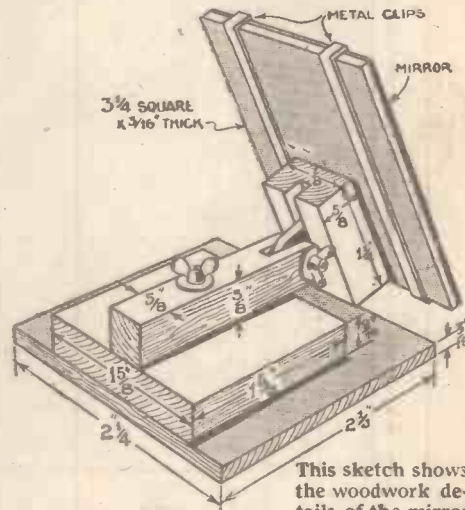
It must be remembered that the object of the condenser and lens arrangement is to focus a spot of light from the projection lamp on to the Kerr cell, which, after reflection from the adjustable mirror, is diffused by another lens, so that it covers at once two of the mirrors on the drum, whence it is reflected on to the viewing screen.

Details of the wooden support for the lens mount were given on page 876 last week, while dimensioned details are given this week of the Kerr cell holder, Nicol prism supports and the adjustable mirror mount.

The sliding part of the mirror mount measures 2 1/4 in. square, while it is, of course, the standard thickness of all the sliding parts in the baseboard slide, namely 3/16 in. On top of this rectangular piece of wood is placed another block 1 1/2 in. square and 1/8 in. thick to bring the mirror swivel up to the right height. The mirror can be adjusted in two directions. There is a strip of 1/2 in. section wood with a hole drilled through it. This strip is clamped to the two base pieces by a bolt with a wing nut, so that rapid adjustment in a horizontal plane is possible.



The other end of this strip is slotted and there is a further bolt and a wing nut, this acting as the pivoting point of the mirror holder so that adjustment at right angles to that already mentioned is possible. The



This sketch shows the woodwork details of the mirror holder and slide. The wing nuts allow the mirror holder to be set at any angle

mirror is 3/4 in. square and is supported on a wooden backing of the same area and 3/8 in. thick. Metal clips are used to clamp the mirror to its backing.

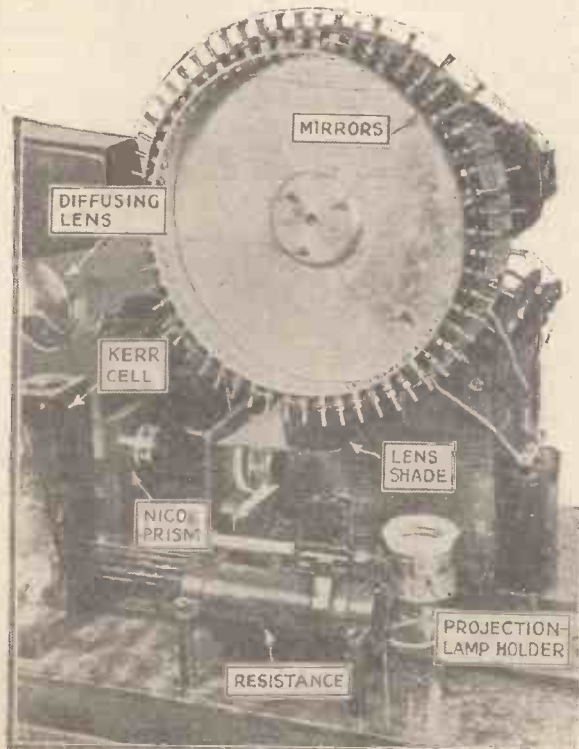
The Kerr cell rests in a holder made up from four pieces of wood, two measuring 3 1/4 in. by 1 1/4 in. and two 1 1/2 in. by 1/2 in. by 1 1/2 in. Two large holes are drilled in the rectangular pieces of wood which, of course, are the horizontal supports. The size of these holes depends on the container of the Kerr cell.

Constructional details of the home-made cell used will be given in next week's issue. It must be emphasised that every part of the construction of this television receiver is an amateur job. Even the Kerr cell is quite easily made. It consists, in brief, of an assembly of plates mounted on a fibre block and placed in a test tube filled with nitrobenzene. The test tube containing the Kerr cell assembly is supported vertically in its mount and the best position found so that the light spot from the projection lamp may be focused on the plate assembly.

The two holders for the Nicol prisms are made up to accommodate the prisms in their holders. The base has the same thickness of 3/8 in. so that it can slide in the baseboard groove.

The Nicol prisms used were taken from a secondhand microscope, but they are readily obtainable at most optical stores.

The baseboard slide is made up from strips of wood arranged so that there is



This lettered photograph shows a "close-up" of important parts of the television receiver. The positions of one Nicol prism and the Kerr cell are shown

(Continued on page 17)

YOUR HOLIDAY (CLASS-B)



DESIGNED
BY
W. JAMES

Here is just the right type of po
outdoor or indoor use. It is con
and above all gives ample vo

help to correct the tone, and normally it
is not necessary to add further condensers
across the loud-speaker.

TONE VARIATION.

If you want a *lower* tone you can easily
connect a condenser across the two anodes,
and if you use a different loud-speaker or
different coupling transformer this may be
necessary, but you will have to find this
out for yourself by test.

The diagram shows a resistance between
the grid terminal of the low-frequency
transformer and the grid of the driver valve.
This is to stop high-frequency currents
from reaching the valve. The other two

is so essential for truly economical working,
and a class-B stage.

These, chiefly, give us the volume and
the quality, and really both are entirely
satisfactory and with a comfortable margin
to spare, I thought, for those occasions
when very loud results are needed.

The class-B valve has, of course, a driver
valve associated with it, and as I have
explained before, you must look upon these
two valves as being chiefly concerned in
giving us power.

You provide the grid circuit of the driver
valve with 3 volts bias, and when this
value of signal strength is applied, the
output power and the volume is consider-
able for a battery-driven set. Regarded
from the point of view of the amount of
low-frequency amplification, we must
remember that the driver transformer has
not a step-up ratio of three or four times
like ordinary low-frequency transformers.
Instead of this there is a step-down,

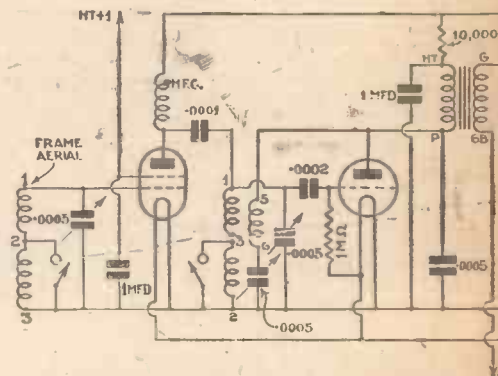
THE chief points considered when this
self-contained set was designed were
that the quality must be good, the
volume adequate for the purpose without
forcing and the sensitivity good enough to
provide a fair number of stations.

I have made the set as compact as
possible and the number of controls is
reduced to the minimum. There is a
permanent-magnet moving-coil loud-
speaker, a large high-tension battery, which

This is the receiver portion which is compactly
arranged to fit in the upper part of the case



with special low-resistance windings.
In the circuit diagram are shown .005-
fixed condensers across the secondary
windings. These definitely stop spurious
oscillations in the class-B stage. They also



The circuit is of a straightforward character
driver and class-B with a number of r

valves in the set are the detector and the
screen-grid. A de-coupled transformer
stage is used. The de-coupling, consisting
of the usual resistance and 1-microfarad
condenser, is necessary for the purpose of
avoiding instability, particularly when the
battery has developed a relatively high
internal resistance. There is also a high-
frequency by-pass in this circuit, a .0005-
microfarad condenser connected from the
anode to the negative. This condenser
does very useful work.

Across this circuit is also the reaction
coil and adjustable condenser, providing
reaction in the tuned grid circuit. There
is a screened choke in the anode circuit
of the screen-grid valve and a small
coupling condenser.

The coil itself is screened, but is not
fitted with a wavelength switch. This
switch is fitted to the panel and is wired
to the coil and the frame aerial, so that
the one switch acts in both circuits. The

PORTABLE

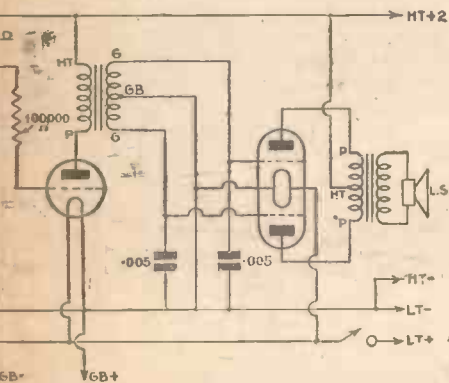
portable, equally suitable for compact, of moderate weight, volume with good quality

circuit is really a normal one with attention paid to details. There is a two-gang tuning condenser of the type having an external trimmer, as it is not too easy accurately to adjust the inductive value of a frame aerial to match that of the coil.

This tuning condenser is mounted on the extreme right-hand side of the baseboard, looking at the front of the set, and on the left is the reaction condenser. In the centre are the battery switch and the wavelength range switch.

SIMPLE TO BUILD

There is always more work in a self-contained set than an ordinary type;



and comprises screen-grid H.F., detector, refinements which ensure good quality

because the frame aerial must be wound and the loud-speaker fitted. The first job is to take out the framework from inside the case; this is left loose by the makers. You will also find a baseboard with two strips of wood for supports, and a board for fitting the loud-speaker and two fixing pieces.

First fit the loud-speaker to its board. Cut a circular hole in it and screw the loud-speaker to it with the transformer on the right. Then place this in position and note that the high-tension battery just fits in place at the bottom of the framework. I screwed a piece of wood along the bottom to stop the battery from resting upon the framework of the loud-speaker if the set is tilted forward.

You can fasten the loud-speaker board against the front by placing it in position and then fitting the two strips of wood. These are screwed through the side, and it is as well to do this work carefully as

you do not want any looseness later on.

As the speaker is raised a little, in order to allow room

for a relatively large high-tension battery, it is necessary to cut a piece away from the front of the base-board. You can

reaction condensers, and the wood underneath might be stained.

The next part to fit is the driver transformer which is underneath the baseboard. Mark its position carefully, so that the baseboard will slide into its place without the transformer hitting the loud-speaker.

The rest of the work is easy. It might be as well to start winding the frame aerial. This is in two sections, the long and the medium, and is wound round the framework. Do not wind direct over the wood, however, but fit a piece of oiled silk or similar material across the four corners.

Put in a screw near the beginning of the winding and also fit a small ebonite block with three tags or small screws in the centre at the top of the framework. Afterwards wires will be taken from two screws to the switch and set. The medium wavelength winding is the one at the back edge of the set, and the turns are wound



easily saw this away and test it for fit. Afterwards the pair of supports for the baseboard can be screwed to the sides of the framework, but you must be careful that the position is correct so as to allow room for the valves.

For this reason the holder for the screen-grid valve is fitted below the baseboard. It is necessary to be careful with the escutcheon and the other parts, so measure the positions carefully before cutting the front. A piece of the moulding is removed for the knobs of the tuning and the



The upper photograph shows another view of the receiver, whilst the one immediately above shows how it is accommodated in the case

"YOUR HOLIDAY PORTABLE"— (Continued from preceding page)

with slight spacing. Then the long wavelength winding is wound at the front of the framework, as shown in the illustration.

These two windings should be carefully wound, with the wires tight and all in the same direction. The start of the medium wavelength has a piece of systoflex over it and is twisted round the screw to hold it. There should be a hole here for the wire to pass through, as it will afterwards have to be joined to a piece of flex coming from the tuning condenser.

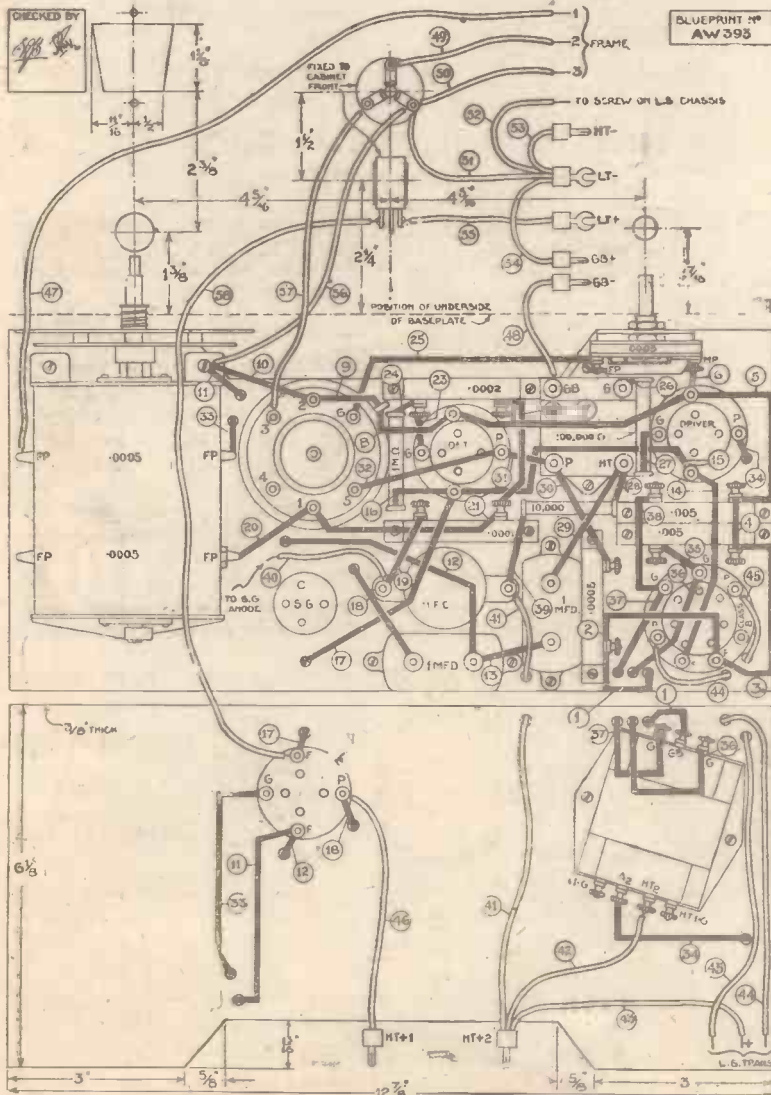
Take the end of this winding to the first tag or screw in the ebonite block at the top of the framework. The start of the long wavelength winding is also taken to this contact block and later on the finish is connected to a tag or the block as well. Afterwards, join a wire to the junction of the medium and long wavelength windings and take this through a hole in the wave-change switch. Take also another wire from the end of the long wavelength coil to the switch.

The hardest part of building the set is now finished, because the receiver proper is easy. It is only necessary first to cover

THE COMPONENTS YOU WILL NEED FOR THE CLASS-B PORTABLE

- CABINET**
1—Camco "Carrier," complete with baseboard.
- CHOKES, HIGH-FREQUENCY**
1—Kinva screened (Wearite, Bulgin).
- COILS**
1—Lissen dual-range shielded with reaction winding (Goltone, Colvera).
- CONDENSERS, FIXED**
5—Lissen small, of the following capacities: .0002, .0001, .0005, two .005.
2—1-mfd. Dubilier type B (Lissen, T.C.C., Telsen, British Radiophone).
- CONDENSERS, VARIABLE**
1—British Radiophone .0005-mfd. two-gang with panel-operated trimmer (J.B., Utility, Polar).
1—Graham Parish .0005-mfd. reaction type (Lissen, Polar, Telsen, J.B., Ormond, Magnum).
- VALVE HOLDERS**
1—W.B. four-pin for sub-baseboard mounting.
2—W.B. four-pin (Clix, Telsen, Lissen, Benjamin, Junit).
1—W.B. seven-pin (Wearite, Benjamin, Ferranti).
- PLUGS AND TERMINALS**
5—Wander plugs, marked: H.T.—, H.T.+1, H.T.+2, G.B.—, G.B.— (Belling-Lee, Clix, Ealex).
2—Spade terminals, marked L.T.—, L.T.— (Belling-Lee, Clix, Ealex).
- RESISTANCES, FIXED**
1—Dubilier 10,000-ohm (Erie, Claude Lyons, Lissen).

- 1—Dubilier 100,000-ohm (Erie, Claude Lyons, Lissen).
1—Dubilier 1-megohm (Erie, Claude Lyons, Lissen).
- SUNDRIES**
Aluminium bracket for reaction condenser (Peto-Scott).
Connecting wire and sleeving (Lewcos).
Three yards thin flex (Lewcos).
Frame aerial wire (Lewcos enamelled 20 and 30 gauge).
Frame aerial fixing strip (Peto-Scott).
- SWITCHES**
1—Bulgin Junior three-point shorting switch (Lissen, Telsen, Wearite, Goltone).
1—Bulgin toggle on-off (Igranic, Utility, Ormond, Claude Lyons, British Radiophone).
- TRANSFORMERS**
1—Varley Niclet (Lissen, Telsen, Lewcos, Multitone, R.I., Ferranti).
1—Class B R.I. Drivermu (Multitone, Benjamin, Varley, Igranic, Ferranti).
- ACCESSORIES**
1—120-volt Lissen H.T. battery (Ediswan, Marconi, Ever-Ready, Pertrix).
1—9-volt Lissen grid-bias battery (Ediswan, Marconi, Ever-Ready, Pertrix).
1—2-volt Exide unspillable accumulator.
1—W.B. moving-coil loud-speaker with matching transformer for class-B valve type PM5 (Ormond, Rola, Magnavox, Amplion).



The layout and wiring diagram of the receiver portion of the Holiday Portable. Details of the case and speaker will be given next week. A full-size blueprint of the entire receiver is available, price 1/6

the baseboard with metal foil and then to place all the parts in position as shown in the layout diagrams. A full-size blueprint, which can be obtained from AMATEUR WIRELESS, Fetter Lane, London, E.C.2 (price 1s. 6d., post free), will make the construction of the set easier.

You will find that while there is no waste space, there is room for all parts with a little to spare. But put all the parts in their place before screwing any down. Afterwards drill the few holes for connecting wires, and be sure the screws on the valve holders clear the base. With the screen-grid valve holder fitted beneath the baseboard and also the transformer, there are several wires, the positions of which are clearly shown in the diagram. The wiring and operation will be explained next week.

"INSTALLING RADIO IN YOUR CAR"

(Continued from page 4)

We fitted the radio set box under the bonnet by screwing the case to the woodwork of the dash behind the engine. You can see this from the photograph.

The aerial fitting is easy in this sort of car. You can use Harbro single cable, available in various colours, tacked under the roof over the beading, and held down with coloured studs to match the interior upholstery, so that you would hardly notice anything extra. Or you can make a sub-running-board aerial, as for the small car.

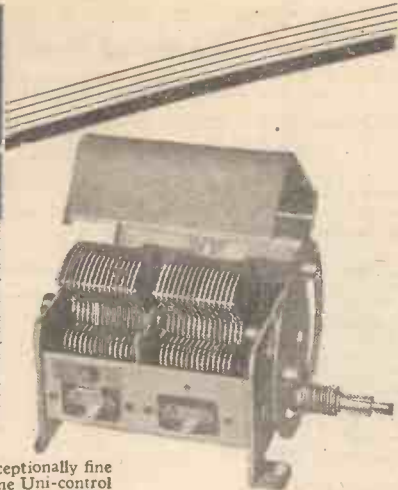
In many cars, possibly in most to-day, there is a layer of chicken wire between the inside fabric and the outside coachwork, which really does seem like the answer to the maiden's prayer because it makes an excellent car aerial. Make a connection to one corner by pulling away a small piece of the fabric and there you are! Some cars are all-metal construction. Then an inside aerial will not be so hot, as the Yanks would say! So try a running-board aerial.

We assume you are going to use batteries for your saloon-car radio. The same battery box can be used as specified for the two-seater, fitted beside the accumulator or on the other side of the car's shaft.

We have talked a lot about the installation of car radio and we hope you realise now how easy it all is. Next week we shall deal with a very simple four-valve using Catkin valves, bristling with stunts, but, quite frankly, not the last word by any means in car radio. Later, we'll give you a "pukka" job if you ask for it, but meanwhile we think the set to be described will give you something to think about—and possibly to criticise!

The Experimenters

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**"JAMES
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Don't Forget to Say That You Saw it in "A.W."

OUR BROADCAST CRITIC

DO not suppose that you have heard the new B.B.C. organ to advantage. You have not. There is only one man at present who could have given you a good idea of it. He is one of Compton's own men, and the only one who really knows how to handle it. The three who played were handicapped by lack of practice on this instrument. This is to be regarded sympathetically, of course, but you must be content to wait for a little until (1) Mr. Berkeley Mason or someone has had a chance of learning his way about the instrument, and (2) the completion of the second console to be placed in a studio so that the organist does not hear the organ *except through a loud-speaker*. So you must be patient.

The formal opening, however, went off fairly well. Sir Walter Alcock was the first player. He began by an unfortunate choice of a Bach choral prelude which showed nothing of the instrument. He continued with what might have been a thrill, had he played it up to speed and with some good diapason tone.

Thalben-Ball spoilt his chances in his first work by playing Parry's rather stupid choral prelude on the tune of "Abide with Me." The Fantasia and Fugue by Liszt certainly gave us some idea of the capacity of the organ, but it is a showy effusion at the best. I was disappointed when I saw it down in the programme.

G. D. Cunningham, the third organist, was the most fortunate because he played with the orchestra. The Handel Concerto is a favourite with everybody, and very easy to play. He managed to find some attractive stops for his solo part, the concert flute on the solo organ being one. That is a beautifully-toned stop.

As a whole, the triple recital was disappointing chiefly because the wrong music was played. The other point of criticism I offer is that all three players I thought guilty of too much *staccato*. Because this modern electric action is so responsive is no reason why organists should get caught by it and forget that good organ playing is *smooth*, not detached. In my opinion Sir Walter Alcock spoilt the Great D Major by *staccato* playing; the same thing applied to Mr. Cunningham in the concerto, though I should add, in fairness, that his improvised cadenza was musically. We shall find that little defects will disappear as soon as organists have accustomed themselves to the difficulties of what is really a very beautiful instrument.

Irene Scharrer played exquisitely in the Schumann Concerto. I never heard her



HERBERT HEYNER

play with such restraint before. I was delighted with the slow movement.

I am sure everybody was glad to hear the announcer say that Sir Henry Wood is making such a fine recovery from his recent illness. Dr. Boulton took his place in the Sunday evening symphony concert.

The Foundations of Music, on the other hand, have been "the goods." I admired George Parker's interpretations of Bach and I have always liked his voice.

Of course, you heard Duke Ellington? Is his *really* a famous orchestra? I suppose it is as everybody says so, but I must admit I cannot see anything outstanding except the harsh and unpleasant tone of some of the instruments. I was faintly amused by some of the extravagances, but otherwise I did not think there need have been so much fuss made about it.

If you liked "the Duke" I suppose you would like Phyllis Clare and her Three Boys. Some of my young friends led me to expect something wonderful. Perhaps that was why I was disappointed.

The Watched Pot I heard in bits—one slice one night and part of the remainder the other. Thus it is a little difficult to judge it fairly. Most of the criticisms I read of it said it was a bad play. I did not think that.

PROGRAMME POINTERS

Now that the new organ is opened I make the suggestion that Mr. Taylor, of the John Compton Organ Company, be asked to give a short recital of the stops of the organ, if I can express it in that way. He is the only man who knows anything about the instrument, really and truly, and I think listeners would appreciate a little talk by him at the console. If he explained half what he explained to me one morning this week he would give a very fascinating talk. It will be months before this organ will be heard to anything like advantage by ordinary recitalists. Why not give listeners a chance of hearing the various stops separately? Also the various electrical devices. Readers of this journal would appreciate it, for the simple reason that they are all technically-minded themselves. Can it be arranged fairly soon?

Dora Gregory in "Mrs. Adams Amongst the Mannequins" was faintly amusing, but no more, I fear.

Claude Gardner as the "Lightheaded-weight Champion of the World" said one funny thing, but unfortunately I have forgotten what it was.

Harry Tate failed to make his famous stage scene "Motoring" amusing by wireless. I was disappointed because I enjoyed seeing it on the stage so much years ago. It may not have been his fault. When he first did it, cars were always breaking down, but somehow he does not appear to have succeeded in bringing it up to date.

Melville Gideon always attracts me. I did not like his songs and I was not really pleased by his voice, but he has a personality. *And that counts.*

Laelia Finneburg's voice pleased me very much. I liked the easy way in which she delivered her Mozart. Not the slightest strain or force. We can do with more of her.

I was sorry I had to switch off Franz Osborn, whom I only heard for a few moments, but the noise made by the lightning in my loud-speaker was beyond a joke. What I heard of his playing of Mussorgsky appealed to me as being tonally good and very well phrased. A very pianistic pianist!

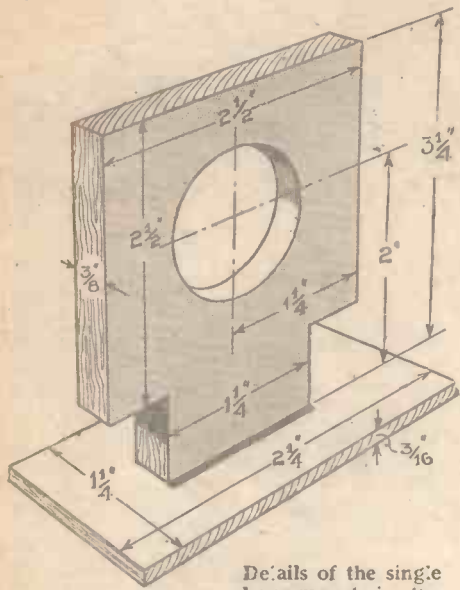
Herbert Heyner's splendid singing of Five Mystical Songs, arranged for piano and string quartet by the composer (Vaughan Williams) should have won approbation from the more serious-minded listeners. There is some beautiful writing in those songs.

I am getting to look upon Ashley Sterne as a first-rate light-music composer. I thought his music to "How's that, Umpire?" very attractive. Thus far he has carefully avoided anything in the nature of jazz or syncopations. Not that there is anything objectionable in these forms of light music, but we have so many at it that (from my point of view) it is refreshing to meet a composer disinclined for this kind of expression of musical feeling.

There was an attractive chamber-music concert, with Mendelssohn and Beethoven, by the Spencer Dyke Quartet this week. I enjoyed it immensely. Their ensemble was very satisfying.

WHITAKER-WILSON.

"A HOME-BUILT TELEVISION RECEIVER" (Continued from page 11)

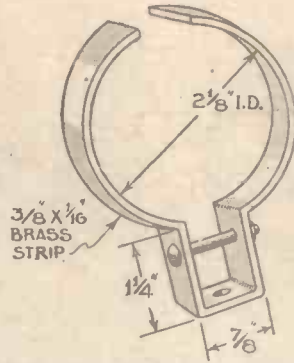


Details of the single lens mount in the baseboard slide

a slide gap of $\frac{1}{16}$ in., and the top strip on each slide overlaps by $\frac{1}{8}$ in. so that the various holders are prevented from falling over.

The circular clip made up from strip brass, details of which are shown by one of the little sketches, is for mounting on the adjustable support, illustrated on page 876 last week.

The clip should be of the correct size to hold the diffusing lens firmly. Adjustment is provided by the two-section arms. In addition, there is a light shield around this diffusing lens which in some cases is essential. There



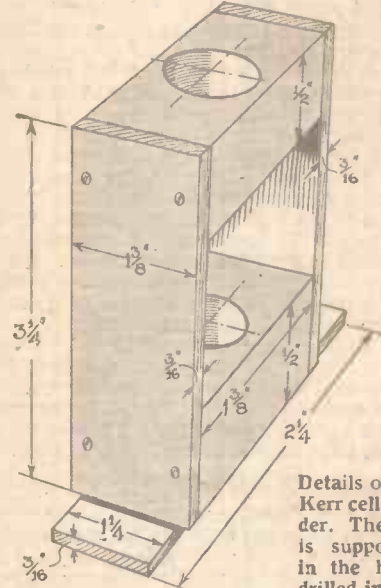
This is the clip made from brass strip which supports the lens projecting the light beam on to the drum

is, of course, a light shield—a strip of metal measuring 4 in. by $2\frac{1}{4}$ in., with a $\frac{1}{2}$ -in. flange attached to the side of the motor support.

The optical scheme of the television receiver is really very simple. The object of setting the mirror drum and diffusing lens at an angle—the light beam being thrown back on to the drum—is to save space. The light beam from the drum is projected down a "trumpet" at the end of which is the glass screen.

The photograph on page 11 shows the details of the Kerr cell and Nicol prism mountings, the holders being in their correct positions for reception on the television outfit illustrated.

Next week details will be given of the home-made Kerr cell and a schematic layout will be shown of the television receiver connected to suitable radio receiver and amplifier gear.



Details of the Kerr cell holder. The cell is supported in the holes drilled in the

two pieces of wood measuring $1\frac{1}{2}$ in. by $\frac{1}{4}$ in.

IRON DUST-CORE COILS

SIR,—The universal application of dust-core radio-frequency inductances seems to call for standardised representation.

In the development of Nucleon tuning coils I have found it convenient to utilise a symbol consisting of a broken or dotted line instead of the usual full line normally used for an iron-core coil.

I am suggesting that this convention be adopted, and I believe a number of radio workers are already utilising my suggestion.

The use of a broken line is actually symbolical of the exact nature of the core and it therefore appears to be a very appropriate symbol. As inductances with ordinary iron cores are frequently shunted by variable or fixed condensers, and as both dust-core and air-core coils are used together, the need for differentiation seems to be very desirable.

It is to be hoped that the suggested symbol will be recognised by the standardisation committees to whom the suggestion is being communicated.

Paul D. Tyers (Watford).

THE "GENERAL-PURPOSE PORTABLE"

SIR,—I wonder if any readers could let me know the results of their tests with the "General-purpose Portable"?

I have been a reader for a long time and none of your sets has yet let me down.

This is the first portable I am thinking about making, so will be pleased if any readers can help me out.

M. Ratliff (127 Elmhurst Mansions, Edgeley Road, Clapham, S.W.4).

OUR EXPERIMENTAL ARTICLES

SIR,—Although I follow with great interest your new feature dealing with experimental work, I wonder you don't print blueprints for the various circuits published. I am

WHAT OUR READERS THINK

The Editor does not necessarily agree with the views expressed by readers and does not accept responsibility for the letters published. Letters cannot be published which do not bear sender's full name and address.

unable to follow theoretical diagrams but would like to take advantage of the new ideas suggested by your contributors.

H. A. C. (Liverpool).

[ED. NOTE.—The "Up-to-date Experimenter" articles are intended for our more advanced readers, and that is why blueprints are not given. From time to time, though, the ideas mentioned by these contributors, who deal with "hot" technical developments whenever they occur, are embodied in the regular blueprint circuits. We should, perhaps, emphasise that blueprints cannot be supplied on any account for the experimental circuits discussed in this feature.]

ARE AERIALS DANGEROUS?

SIR,—I have read with some concern the recent accounts of houses fitted with wireless aerials being struck by lightning. I personally am equipped with a lightning switch, which earths my aerial lead-in wire when the set is not in action. Is this sufficient protection or do you support the contention that if the aerial is going to be struck no ordinary precaution will avail?

R. E. W. (St. Neots).

[ED. NOTE.—We consider that an aerial earthed outside the house—that is with the switch mounted on the wall so that there is a direct path to earth without entry into the house—is the sanest precaution against

lightning, but we would stress the point that, so far as is known, aerials do not materially add to the risk of a house being struck by lightning.]

FOR CLASS B

A novel class-B converter has just been brought out by the Multitone Electric Co., Ltd. This can be plugged into any battery set using 2-volt valves and raises the undistorted output from the usual low battery output of about 150 milliwatts to the full normal class-B output of between 1 and 2 watts at 120 volts, depending on the valve used. At the same time the converter considerably increases the sensitivity of the set. It is plugged into the output stage of a battery set and is then switched on and off with the main circuit, there being no separate switch or terminals. The price of the Multitone converter is 37s. 6d., without the valve, and full details may be obtained free on mention of "A.W." from the Multitone Electric Co., Ltd., 95 White Lion Street, London, N.1.

HIGH-VOLTAGE MAINS VALVES

Another revolutionary valve has been added to the Ostar-Ganz range of high-voltage mains valves. It is known as the D130. Like their other types, it works direct from either A.C. or D.C. supply without the use of transformers or cut-down resistances. The D130 can be used as H.F. detector, L.F. or as a last-stage amplifier without any alteration in high-voltage circuits and only slight alteration in others. It can also be used in place of any S.G. valve with excellent results. The D130 gives great increase in volume, considerably increases selectivity and reduces mains interference.

Full details can be obtained from Messrs. Eugene Forbat, -28-9 Southampton Street, Strand, W.C.2.

More About W. JAMES'S MOST MODERN SET

Full constructional details of this receiver were given last week. Here are some notes on its adjustment and operation.

THE most important adjustments to be made in a set of this description are those to the tuning circuits.

This is true in any gang-tuning set, but is, if anything, more important than ever when the tuning coils have such low losses as those used in this set. The separate coils tune much more sharply than the usual canned tuning coils. Consequently, the three circuits together give very much sharper tuning.

But to get the full advantage of the possibilities in this direction, it is necessary very carefully to gang the tuning circuits. We can assume that the coils are themselves accurate and that the sections of the gang tuning condenser are also well matched.

It is, then, only necessary to make the sum of the fixed capacities in each circuit of equal value and the tuning will be correct. The stray capacities are composed of the capacities of the valves, holders, wiring, the aerial and so on, and each condenser has a trimmer.

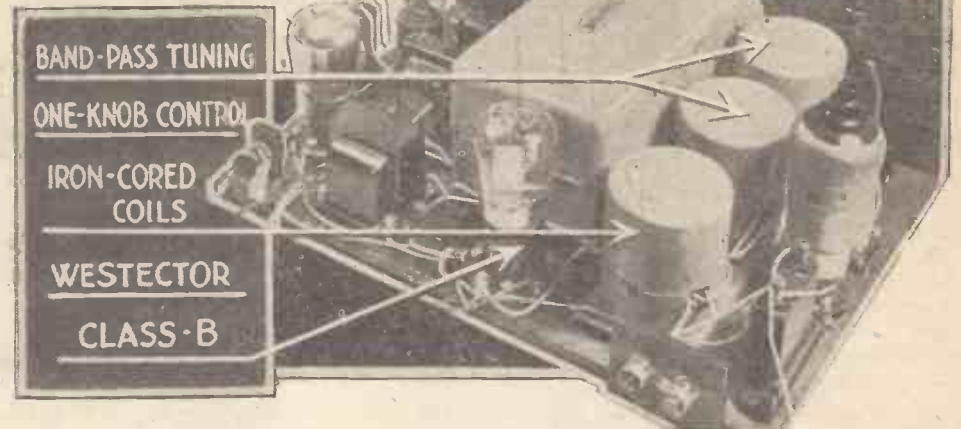
Ganging

We can, therefore, adjust the trimmers in order to make the total of the fixed capacities in each circuit alike. Now, it will be clear that we can balance the circuits with the trimmers set as near their maximum as possible or with them adjusted about their minimums.

It is important to note the effect of balancing in the two ways, for in one case the minimum capacity of the tuned circuits, that is with the tuning condenser set at zero, will be higher than in the other. It might be found, for example, that the lowest wavelength in one case was 240 metres and in the other case 200 metres. In both instances the set would be properly ganged, but it would be possible to go over the trimming of the former set (minimum wavelength, 240 metres) and by reducing the capacity of each trimmer to maintain the correct tuning but to lower the minimum wavelength.

The point I want to bring out is that it is possible to gang correctly so far as accurate tuning is concerned, but yet not to make the most of the tuning range. It is, therefore, desirable to use the least possible capacity in all the trimmers for then the circuits will tune accurately and the set will tune down to the lowest possible wavelength.

There is another point to be noticed, however, and it is that if you change a valve you will have to re-gang in all probability. Thus if the capacity in a circuit with the tuning condenser set at zero is only 30 micro-micro-



farads and in another case is, say 60, it is clear that an addition of 2 micro-microfarads to one circuit as the result of changing a valve will have more effect in one case than the other.

But apart from this feature, it is definitely desirable to gang using the smallest capacities in the trimming condensers. I always prefer to use a milliammeter. One can be connected in the anode circuit of the first low-frequency valve and the biggest change in its reading is produced by the strongest signal. The local station should, therefore, be tuned in first and the trimmers be roughly adjusted.

How to Tune the Set

If you turn the knob of the tuning condenser very slowly about the tuning point you will get an idea of how the set tunes. If, for example, the needle moved back quickly, held the reading for a part of a degree over the tuning scale and then moved back quickly, the set would be tuning sharply and have a band-pass characteristic.

If, on the other hand, the needle of the meter moved back, then forward and then back again before returning to its original position as the station was tuned through, there would be double-hump tuning. It is always advisable to test the ganging near the bottom of the tuning range on a distant station and when the necessary adjustments have been made, to test once more near the top of the range.

The reaction will help to bring up the strength of the weaker stations and to act as a volume control. Adjust the voltage to the

screen of the screen-grid valve as carefully as possible. As it is increased the anode current passed by the valve will go up, so do not use more than necessary.

A further point is the bias applied to the driver valve. This must be as much as possible. Do not, of course, spoil the quality by using too much bias, but keep the anode current passed by this valve as small as possible consistent with good quality.

I have noticed one or two samples of class-B valves which have passed a rather large "no signal" current. About 3 milliamperes should be the maximum and if it should be more the valve is a poor one. No doubt it could be changed.

Always use a decent dry battery with a set of this sort and not one of low capacity; as trouble and expense will be saved. A good mains unit may be used if desired, but a poor one will not give those momentary large peaks of current which are so essential for good quality.

A mains unit having poor regulation and small smoothing condensers is almost bound to give poor results. In a set of this sort the chief points are the ganging and the adjustment of the valves. Correct ganging will mean that the maximum selectivity and sensitivity are being obtained.

The range of this set is really remarkable. It gives considerable volume and is selective and easy to operate. This set is really up to date in all respects and should meet the needs of those who want a receiver giving a large number of stations and really good quality. It is worth a good moving-coil loud-speaker.

HERE is a letter from a reader whose problem may perhaps be yours. This is what he says:—

"Two or three years ago I built one of your sets which still performs perfectly. Down in this part of the country, where we have no powerful station near by, the selectivity is quite good enough for our requirements, although I admit that it does not compare in efficiency and selectivity with your more recent designs which I have heard. All the same, it suits us for general programme reception, particularly since I fitted some modern valves. My only worry is that it looks old-fashioned. Can I do something about it, as at the moment I do not want to build a new receiver?"

I have had more than one letter of this

GIVE YOUR SET A MODERN LOOK!

SIMPLE CHANGES THAT ALL CAN MAKE

By PERCY W. HARRIS

kind recently, so in dealing with this particular case I may be able to help a number of other readers. Fortunately it is comparatively simple to do what our friend asks.

When he says that his set "looks old-fashioned" he is, of course, referring only to the exterior appearance, comprising the cabinet, panel, and visible controls. Practically all sets at the time the particular example we are discussing was built, were made in what

was then termed the American cabinet, and this one had a panel 14 in. by 7 in. with a baseboard 10 in. deep. The cabinet itself was generally of the simplest kind, in either oak or mahogany with a top lid and a slot at the back for the terminals. The panel was invariably ebonite and as the surface of even the best ebonite deteriorates on exposure to sunlight, the set is rather "dated." The dials and knobs, too, are rather old-fashioned, as I see from the photographs of the original set, and the speaker, in common with all sets of the day, was a separate item connected to the receiver by flexible leads.

It so happens that the speaker used by this reader is of the home-constructed variety, using a balanced armature unit and an inexpensive case. I recommend him to follow the

(Continued at foot of next page)

OUR SELF-BINDER



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to form a volume whether he will keep the issues so bound and buy another case for the ensuing issues or whether he will detach the copies and pack them away and start all over again with the same case to accommodate the next twenty-six copies issued. For ourselves, though, we strongly recommend a new case every time, as the convenient preservation of the bound-up copies is so marked as to well repay the slight expense of the new case.

"Amateur Wireless" volumes run from the first issue in January to the last issue in June, and from the first issue in July to the last issue in December. Readers when applying to us for the self-binding case should say whether they want it for binding the last twenty-six copies issued or whether they are now starting to bind their copies week by week as published.

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We ourselves are adopting them for use in the office and in the home. Each case will contain twenty-six issues and with its embossed gold lettering will have the appearance, when standing on the bookshelf, of a book bound in first-class style as will be gathered from the accompanying illustrations.

The reader can please himself after having built up the twenty-six issues

"GIVE YOUR SET A MODERN LOOK"
(Continued from preceding page)

modern convention and put both speaker and set into one cabinet. Excellent and inexpensive cabinets to take both set and speaker are obtainable from a number of firms, and if his set is slid from its original case, it can be slipped into the top of the new case just as it is, for many cabinets are available to take this size of panel. The speaker can then be removed from the original cabinet and placed behind the grill of the new one while the batteries, which at present stand on the floor can be tucked away neatly behind the speaker, making a complete self-contained set.

This change, which can be made in an evening with the greatest of ease, will do much to modernise the receiver. I would also suggest

two other changes be made at comparatively small expense, both of which will do much to enhance appearance. The first is to discard the ebonite panel; replacing it by a wood one ordered at the same time as the cabinet from the cabinet maker to match the particular wood used: the other is to buy a couple of new slow-motion dials as well as new knobs for the reaction and wave-change. If these knobs are bought at the same time as the slow-motion dials it should be possible to find a pair which will match those used on the slow-motion dials and give a sense of unity. The small ebonite knob of the on-off switch will not need to be changed.

It is not so much trouble as it sounds to change a panel from ebonite to wood, for if you demount the parts from the ebonite you will

find that you can use the old panel as a drilling guide for the new one. With care it may not be even necessary to disturb the wiring, but if you have to move one or two of the connections they can be easily replaced again.

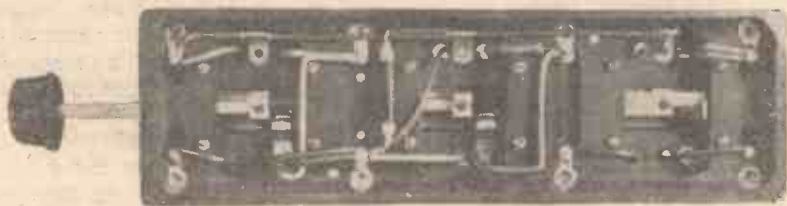
Notice one thing in particular. In most of the new cabinets the set complete with panel slides in from behind and wood beading conceals the edge of the panel. Be sure when choosing your design of cabinet that the controls on your panel will not foul any of the beading, particularly in sets which have a specially shaped opening. If the wood panel is much thinner than the old ebonite one you may need a few spacing washers to make up for the thickness when securing components to the panel. These washers are obtainable from any wireless dealer for a few pence.

Now, Iron Cores for 9 F. Coils in Super-hets!

Read these interesting advance details of the new Igranicores coils

AMONG radio components that have recently been improved out of all recognition are tuning coils. How vast are these improvements is not yet clear even to some well-versed amateurs. The history of coil design is rather amusing really. Firstly, we had the well-meaning designer who said that only large "jam-pot" coils were any good. He was immediately followed by designers who insisted that for practical set-making small-diameter coils were the only thing. Then came the copper-can craze! Definitely, this last phase pandered to inefficiency. The coils were so heavily damped by solid masses of copper that flat tuning was common. After that gradual improvements in screened coils took place, up to the well-known dual-range coil with its aluminium covers we use to-day.

Now we must get used to the idea of a radical change. We approach the iron-core age! The first thing that strikes anyone about these new coils is the apparent inconsistency with past technique. Why are we definitely introducing metal into the heart of the coil



The underside of the Igranicores band-pass unit contains a grid resistance

when we have already discovered that the proximity of metal to the turns decreases efficiency very much? Let's explain how this new coil works and then you'll understand that there is no inconsistency. If we take as an example an air-cored coil covering the broadcast band, wound on a former of some insulating material, the length of wire is fairly considerable, about sixty turns being needed on a 2-in. former. The losses of that coil are related to the high-frequency resistance of the wire. If we lower the high-frequency resistance in some way obviously the coil efficiency will be increased.

To do this you must reduce the length of the

OFTEN I am asked to explain—if I can!—the enormous discrepancy between the imposing list of stations I frequently record as having received at good strength and the indifferent results obtained by the average reader.

Quite bluntly, I must tell you that the average short-wave set is hopelessly inefficient. I always thought I had an efficient short-wave set until I examined the Post Office standard equipment for its world-wide radio-telephone service.

On such commercial sets it is not a question of whether any given station can be obtained, but rather of adjusting the volume to give the right "telephone" strength. Such stations as Tokio come through the Post Office sets loudly enough to fill the whole building and should they wish to pick up a large liner in, say, South American waters, they can easily get it by tuning to the right wavelength for that period of the day. The result is almost a foregone conclusion!

It follows that these out-of-the-way stations

wire. Perhaps that's not all the story, as you could use a heavier gauge of wire, for example, which would help to reduce the resistance, but the main thing is to reduce the amount of wire.

We all know that a coil has inductance and capacity. If we put in an iron core, insert a piece of iron in the centre of the former, the inductance will rise enormously and this will enable us to cut down the number of turns to give the required inductance.

This sounds all very well in theory and you may ask why it was not done years ago! The snag is that ordinary iron is quite unsuitable, in fact the losses at high frequency are colossal, and would more than counteract any gain

through reduction in inductance, in fact the coil would be unworkable.

Just recently various manufacturers have developed a core that has been found

to have negligible losses at high frequency. It is this type of iron core that has revolutionised coil design. All our old ideas must be dumped. The sooner amateurs realise that the sooner will they be able to derive the wonderful advantages offered. It's the biggest advance since the origin of coils, and that's no exaggeration.

This new iron core consists of thousands of small particles of soft iron, each insulated from all the others, bonded together under pressure but insulated by the bonding material one from another. It's an expensive manufacturing process and so the coils will cost more. The extra cost is more than justified by the improved results.

SHORT-WAVE NOTES

By "SHORT-WAVER"

can be heard, but, of course, for real reliability the apparatus is quite complicated. My own set, which is a straight screen-grid four-valver, can pick up the same stations as the Post Office, but, of course, with less strength. I really can get almost any station I want.

Now, if I were to give this set to anyone not really *au fait* with short-wave technique his log of stations would not be very impressive. Watching a friend of mine tune a short-wave set the other day, I realised just what the trouble was; his set was very good indeed and tuned from 14 to 100 metres, but he could not possibly tune in stations by design, all he got being rather in the nature of an accident because he was tuning from the minimum

The new Igranicores coils have been developed on the latest lines, and for the first time we have an intermediate-frequency transformer for super-hets using an iron core. The Igranicores people have realised the vast advantages of the new principle and there is to be a complete range of coils for all needs.

Types Available

The first coil is a standard dual-range aerial coil, type A, tuning from 210 to 510 metres and from 950 to 2,200 metres. This is designed mainly for simple sets and includes a reaction winding.

The second is a coil for inter-valve coupling and can be used for tuned-grid following a high-frequency amplifier valve. Covers a similar wavelength as above.

The third coil is a dual-range band-pass covering a similar wavelength range, and we are specially impressed with the fact that there is a grid resistance included as an integral part of the coil, so that it can never be omitted—even by novices! A genuine 9-kilocycle separation is provided.

The fourth is a short-wave dual-range coil—the very first short-wave tuning coil with the new iron-core system. The tuning range is 14.8 to 27.5 metres and 27.2 to 78 metres, switching being internal.

The fifth is an oscillator coil and the sixth a band-pass intermediate coil, which will be of great value to super-het fans. They are similar to the other coils but they have 10-kilocycle separation instead of 9-kilocycle and the wavelength range is 200 to 550 and 800 to 2,000 metres.

We have done some experiments with high-frequency chokes using ordinary iron as a core to increase the inductance and we foresee that the next development in this new Iron Age is the production of wonderfully efficient high-frequency chokes, which should be very welcome, especially for work with some of the new high-impedance types of valves, such as the high-frequency pentode.

wavelength to the maximum—as he would a broadcast set—a method that is quite useless. The time was the afternoon and as I have so often told you, at this time it is useless trying to tune anything above 25 metres. Far better to concentrate on wavelengths from 25 metres down to the lowest limit and then quite a lot of South American stations, for example, will be heard, with careful tuning.

I pointed out all this to my friend and showed him how to tune, but I used only a very small portion of his tuning scale. Even so, I was able to pick up for him all the scheduled stations—much to his surprise. If this would-be short-wave listener had realised the importance of the right wavelength for any given time, or if he had any means of checking his wavelength, he would have been much more successful.

In the course of the next few weeks "The Experimenters" will give you, firstly, some details of what I consider to be a successful short-wave set—one that can be accurately calibrated.

Sets of the Season

Aerodyne Swift Battery Receiver



HERE for once is a very simple set—simple, that is, in these days of super-hets and other rather elaborate valve sequences. It would be wrong to assume that the day of the simple set is over, as there are still thousands of listeners whose only interest is in the reliable reception of the nearest regional stations. For such relatively easy reception there is no need for a complicated set, and a three-valver with a detector and two low-frequency amplifier stages, such as we find incorporated in this Aerodyne set, are eminently suitable, provided that due care is taken of the aerial-tuning circuit.

GOOD SELECTIVITY

If this circuit is not very carefully designed it will be so unselective that there will be a background of foreign stations when listening to the wanted locals. One very good way of making the aerial-tuning circuit sufficiently selective to ensure clear reception of the locals is to react the detector, and thus decrease the resistance of the aerial tuning circuit to such an extent that a sharp resonance curve is obtained.

If this process is carried too far we shall mutilate the quality of reproduction because the high notes will be attenuated. Fortunately, if two ordinary transformer stages are used any high-note cutting introduced by the sharpness of the aerial tuning will probably be counteracted by the rising characteristic of the low-frequency couplings.

This somewhat theoretical argument is well borne out in practice, at least with the Aerodyne set. I found that the tuning was extremely selective when reaction was fully advanced. So far as I could tell there was no appreciable high-note cutting, and I can assure you that the overall quality on the self-contained moving-iron loud-speaker is definitely satisfactory.

The set is arranged, with the three valves in line, on a shelf at the top of a neat oak cabinet. The controls project through to the front, and consist of three knobs, the centre one working the tuning condenser and also a scale marked from 0 to 180 degrees.

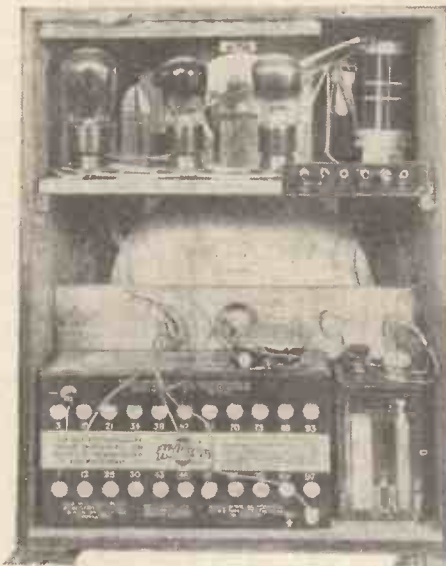
The other two knobs are subsidiary controls, one being for the wave-range switching and battery on-off action, and the other for reaction, which is, of course, capacity controlled.

EASY TO TUNE

Although a certain amount of *finesse* is needed to get the best from the set when tuned to foreign stations, almost anybody, however non-technical they may be, should be able to tune in the local stations without any difficulty. The reaction is very smooth and you can approach the point of oscillation without causing a "plop." This is an essential condition for sensitive reception with a detector low-frequency circuit.

When I measured the total anode current I was pleased to find it was only 5 milliamperes. This means that even a standard-capacity battery, such as the 99-volt unit supplied with the set, will last many months, because for once it is not being over-run. Most standard batteries give their best life when the current does not exceed 6 or 7 milliamperes, so this set treats the battery unusually well.

With a normal outside aerial and earth the circuit behaves splendidly. The two London stations came in at full strength without pushing reaction to the limit. Moreover, I was able to restrict these stations to 10 degrees on the scale, which means that there was no undue local-station swamping, and only two or three stations on each side of the locals' settings were wiped out.



The Aerodyne Three is built upon conventional lines, every care having been taken to make the most of the available space

On the long waves I was able to get Radio Paris at very fair strength, and, what is equally important, it was quite clear of the Daventry National transmission.

SET TESTER.

BRIEF SPECIFICATION

Makers: Aerodyne Radio (Hustler, Simpson & Webb, Ltd.).

Price: 4 guineas complete.

Valve Combination: Detector and two transformer-coupled low-frequency stages, with small power output valve.

Power Supply: Self-contained batteries.

Anode Current: 5 milliamperes.

Type: Self-contained table set for use with external aerial and earth.

Remarks: A very inexpensive battery set giving reliable local-station reception with quite pleasing quality and very economical running.

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BROADCASTING STATIONS

Broadcasting Stations classified in order of wavelengths. For the purpose of better comparison, the power indicated is that of the carrier wave.

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
13.97	21,470	Daventry (GSH)	15.0	269.8	1,112	Bari	20.0	456.6	657	San Sebastian	
16.88	17,770	Daventry (GSG)	15.0	271.5	1,105	Rennes	1.3				(EAJ) 83.5
19.68	15,243	Paris	10.0	273.7	1,096	Turin (Torino)	7.0	459.6	652.7	Beromunster	60.0
19.73	15,200	Konigsbrunn (h's'n)	8.0	276.5	1,085	Heilsberg	60.0	465.8	644	Lyons (PTT)	15.0
19.82	15,140	Daventry (GSF)	15.0	279.9	1,071.4	Bratislava	14.0	472.4	635	Langenberg	60.0
19.84	15,120	Vatican (HVJ)	15.0	281	1,067	Copenhagen	0.75	476	630.2	Simferopol	15.0
25.20	11,905	Paris	10.0	282.2	1,063	Lisbon (CTIAA)	2.0	480	625	North Regional	50.0
25.28	11,865	Daventry (GSE)	20.0	283.6	1,058	Innsbruck	0.5	483	621.1	Ivanovo-	
25.51	11,760	Zeesen (DJD)	8.0	283.6	1,058	Berlin (E)	0.5			Vosnesensk	20.0
25.53	11,750	Daventry (GSD)	20.0	283.6	1,058	Magdeburg	0.5	488.6	614	Prague	120.0
25.63	11,710	Paris	10.0	283.6	1,058	Stettin	0.5	495.8	605	Trondheim	1.2
30.0	10,000	Madrid (EAQ)	20.0	284.3	1,055.2	Radio Lyons	1.0	500.8	599	Florence	20.0
31.25	9,598	Lisbon (CTIAA)	2.0	286	1,049	Montpellier	0.9	501.7	598	Gorky	10.0
31.3	9,585	Daventry (GSC)	20.0	288.3	1,040	Bournemouth	1.0	509	590	Astrakhan (RV35)	10.0
31.38	9,560	Zeesen (DJA)	8.0	288.3	1,040	Scottish National	50.0	509.3	589	Brussels (No. 1)	15.0
31.55	9,510	Daventry (GSB)	20.0	291	1,031	Viipuri	13.0	517	581	Vienna	100.0
31.6	9,494	Poznan (SRI)	0.5	293	1,022	Kosice	2.5	525	572	Riga	15.0
32.26	9,300	Rabat	0.5	293.7	1,021.5	Limoges (PTT)	0.7	532.9	563	Munich	60.0
40.3	7,464	Radio Nations	20.0	296.1	1,013	Hilversum	20.0	540.6	555	Palermo	3.0
45.38	6,611	Moscow	12.0	298.8	1,004	Tallin	11.0	542	554	Sundsvall	10.0
46.6	6,438	Moscow	12.0	301.5	995	North National	50.0	550.5	545	Budapest (1)	18.5
48.2	6,220	Rome (ZRO)	9.0	304.3	986	Bordeaux (PTT)	13.0	559.7	536	Tampere	1.0
49.4	6,073	Skamleback	0.5	306.8	978	Zagreb	0.75	559.7	536	Kaiserslautern	1.5
49.4	6,073	Vienna	0.5	307	977	Falun	0.5	559.7	536	Augsburg	0.3
49.59	6,050	Daventry (GSA)	20.0	308.4	972.6	Vitus (Paris)	1.0	563	533	Wilno	22.3
49.6	6,048	Vienna (UOR2)	2.0	309.9	968	West Regional	50.0	566	530	Hanover	
49.83	6,020	Zeesen (DJC)	10.0	312.8	959	Cracow	2.0	569.2	527	Frelburg	0.2
50.0	6,000	Moscow	20.0	313.9	955.6	Genoa (Genova)	10.0	570.3	526.1	Grenoble (PTT)	2.0
50.26	5,969	Vatican (HVJ)	10.0	315.8	950	Marseilles	1.6	574.7	522	Ljubljana	7.5
58.31	5,145	Prague	0.5	318.8	941	Naples (Napoli)	1.5	583.6	514	Tartu	
202.3	1,483	Liege (Exp)	0.2	318.8	941	Sofia (Rodno Radio)	1.0	719.4	416.6	Moscow (RV2)	20.0
202.7	1,480	Kristinehamn	0.25					743	404	Samara	10.0
205.8	1,458	Seraing	0.2	319.7	936	Dresden	10.0	750	400	Geneva	0.5
208.3	1,440	Liege (Wallonie)	0.3	321.9	932	Goteborg	10.0	770	389	Ostersund	0.6
209.8	1,429	Miskolcz	1.25	325	923	Breslau	60.0	779.2	385	Petrozavodsk	
209.8	1,429	Magyarovar	1.25	328.2	914	Poste Parisien	60.0			(RV29)	20.0
209.8	1,429	Pecs	1.25	331.6	904	Milan (Siziano)	50.0	824	363.6	Sverdlovsk	50.0
211.3	1,420	Newcastle	1.0	335	896	Poznan	2.0	824.2	364	Rostov (Don)	35.0
214.3	1,400	Aberdeen	1.0	338.2	887	Brussels (No. 2)	15.0	833	360.1	Heston Airport	5.0
214.9	1,396	Antwerpen	0.4	341.3	879	Brunn (Brno)	35.0	840	357.1	Budapest (2)	3.0
215.6	1,391	Chatelineau (EL)	3.0	345.2	869	Strasbourg (PTT)	11.5	848.7	353.4	Rostov (RV12)	20.0
217.1	1,382	Brussels	0.25	348.2	861.5	Leningrad (RV70)	10.0	857.1	350	Leningrad	100.0
217.1	1,382	Salzburg	0.5	348.8	860	Barcelona (EA11)	8.0	882	340	Saratov (RV3)	20.0
218	1,373	Plymouth	0.2	352.1	852	Graz	7.0	937.5	320	Kharkov (RV4)	20.0
220	1,363.8	Beziery	0.5	355.9	843	London Regional	50.0	967.7	310	Alma Ata (RV60)	10.0
220.3	1,362	Binche	0.1	358	838	Tiraspol	10.0	986.9	304	Sverdlovsk	60.0
222.3	1,354	Liege (Coince)	0.15	360.6	832	Muhlacker	60.0	1,000	300	Moscow	100.0
223.2	1,344	Swedish Relays	—	363.6	825	Algiers (PTT)	16.0	1,034.5	290	Kiev (RV9)	100.0
224.4	1,337	Cork (6CK)	1.2	365.5	820.7	Bergen	1.0	1,060	283	Schevingen-	
225.9	1,327.3	Fecamp	10.0	367.5	816.2	Bolzano	1.0			Haven	10.0
227.4	1,319	Flensburg	0.5	368.1	815	Fredrikstad	0.7	1,071.4	280	Tiflis (RV7)	100.0
230.6	1,301	Malmo	1.2	368.1	815	Helsinki	13.2	1,083	277	Oslo	60.0
231.3	1,294.6	Kiel	0.25	368.1	815	Seville (EAJ5)	1.5	1,101	272	Moscow Popoff	40.0
235	1,283	Lodz	2.2	370.1	810	Santiago (EAJ4)	0.2	1,107	271	Minsk	35.0
235.5	1,274	Kristiansand	0.5	378.1	810	Radio LL (Paris)	0.8	1,145	262	Monte Ceneri	
236.2	1,270	Bordeaux (S.O.)	3.0	372.2	806	Hamburg	15.5			(tests)	15.0
237.9	1,261	Nimes	1.0	376.4	797	Scottish Regional	50.0	1,153.8	260	Kalundborg	7.0
240.1	1,256	Nurnberg	2.0	381.7	788	Lwow	16.0	1,171.5	256	Taschkent (RV11)	25.0
240.1	1,249.5	Stavanger	0.5	384.6	780	Radio Toulouse	8.0	1,190.5	252	Luxembourg	150.0
242	1,238	Belfast	1.0			(suspended)		1,200	250	Istanbul	5.0
244.1	1,229	Berne	0.5	385	779	Stalino (RV26)	10.0	1,200	250	Reykjavik	16.6
245.9	1,220	Berne	0.5	389.6	770	Leipzig	75.0	1,229.5	244	Boden	10.0
245.9	1,220	Cassel	0.25	395.5	758.5	Eucharist	12.0	1,237	242.5	Vienna (Exp)	3.0
245.9	1,220	Linz	0.5	398.9	752	Midland Regional	25.0	1,266	237	Bakow (I.U.)	35.0
245.9	1,220	Swansea	0.12	399	752	Vladikavkaz	10.0	1,304	230	Moscow (I.U.)	100.0
245.9	1,220	Schneeberg	0.25	403.8	743	Sottens	25.0	1,354.4	221.5	Motala	30.0
247.7	1,211	Trieste	10.0	408.7	734	Katowice	16.0	1,380	217.4	Novosibirsk	
249.5	1,202.4	Juan-les-Pins	1.0	413	725	Athlone	80			(RV6)	100.0
251	1,195.2	Barcelona (EAJ15)	6.0	416.4	720.5	Radio Maroc		1,411.8	212.5	Warsaw	120.0
253.1	1,185	Gleiwitz	5.0			(Rabat)	6.0	1,445.8	207.5	Eiffel Tower	13.5
254.7	1,177.6	Toulouse (PTT)	0.7	419	716	Berlin	1.5	1,481	202.5	Moscow (RV1)	500.0
256.7	1,168	Horby	10.0	424.3	707	Madrid (EAJ7)	3.0	1,538	195	Ankara	7.0
259.3	1,157	Frankfurt-a-M.	17.0	424.3	707	Madrid (Espana)	2.0	1,554.4	193	Daventry (Nat.)	30.0
259.3	1,157	Treves	20	430.4	697	Belgrade	2.8	1,600	187.5	Irkutsk	10.0
261.6	1,147	London National	50.0	435.4	689	Makhatch-Kala	100.0	1,620	185	Norddeich (KVA)	10.0
261.6	1,147	Western (Nat.)	50.0	435.4	689	Stockholm	55.0	1,634.9	183.5	Zeesen	60.0
263.8	1,137	Moravska-Ostrava	11.0	441.2	680	Rome (Roma)	60.0	1,685.3	178	Kharkov	25.0
265.7	1,129	Lille (PTT)	1.3	447.1	671	Paris (PTT)	7.0	1,725	174	Radio Paris	75.0
267.2	1,123	Nyiregyhaza	6.25	449.8	667	Danzig	0.5	1,796	167	Lahti	54.0
267.4	1,121.8	Valencia	6.0	450.3							

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An appropriate item for the time of year will be included in the Light Orchestral Concert from Belfast on July 13, when the orchestra will play the suite by Jolowicz, "A Mediterranean Cruise." The three movements are named Malaga, Naples and Nice.

POSTCARD RADIO LITERATURE

GET THESE CATALOGUES FREE

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

Trix Mains Parts

TRANSFORMERS for valves and metal rectifiers, step-up and step-down transformers, smoothing chokes and filament transformers are dealt with in detail in the latest Trix list. Set makers types with loose-leads suitable for either surface or sub-baseboard wiring are available and also the standard types with terminals. Screened primaries can be supplied if required. **1045**

Blue Spot 29 P.M.

Blue Spot have some interesting new speakers and among these is the 29 P.M., a permanent-magnet chassis having an integral matching transformer. Transformers for Q.P.P. (pentode) working can be supplied at a small extra charge. The 29 P.M. is very sensitive and can handle an undistorted output of 3-watts. A folder available through my Free Catalogue Service describes this speaker and also the oak cabinet model 22 P.M. **1046**

It Simplifies Soldering!

I should imagine that it is almost unnecessary to draw attention to Fluxite, as every handy man knows how useful it is. In fact, Fluxite has become almost a household word. But you may not know that handy Fluxite kits are available which are very helpful in making a thorough job of wiring up your set, with good soldered joints. **1047**

Arden Chargers

Some very inexpensive battery chargers have just been brought out by the Arden Agency. An A.C. trickle charger with a Westinghouse rectifier costs only 11s. 9d. complete, while there is a D.C. charger for 6s. 6d.! Leaflets are obtainable through my Catalogue Service giving details and prices. **1048**

Centralab Volume Controls

Here's a very handy catalogue describing the new Centralab controls. There is already a section devoted to fixed resistances with flexible wire leads for simple connection. In the case of the variable controls, dimension drawings are given so that you can easily see how to fit them in your set. **1049**

OBSERVER.

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

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Contributions are always welcome, will be promptly considered, and if used will be paid for.

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CRYSTAL SET (6d.)

- 1931 Crystal Set AW308
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- B.B.C. One-valver AW387
- Portable Short-wave One AW354

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- Mascot Two (D, Trans) AW353
- Ideal Regional 2 (D, Trans) AW357
- Quality 30s. Two (D, Trans) AW361
- Ether Music Two (D, Trans) AW364
- Clarion-voice 2 (SG, D, Pen) AW371
- Home Station A.C. 2 (D, Pen) AW374
- B.B.C. National Two (D, Trans) AW377
- Melody Ranger Two (D, Trans) AW388
- Screen-grid Two (SG, Trans) WM289
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THREE-VALVE SETS (1s. each)

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- Build As You Learn Three AW366
- Build As You Learn SG 3 (SG, D, Trans) AW372
- James Push-Push Three (SG, D, Q.P.P.) (1/6) AW378
- Everybody's Home Radiogram (SG, D, Trans) AW381
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- Plug-in Short-wave Adaptor AW382
- Voltage Regulator WM287

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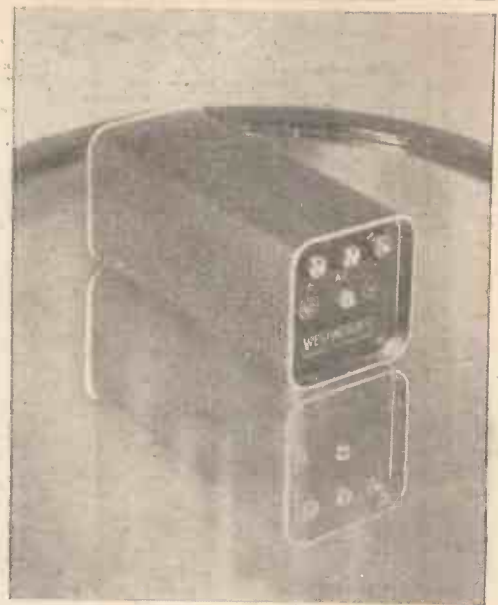
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