CHEAPENING YOUR WIRELESS

ALL ABOUT MAINS UNITS—By W. JAMES

Amateur Wireless

and Radiovision

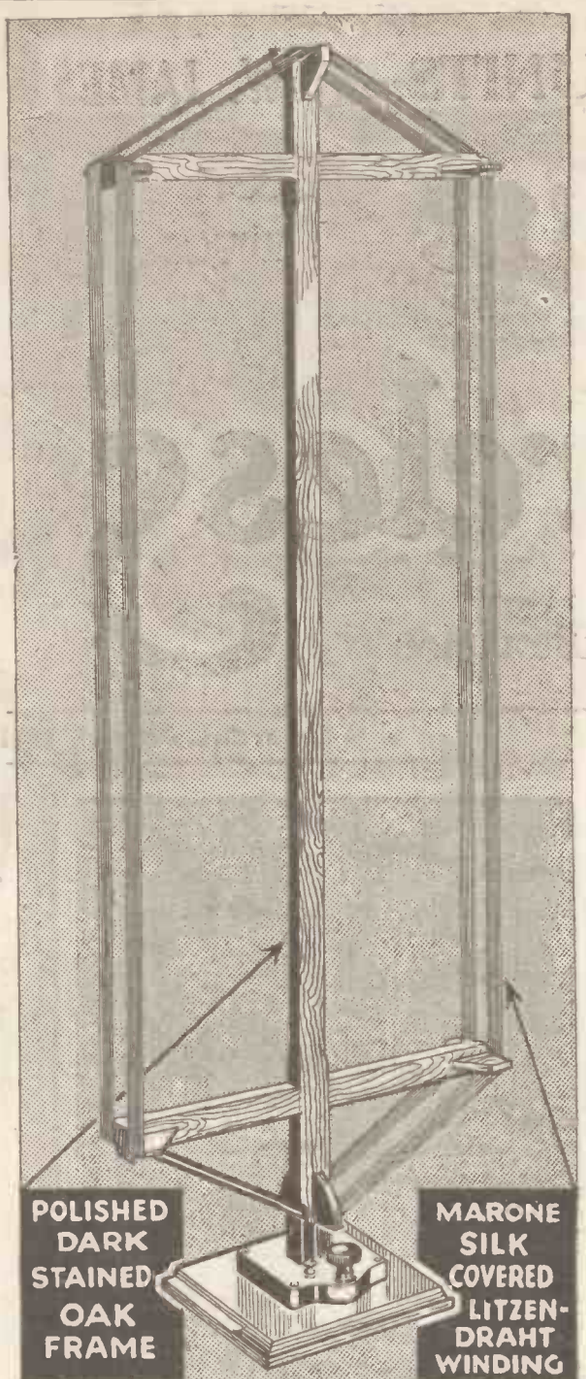
Every Thursday 3d

Vol. XIX. No. 474 Saturday, July 11, 1931

BUILDING & USING The PORTABLE "CENTURY SUPER"

THE 100-STATION SET

Registered at the G.P.O. as a Newspaper



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LEAD THE WAY

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Read what "THERMION" *of* A.W. *says about Frame Aerials*

A QUESTION OF SIZE

By the way, it is best, even with a super-het receiver, not to use too small a frame. A safe rule is to make it as large as possible. Some people go from one extreme to the other. Having got rid of the garden pole, they promptly descend to a 12- or 15-in. frame and expect to get just as many stations on it. After all, the signal pick-up is directly proportional to the area of the windings, and it is asking rather a lot to cut this down to a square foot, a two-foot side giving an effective area of four square feet gives the more distant stations a much better chance, and can hardly be said to be unwieldy for ordinary indoor work.

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Fully descriptive leaflet, Reference R.71.

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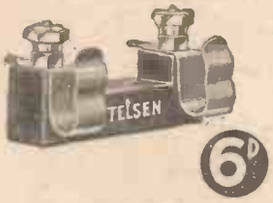

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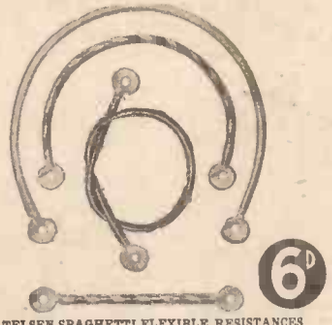

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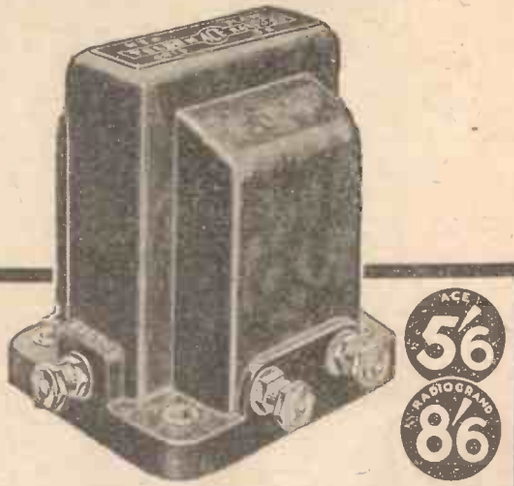

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Filament volts	2.0
Filament current	0.2
Anode volts (max.)	150
Screen volts (max.)	75

S22 mutual conductance 1.75 M.A. per volt—the highest figure ever reached in this class—is ideal for three-valve, portable and similar sets. It provides considerably increased amplification, longer range, greater volume and perfect stability **20/-**

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Impedance	200,000 ohms
Mutual conductance	1.1 MA/volt
Filament volts	2.0
Filament current	0.1
Anode volts (max.)	150
Screen volts (max.)	70

S21 mutual conductance 1.1 M.A. per volt—is designed for multi-stage H.F. amplifiers, including 2 S.G. portables, where a lower stage gain is preferable. Its minute self-capacity ensures perfect stability in combination with highest effective amplification **20/-**

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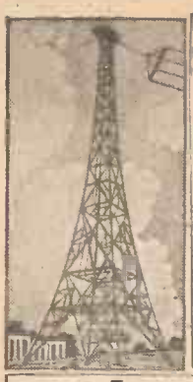
No. 474. Vol. XIX. JULY 11, 1931



Amateur Wireless and Radiovision

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BRITAIN'S LEADING RADIO WEEKLY FOR CONSTRUCTOR, LISTENER & EXPERIMENTER.
RESEARCH CONSULTANT: W. JAMES.
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NEWS · & · GOSSIP · OF THE · WEEK

NORTH NATIONAL

WE hear that on July 12 North National will begin its regular service transmissions on a wavelength of 301 metres. Already the transmitter at Manchester and the relays at Leeds and Bradford are being dismantled. No B.B.C. engineer will be dismissed. A skeleton staff of engineers will be retained for the present at Sheffield, Hull, Stoke, and Liverpool. Possibly, some of these centres may be retained if it is found that the Moorside Edge transmissions inadequately cover the ground.

SHEFFIELD'S CASE

TOWARDS the end of July there will be a meeting between the Chief Engineer of the B.B.C., Mr. Liveing, who is the programme director of North Regional, and Mr. Lloyd, of the Sheffield Town Council. At this meeting the fate of the Sheffield relay will be decided. Between now and the time of the meeting there will be ample opportunity to see whether the transmissions of North National really do render the Sheffield transmissions redundant.

HILVERSUM'S INTERFERENCE

LISTENING to North National the other afternoon, during the test of a set in London, we found it difficult to separate the transmissions of the 301-metre Moorside Edge station from the 298-metre Hilversum transmissions. Although there was no suggestion of heterodyne interference, it would need a very selective set to separate the Dutch station from the North National station.

Fortunately, Hilversum adheres strictly to its frequency, which is only 9 kilocycles above North National. At the B.B.C.'s Tatsfield listening post, slight interference with North National transmissions was noted twice during June. There is a general impression that the transmissions of North National are more likely to give trouble to Hilversum listeners in Holland than are the Dutch transmissions to North National listeners in England.

MORE INTERFERENCE

A SERIOUS source of interference that is now receiving a good deal of the B.B.C.'s attention is that of trolley-buses. It appears that the United Tramways system has recently converted twenty miles of its track to trolley-bus working in place of the former tramway service. After only two weeks of operation of this trolley-bus service the B.B.C. had received twenty letters of complaint.

POST OFFICE HELP

AS a complete extension of the trolley bus system by United Tramways would affect something like a quarter of a million listeners' reception, immediate remedies are being sought by collaboration between the Post Office and the tramway people. Already, an experimental trolley-bus is on the road, fitted with a special induction coil made to Post Office specification. If this successfully cuts out the electrical interference caused by the trolley-bus, no doubt it will be incorporated throughout the system.

TAKING FIELD STRENGTHS

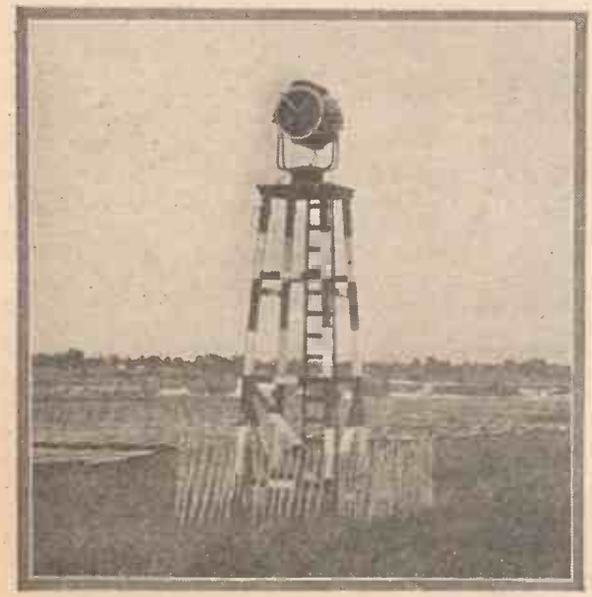
AT the moment, B.B.C. engineers are engaged in measuring the field strengths of North Regional in the vicinity of Newcastle. Similar measurements are being made on the strength of Newcastle around Moorside Edge. The object of these measurements is to prepare the ground for experiments in the autumn, when Newcastle will transmit on the same wavelength as North Regional, namely, 479 metres. It is well known that such a plan is only workable if the ratio of one signal to the other is sufficiently great to overcome the "mush" effect produced by synchronised wavelength working. The area that will be closely watched during the forthcoming experiments will be around the Hartlepools.

WORTH WAITING FOR

SOME readers may remember that very successful "Review of Revues,"

PRINCIPAL CONTENTS

THE SEARCHLIGHT LOUD-SPEAKER



A new type of Marconiphone loud-speaker for public-address work. Speakers of this type were used at the R.A.F. Pageant

NEXT WEEK: A SIMPLE SELF-CONTAINED TWO-VALVER

NEWS · & · GOSSIP · OF THE · WEEK —*Continued*

arranged for broadcasting in March, 1927, by Archie de Bear. At the time, this broadcast revue was voted extremely successful. It is therefore interesting to hear that Mr. De Bear is to take charge of the microphone once more on August 10 and 11. At the time of writing this clever exponent of the song-and-dance type of show is gathering together a strong cast for the proposed broadcast revue.

ON HOLIDAY

THAT tireless producer of broadcast novelties, Gordon McConnell, has been feeling the strain of producing two original shows every month, year in and year out. So he has now gone on a long cruise to recuperate. While he is away, Dennis Freeman will help John Watt in his broadcast productions.

B.B.C. ARCHIVES

PRESUMABLY for the benefit of posterity, B.B.C. departments have been asked to preserve objects and documents likely to be of interest in the proposed B.B.C. archives. One suggestion was that the camp bed used during the General Strike by a big official of the B.B.C. should have place of honour in the archives!

THE PROMS. AGAIN

ONCE more the season of Promenade concerts, given at the Queens Hall under the baton of Sir Henry Wood, will figure largely in the programmes, starting on August 8. At the suggestion of some of the performers, a special summer dress has been sanctioned for the men players. On very hot nights, therefore, Queens Hall audiences will find the orchestra turned out in a much more comfortable attire, with soft, white silk shirts, and very light dinner jackets.

A CANADIAN MONOPOLY?

AS we go to press we hear that Canadian broadcasting, which has been in the melting pot for several months, is to be controlled by the Dominion Government, and not by the Provinces. From this information we infer that a Canadian broadcasting constitution on the lines of our B.B.C. may soon come into being. A feather in our cap!

TRUTH ABOUT JACK PAYNE

PERSISTENT but, nevertheless, inaccurate statements are being made at the present time about Jack Payne and his B.B.C. Dance Band, which is stated to be in danger of having to play second fiddle to a new and "rival" combination. But since Jack Payne has just signed a new B.B.C. contract, extending over several years, it does not seem likely that the rumours so current at the present time have any foundation of truth.

THE PASSING of the RELAY STATIONS

On account of Moorside Edge taking over the full northern service, the Leeds relay station, 2LS, is being dismantled

ROY FOX'S BAND

PERHAPS the rumours about Jack Payne's band can be traced to the fact that Roy Fox and his band are to be introduced to British broadcasting on July 3, and are subsequently booked for several broadcasts. By all accounts, Roy Fox has a very "hot" band, which always starts its programme with the slogan tune, "Whispering."

B.B.C. AIRMAN'S DEATH

SAVOY HILL is mourning the loss of Mr. F. A. O'Brien, who was recently killed during a flight with the R.A.F. Reserve. Mr. O'Brien was an engineer at the Birmingham station. It is curious how many B.B.C. officials have been airmen. The list is very long, and includes Rex Palmer, Cecil Lewis, Captain Eckersley, Mr. McCulloch, Gladstone Murray, and Noel Ashbridge, the Chief Engineer.

PROMENADE CONCERTS

DETAILS of the B.B.C. promenade concerts are now available. The orchestra, conducted by Sir Henry Wood, will consist of ninety-three players. Saturdays will be miscellaneous, and will include a few Wagner items. Mondays are devoted exclusively to Wagner. On Tuesdays we shall hear Mozart and Tchaikovsky. Wednesdays will alternate between Bach and Brahms. Thursdays will be notable for British composers, and Fridays for Beethoven.

OUTSTANDING ITEMS

LISTENERS will be glad to know that Ravel's *Bolero* will again be given in the promenade concerts. Frank Titterton is to sing songs by Julius Harrison. Pouishnoff is to play Saint-Saëns' No. 2 in G minor. Other items include Mossolov's Factory sensation, and Vaughan Williams is to conduct his Flos Campi for viola, chorus, and orchestra, the solo viola being Bernard Shore.

THE NATIONAL CHORUS

THE B.B.C. announces that further auditions are about to be held with a view to filling a few vacancies in the National Chorus. Tenors are particularly required.

The National Chorus consists of two hundred and fifty amateur singers. There is no subscription and music is provided free. The chorus rehearses in Central London on Friday evenings from 6 to 8 or 8.30. Applicants are required to pass an audition in singing and sight-reading.

Amateur singers who may be interested and who can attend weekly rehearsals in London are asked to apply for particulars to the Honorary Secretary, National Chorus, B.B.C., Savoy Hill, London, W.C.2.

THESE ALTERNATIVES

TESTING a new set the other night, a member of our staff had a real dose of ideal broadcasting. He tuned in London National very nicely, but quickly sought relief owing to a soprano being in her stride. He came upon London Regional and was aghast to find a contralto just on a top note. Quickly moving the dials upwards, he arrived at Midland Regional where, to his horror, a ladies' chorus was just working up to its final crescendo. So to Brussels—and sweet music!

SCOTTISH GRUMBLES

THERE is a good deal of ill-feeling in Scotland about the inadequacy of the B.B.C.'s present service. Several schemes are under consideration at Savoy Hill. When Falkirk opens next year it is quite possible that the Falkirk transmissions will be relayed at certain points by low-power synchronised-wavelength stations.

The Bach Cantatas which have been broadcast on Sundays for the past three years are to be given a rest for the next ten weeks!

National vaudeville programme on July 11 includes Jack and Claude Hulbert; Arthur Young, in syncopated works for the piano; Doris Hare, in light songs and character impressions; and Irene de Noiret, in international folk songs and chansons.

CHEAPENING YOUR WIRELESS

Hotspot in the article below points out how many economies can be effected in wireless reception by the suitable choice of a set in the first place and correct maintenance afterwards

SOME readers may have heard the story of the Scotsman who bought an expensive portable set because it saved him the cost of the annual licence fee! Not every set buyer thinks at the time of buying a set whether it is going to cost too much to run, or whether the set is the right sort for his reception requirements. I would say that the best way to cheapen your wireless is to buy carefully in the first place.

Choosing the Receiver

During the last two years I have helped hundreds of readers to choose wireless sets; a job that has often been thankless owing to arbitrary restrictions imposed upon me by set buyers. For example, I cannot do better than quote the frequent request for a good battery set to cost not more than £12. Well, all I can do is to suggest a three-valve battery set, several of which are on the market around that figure.

But the cost of the set includes only the valves; before the set can work it has to be provided with batteries, a loud-speaker and an external aerial. Suppose we allow £2 for the cost of a two-volt accumulator and a 120-volt high-tension battery, and £5 for a tolerably good cabinet cone loud-speaker. That means a minimum installation cost of say, £20. Yet the very idea of spending £22 on a well-designed self-contained set is scorned by many of those who stipulate say £12 as the nucleus price of the installation.

Personally, I am all in favour of the self-contained set for those listeners who are compelled to use batteries. Quite apart from the convenience of these sets, they are more value for money than sets with separate batteries and loud-speakers. For while you can expect only a three-valver for an outlay of £20 for the complete installation, you can have an up-to-date four-valver in self-contained form—and for very little, if any, more money.

Battery Economies

Whenever the idea of cheapening wireless is discussed, the high-tension battery crops up. Of course, it *is* cheaper in the long run to use super-capacities, if only for the reason that standard capacities have only a very short run—at least, when used to deliver more than 6 or 7 milliamperes.

But while portable-set makers continue to attempt the well-nigh impossible task of making portables really portable, allowing space in the suit-case for standard capacities only, how *can* my readers economise? The only thing to do is to buy the big batteries and connect them externally.

I know one bright portable-set owner who has an external battery box nearly as big as the set! He uses the big batteries when the set is stationary—which is nearly all the year round—and he fits the wasteful small battery when the portable is wanted on holiday.

While I can, to some extent, excuse the manufacturers for fitting standard batteries to the suit-case portable, I see no reason for this bad practice in the table-cabinet type of self-contained set. If the set-buying public were as well up in battery lore as the set builder, the set manufacturers would have to think twice about the amount of cabinet space left for the accommodation of the high-tension battery. Perhaps there will be an improvement by next Show time. Meanwhile, buyers of self-contained sets should be wary of those that need more than 10 to 12 milliamperes from the inevitable standard battery.

In any battery-operated set the power valve has a great bearing on the running costs. Sometimes the power valve is much too large for the high-tension battery providing its anode current. Then the battery lasts only a few weeks, whereas by a sacrifice of volume the running costs could be almost halved. For example, the P215 type of power valve takes about 8 milliamperes maximum, for an undistorted output of 150 milli-watts, whereas the P2 type of power valve, for an undistorted output of 300 milliwatts, requires 16 milliamperes.

Every user of the standard-capacity high-tension battery should seriously consider whether the undistorted volume output of the P2 provides sufficiently marked improvement in quality to justify the extravagance of the running costs. Often the listener will be surprised how little difference is made in the quality when the much more economically run P215 power valve is put in place of the P2. This is not because the P2 is inefficient—far from it—but because the small power valve is now so extraordinarily good in all well-known makes.

With mains-operated sets the running costs are usually dismissed as negligible. This is fairly true of the A.C. set, which seldom takes more than 30 or 40 watts from the supply. But it is a different story with sets for D.C. mains. If such sets employ valves designed to be heated from A.C. at 4 volts, the total filament consumption is over 200 watts—as much power as that taken by a small electric radiator.

Using the Mains

The new 8-volt and 16-volt D.C. mains valves are a great advance, providing the means whereby set constructors and manufacturers can materially cheapen running costs. Although the total wattage for the new D.C. valves is no less than that of A.C. valves, the current consumption is much lower. As these valves are connected in series with the mains and a suitable dropping resistance, their filament current is the factor that determines the total wattage. The filament current of these valves is only .25 ampere, so the filament consumption is only 50 watts for a 200-volt D.C. supply.

Portables vary in their current demands. Special attention has been paid to this point in the Amplion model shown here

The more we investigate the costs of wireless the more false economies we seem to expose. Many of the so-called savings in broadcast reception are very transitory, because developments follow one another in such quick succession. Look, for

(*Continued at foot of page* 40)

WILL HAY—SCHOOLMASTER

Interviewed in his "Schoolroom" by Alan Hunter

Will Hay, the Schoolmaster Comedian

I FIRST met Will Hay on the ice—he was doing his best to cut a figure of eight. When I loomed up he seemed rather inclined to regard me as a figure of hate, but we soon overcame the natural coldness of our environment.

Said Will Hay: "Come along to the schoolroom—I mean the dressing-room—and I'll tell you all about my wireless adventures."

So I duly presented myself a few weeks later and was shown up to the schoolmaster's room and, well, there was certainly a class in progress: co-education, in fact. Everyone was drinking—tea! I accepted a cup and we began.

"If you people will kindly shut up I will be able to tell Alan Hunter how I made—ahem—my microphone debut." Howls of derision from the "class."

"It was in 1922, if I remember rightly," went on Will Hay, "and I distinctly remember that I had to hold the microphone in my hand. There were none of your ornate pedestal affairs in those days. My announcer was Arthur Burrows."

"I did not broadcast again until 1925—no, you are quite wrong—the original turn went down very well. Although personally I must confess I didn't think it would."

"Bertram Fryer was at the Newcastle studio at that time. He had a lot more faith in the broadcasting possibilities of my school sketch than I had. Still, he was right. I seemed to get over very well.

"Then the variety managers began to get a little restive. To avoid any trouble I changed my name for broadcasting purposes. Don't you remember Charlie Kidd? He was none other than yours truly."

I asked Will Hay whether he had any difficulty in preparing funny stuff specially for broadcasting.

"No, I can't remember finding that very perplexing. After all, its simply a matter of being able to visualise your audience and to appreciate the limitations of your medium. Fortunately, the managers removed the bar (cries of 'shame' from the inattentive class) so I was able to carry on with my ordinary lines."

A Keen Listener

"Is it true," I asked Will Hay, "that you used to be very keen on wireless as a hobby?"

"Quite true; I still am, for that matter. I started with a coherer, graduated to the crystal-set stage and before long I had sets all over the place.

"From my crystal I went on to a two-valver. But the best set I ever made was a Reinartz three-valver—actually from a circuit given in AMATEUR WIRELESS. My biggest set? A four-valver. That was my limit.

"I am a very keen short-wave listener. I get America every night on my home-built short-wave two-valver. And I have heard Australia, but I suppose thousands of your readers have done the same, so I must not boast about that.

"Talking of long distances in broadcasting—here's an interesting thought. When I was in America in 1927 I broadcast from a Baltimore studio—just a ten-minute humorous talk—and that broadcast was heard in England. Probably some of my English broadcasts are heard in America. Quite comic to think that I may have been heard on each side of the Atlantic from the opposite side!"

Soon afterwards Will Hay had to make up for his schoolmaster act. When I saw this in progress I realised why the schoolmaster comedian goes down so well, not merely with the audience in the theatre, but with that infinitely more vast audience of B.B.C. listeners.

Will Hay's humour is puckish. It has that element of impishness that appeals to the schoolboy in all of us. There is not an equivocal line in the whole act. Yet, hardly a line failed to bring a smile or guffaw from the audience.

I believe simple humour is the right thing for broadcasting. "Who signed Magna Carta? Please Sir, I didn't!" Nothing deep or subtle in that sort of humour, but hear it by radio and you immediately visualise the painstaking schoolmaster, with spectacles perched on the end of his nose, peering at the inky-fingered and thoughtless schoolboy.

Imagination is essential for the enjoyment of broadcasting, but when listening to radio humour one does not want to stretch the imagination too far. Will Hay's humour broadcasts well because one can enjoy it so effortlessly.

OUR LISTENING-POST—By JAY COOTE

CONTINUOUS complaints received from listeners regarding the "spread" of the Scheveningen-Haven commercial transmitter have prompted the Dutch authorities to try to alleviate this trouble. Recently steps were taken to ascertain whether the transfer of these broadcasts to Kootwijk, on equal or even higher power, would solve the problem. These experiments proved a "mystery" which has puzzled listeners in this country; an unidentified station was broadcasting music and put out unfamiliar announcements. The call on one occasion was sufficiently explanatory, "*Hier Den Haag, Groepzender van de Zakelijke Omroep te Kootwijk,*" which, put into English, signified that The Hague was calling and that transmissions emanated from the commercial radio station at Kootwijk. For the present, at least, there would appear to be no question of musical transmissions from this source, gramophone records being solely used for the purpose of testing microphones and landlines. The wavelength is 1,053 metres, one already adopted by Scheveningen-Haven in order to avoid a clash with Oslo.

Wave Jumping

The new Italian station at Palermo (Italy) is now in full swing, and relays the Rome and Naples programmes nightly. Considerable confusion was caused by its arbitrary use of unallotted wavelengths. Tests were made in various positions of the broadcast band in order to find a favourable channel irrespective of any interference this might cause to neighbouring or more distant transmissions. For a few days Palermo almost sat on top of Madrid, much to the latter's discomfiture, but a move has been made, and when last heard of, Palermo had usurped the Sundsvall claim and was unconcernedly working on 541.5 metres. On two evenings, when I heard the Italian national anthem and the conventional "*Buona notte a tutti,*" I jumped to the conclusion that Milan was carrying out another test, but I picked up the actual call on a later date. Palermo may not remain in that position, and it is quite possible that within the next few days you may tune in its broadcasts on a totally different condenser reading. The power radiated is nearly 4 kilowatts and the signals are good.

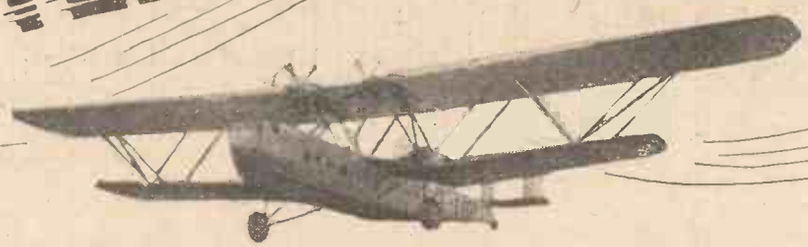
Firenze (Florence) will be the next addition to the Italian net and may prove to be a notable one, for the power of the transmitter is said to be 20 kilowatts. The station is situated on a favourable site between Pratolino and Trespiano at some four miles from the centre of the city. If all goes well, the authorities will formally open the station on October 28 next in commemoration of the *Marcia su Roma* and in celebration of the great Fascist Festival.

Another Giant

Of the new German broadcasting stations under construction, Leipzig may prove to be the most powerful, for the transmitter to be erected near Pegau is one rated at 150 kilowatts. Although a decision has not yet been taken regarding Berlin, listeners in the capital are not willing to play second fiddle to a provincial city, and it is rumoured that pressure is being brought upon the *Reichsfunk* to endow Berlin with similar equipment.

It is a curious fact that when it comes to installing giant transmitters for the purpose of improving the broadcasting service, the German authorities do not appear to be daunted by a mere question of finance, as recent events have demonstrated; so soon as the plans for a new station have been passed the work is put in hand without delay, and in almost record time the newcomer is launched on the ether. Germany undoubtedly is maintaining her lead in the European War of the Kilowatts!

LISTENING TO AIR LINERS



Few branches of wireless reception are more interesting than that of listening-in to the messages exchanged between air-liners and ground stations. The listener who tunes in occasionally to 900 metres is assured of an interesting half-hour at any time of the day.

ENGLAND'S airport for Continental traffic is at Croydon. Overlooking the stretch of tarmac which is the aerodrome's arrival and departure "platform" is the Control Tower. Here wireless operators keep in constant touch with machines flying to and from the Continent, record their positions on a large scale map, and supply them with weather reports. The wireless transmitter employed in this service is situated at some distance from the aerodrome as its masts and aerials would be a source of danger to incoming and outgoing machines. Every pilot has to pass routine messages to the control tower at fixed points on his journey. He gives his first call soon after taking off when he has gained sufficient height for his aerial, which trails beneath the machine, to be safely lowered. This message is a formal statement of his craft's registration letters and of his destination. When he leaves the English coast he tells the control tower his place of departure and the point on the French coast he is making for. As soon as the Channel crossing is completed he informs Croydon of his arrival on the other side and thenceforward his routine calls are made to the aerodrome of his destination.

So much for the messages he is bound to transmit. He can also at any time ask for the latest weather reports for the areas he is approaching and exchange information with other pilots flying on the same route.

Position Finding

One of the greatest uses of wireless on the airways is for position finding. A pilot who has lost his bearings calls up Croydon, who tells him to leave his generator running for half a minute. This transmits a continuous ripple that is picked up at Croydon and also at the wireless stations at Pulham in Norfolk and at Lympne in Kent. For position finding, receiving sets with frame aerials are used. The directional properties of the frames enable bearings to be taken on the transmitting aeroplane. Pulham and Lympne transmit their results to Croydon who plots the machine's position on a map. Two bearings would, of course, be sufficient, but the third acts as a check. The whole process, including the transmission of the result to the pilot, takes about one minute. When visibility is poor, as in this country it often is, the control tower informs pilots of the position and altitude of other machines in their vicinity and this greatly minimises the risk of collisions. In fact, one of the most interesting times to tune in to the 900-metre band is when weather conditions are bad.

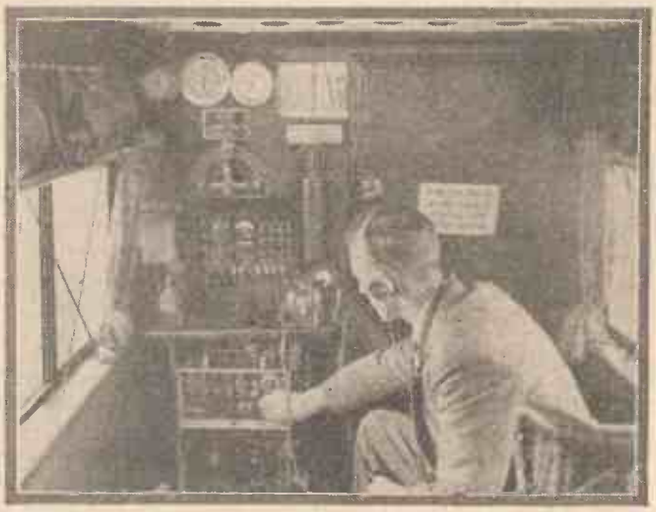
Suitable Receivers

In the south of England simple sets of the det. and L.F. type should pick up Croydon at reasonable strength on the loudspeaker.

To hear the pilots themselves, phones are necessary, even with sensitive receivers, as the limitations of space and available current prevent the aeroplane transmitters from being very powerful. With a S.G. det.-L.F. set situated north of London, the writer has picked up intelligible speech from an air-liner that had just left Paris. Messages from machines crossing the French coast are received at loud and clear 'phone strength. An H.F. stage is almost essential to receiving the aeroplanes. However, the aerodrome operators repeat each message from the pilots and ask for confirmation, so even if you cannot hear the planes, you can follow their movements.

The British, French, Belgian and Dutch airways use telephony for communicating with the ground stations, though telegraphy is available if necessary. The Germans use telegraphy only, and if you can read morse you will probably be able to follow the giant monoplanes of the Luft Hansa Company over a large part of their journeys owing to the long distances over which morse signals are readable. The messages are transmitted rather rapidly, but once you get the hang of the form in which they are sent you should have little difficulty in understanding them. Here is an example: GED de D170 QTH Dover for Calais. That is to say, the German aeroplane whose registration mark is D170 is calling Croydon (call sign GED) and telling him that he is passing Dover and making for Calais. QTH is an official abbreviation meaning "My position is."

If the man at Croydon had not heard from D170 for some time and wanted to know where he was, he would send: "D170 de GED pse QTH?"—that is: "What is your position please." Other important contractions are QAB, meaning "I am making for" (followed by interrogation mark, "Where are you making for?") And QTF, which the pilot sends when he wants to have his position fixed by the direction-finding services. The signs QAN and QAO are used to request information concerning the state of weather and wind respectively, the name of the place for which the information is desired following the contraction.



Wireless gear is an important feature of the modern air-liner. This is a photograph of the wireless cabin, showing the equipment

The study of the commercial flying services is extremely fascinating. When you come to think of it it is rather wonderful to be able to sit at home and follow the progress of the Scandinavian air express and the Golden Ray or of our own services.

All the airways issue time tables obtainable at their head offices and from many tourist agencies and these will show you the best times to listen for the liners.

And now a word about tuning in to 900 metres, the airways wavelength. You will

(*Continued at foot of next page*)

THE HOW AND WHY OF RADIO—XLIV

D.C. MAINS VALVES

Written specially for beginners who want simple and practical explanations of the underlying principles of radio

ONE of the most interesting valve developments of the year is the D.C. mains valve. Readers are no doubt familiar with valves having filaments specially designed to be heated at 4 volts from the A.C. supply. Such A.C. valves pass a filament current of 1 ampere, so the total power consumption is 4 watts per

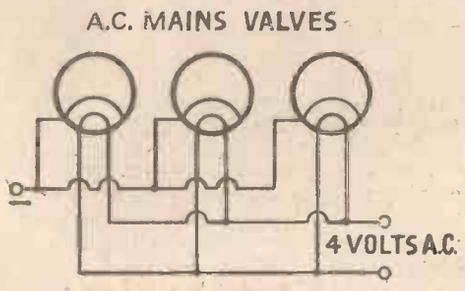


Fig. 1. A.C. Valves working in parallel

valve. A full description of the A.C. mains valve will be found in the "How and Why" article in AMATEUR WIRELESS dated March 7, 1931.

Fig. 1 shows how three A.C. mains valves are connected across the 4-volt winding of a mains transformer. It will be seen that the filaments of the valves are in parallel. The total filament power consumption of these three valves is 12 watts.

Suppose that the mains were D.C. and we wanted to use the three valves of Fig. 1; how could this be done? Quite simply, by connecting the filaments in series with each other and with a suitable series resistance across the mains supply. In order to pass 1 ampere through the filaments in series, we shall have to work out from Ohm's law the size of resistance required for, say, 200 volts.

Although there would be no insuperable technical difficulty in working the A.C. valves in series, as shown by Fig. 2, such a plan would be extremely expensive. The total power consumption of the filaments would then be the voltage of the mains supply multiplied by 1 ampere. So for a 200-volt supply the power consumption would reach the colossal figure of 200 watts, or as much as a small electric fire! A very special series resistance would have to be designed to dissipate the heat generated with this circuit.

From these elementary considerations it is obvious that a special filament is needed to work valves from D.C. mains. As the filaments are to be connected in series the voltage rating of each filament is of small importance. What we are concerned with, in any endeavour to keep down the total consumption, is a reduction in the filament current.

OTHER VALVE ARTICLES IN THIS SERIES

How the Detector Works.—October 11, 1930.
Choosing Valves for Best Results.—November 15, 1930.
Power Valve Points.—April 25, 1931.
What You Should Know About Valves.—May 9, 1931.
How the Filament Makes the Valve Work.—May 16, 1931.
What Goes On Inside the Valve.—May 23, 1931.
More About How the Valve Works.—May 30, 1931.
Simple Valve Curves.—June 6, 1931.
The Goodness Factor of a Valve.—June 13, 1931.
How Signals Affect the Valve.—June 20, 1931.
The Screen-grid Valve.—June 27, 1931.
The Pentode Power Valve.—July 4, 1931.

The first indirectly heated D.C.-mains valves were marketed at the beginning of this year among the Mazda group. Three valves were then introduced, a screen-grid high-frequency amplifier, a detector and a pentode power valve. The pentode has a filament voltage of 8 and a filament current of .5 ampere. The other two valves have 4-volt .5-ampere filaments.

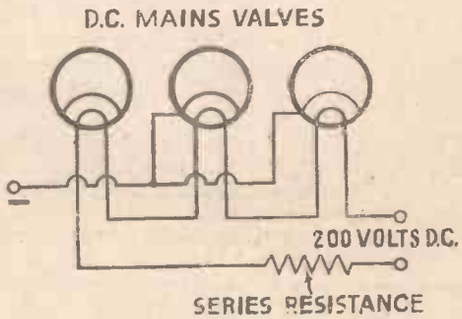


Fig. 2. D.C. valves in series

With three of these valves connected in series the total filament current consumption is therefore only .5 ampere, just half the total of three A.C.-mains valves connected in series. Working on a 200-volt supply, three of the new D.C.-mains valves would take a power of only 100 watts. Incidentally, the construction of a resistance to dissipate this power is quite practicable.

Very shortly the Osram range will be augmented with several D.C.-mains valves, for high-frequency amplification, detection and power output. These will have filament voltages of 16 and the filament current will be only .25 ampere. Connected in series, a batch of these valves will prove very economical to run, because the total power consumption of the filaments will be .25 multiplied by the voltage of the D.C. mains supply. If the supply is 200 volts the filament wattage will therefore be 50 watts.

It should be emphasised that all the new D.C.-mains valves are indirectly heated. That is to say, the mains supply is quite separate from the cathode connections.

HOTSPOT.

"CHEAPENING YOUR WIRELESS"

(*Continued from page 37*)

example, at the pick-up craze. At first the only way to reproduce records was through a separate amplifier or by plugging the pick-up into the detector socket of the broadcast set. Set buyers of the season just finished therefore insisted on pick-up terminals being fitted.

But when we come to look at ruling prices for reputable radio-gramophones, we find their all-in price is no more than the total cost of a good all-electric set, pick-up, loud-speaker and gramophone motor. To-day it is much better to buy a complete radio-gramophone than a set with all the externals for the reproduction of records.

Another mistake that set-buyers are inclined to make is to install a much bigger set than the reception need demands. One of the commonest fallacies is that a two-valver cannot give as good reproduction as a three- or four-valver. For local-station reception the small set is technically just as good as a big set. In fact, it may be better, for there will be less chance of distortion due to over-loading.

Mr. Edgar Wallace makes his second microphone appearance on July 20. He has not yet settled definitely upon a subject, though it is suggested that he should choose some arresting and characteristic topic, such as the cross-examination of a witness in an imaginary murder trial.

LISTENING TO AIR LINERS

(*Continued from preceding page*)

find it at the bottom of the long-wave scale on most sets and a guide to its position are the radio beacons on 1,000 metres, that are easily recognisable by the distinctive and regular morse signals they transmit. You may get interference from direct pick-up of a near-by broadcasting station, but various devices have been described in these pages to overcome this difficulty.

Radio forms a pleasant introduction to flying that cannot fail to do much to foster air-mindedness, and one day you, too, may watch Croydon aerodrome and the distant towers of the Crystal Palace drop away beneath a powerful air liner bound for the Continent.

B. K. COOPER.

On Your Wavelength!

STILL BUILDING

TWO years ago I was talking to a very Eminent Person in broadcasting on the subject of home-made wireless receiving sets. He told me that the day of the home constructor was definitely over and that within a couple of years (this brings us to the present day) no one would think of building his own wireless set. I begged to differ, and we had a little wager on the question, the stakes being the best variable condenser available at the end of the two years. I am going round in a day or two to collect that condenser. My proof, if I need any, that I have won is to be found in the continued popularity of constructors' sets as published by AMATEUR WIRELESS and *Wireless Magazine*, and by the enormous number of "Century Supers" that were made by readers.

A NATION OF CONSTRUCTORS

NO, the home constructor is still very much alive and likely to remain so in this country, for one of our national peculiarities is that we do love doing little jobs in the workshop or on the kitchen table and making things for ourselves. There is no other country in the world where anything like such a trade is done by toolshops with amateurs. I know about a score of amateurs who are absolutely first-class workmen in metal and probably double that number who are real experts at wood work. We are a nation of constructors.

KIT SUCCESS

NOWADAYS, of course, the business of set construction has been enormously simplified by the introduction of the complete kit. Old readers may remember how, years ago, I strove and strove to get manufacturers to introduce kits of parts. At length the idea bore fruit, and the very first kit set put on the market was one of those run-away successes that seem almost too good to be true. Since then we have had large numbers of kits, and in every case where the set itself has been a good one, success has been achieved. The kit set has brought into the field an entirely new type of constructor—the man or woman not very skilled in the use of tools, but still possessing the national longing to make something for himself or herself. With a ready-drilled panel and with clear wiring diagrams, construction is a simple business, and a set that has quite a professional look can be produced by anyone whose fingers are not all thumbs.

In the old days it was a very different business. As often as not you had to cut out your own panels, you had also to do all your own drilling, and matters became easier if you could undertake a good number of small metal-working jobs. Nowadays, skill of this kind is not necessary, but the skilled workshop man has, of course, a wider field, for he can design his own sets or adapt published designs and, if he feels so minded, he can make not a few of the parts required.

THE OLD SET

THE coming of super-power stations, though it has increased the total number of licence-holders, has driven a certain number of people out of wireless. I have personal knowledge of not a few instances. Here is a typical case. An amateur constructor friend of mine who is not too well provided with this world's goods, built, a couple of years ago, what was then a first-rate four-valve set. To do so he had to scrape and save, for he wanted to employ the best of parts. When first made the set was a wonder, for it brought in not only the local station with excellent quality, but also a large number of foreigners. Nobody could have been more pleased and happy than he. Then the two Brookmans Parks got going. He could separate them from one another, but, except on wavelengths above about 400 metres, practically nothing was left to him on the broadcast band. Even that, though, was not too bad, and he was not dissatisfied until 5GB went down to 398.9 metres. Now, with "Raucous Reg," "Noisy Nat," Midland Reg., Northern Nat., and Northern Reg., his set is virtually useless on the medium band and, since atmospherics have been so bad this summer, the long waves have not been much good to him. I have never heard him grumble; he is not that sort. He told me that he could not afford to build a new set and that probably his best course was to give up wireless—at any rate, for the time being. I am glad to say that I have just been able to show him a simple and comparatively inexpensive way of giving his old set a new lease of life, and here is how it happened.

A FINE COIL

HEARING very good independent reports on the new Varley Constant Square Peak coil, I got hold of one and fitted it to a two-valver of my own design for short-range purposes, which had become useless owing to swamping by "Raucous Reg" and "Noisy Nat." To attain increased selectivity with a detector and one L.F. set is easy enough by well-known methods if you don't mind losing quality. But I do mind that loss very much. Or, again, you can construct band-pass circuits on well-known lines, though the odds are that in practice you will find that if they pass the band that they ought to on some wavelengths, they go all to pieces on others. Anyhow, the Varley coil seemed worth trying, and I fitted it to my two-valver, there being luckily plenty of room in the cabinet. The result was a revelation. There was a slight falling off in signal strength, but far less than one would have expected, and, anyhow, even with a two-valver you have plenty to play with at from fifteen to twenty or even twenty-five miles. It is now easy with this set to separate the home high-power stations from one another, and if I want to I can pick up quite a number of foreigners on wavelengths in between theirs. There must be any number of oldish sets which can be made useful once more by fitting them with a coil of this kind.

GANGED CONDENSERS

A GOOD many years ago now I ganged up a couple of ordinary condensers after some fiddlesome hours in the workshop. I wouldn't have undertaken the job had there been ready-made ganged condensers available at prices suitable for non-millionaires, but there weren't in those days. Nowadays you can purchase first-rate ganged condensers at prices that are almost ridiculous. In their design, too, the modern tendency towards compactness is making itself evident. Some that I recently acquired take up little or no more space than a single condenser of yesteryear.

There is, though, one rather important point to which I would like to call the attention of makers. This is that such a thing as a common "live" spindle is not always ideal in ganged condensers. There are some in which each unit is completely insulated from all the others; there are also several otherwise excellent makes in which the spindle of all condensers must be connected to points at the same potential. This makes things rather awkward in a big set where you want, for instance, to have a progressive increase in the grid bias of the H.F. valves.

BACK AGAIN

WHEN we went low-loss mad, as we did five or six years ago, a whole heap of absurdities crept into our ideas on high-frequency losses. Just before that time, very compact variable condensers had made their appearance, their small size being due to the use of mica instead of air as a dielectric. As low-lossers we could have nothing to do with mica; we wanted lots and lots of air. We wouldn't have ebonite end plates; we insisted, in fact, upon all solid dielectric material being reduced to the smallest possible limits. And figures seem to show that we were right, for many writers published the results both of calculations and of actual measurements to show what large losses occurred when big chunks of solid dielectric material were present. There was only one thing wrong with these calculations and measurements. Nearly all of them were based on a frequency of 1,000 cycles. Now, 1,000 cycles is an audio frequency, and not very high frequency at that. At 1,000 cycles dielectric losses really have a good deal of importance, *but* as the frequency is increased, dielectric losses go right down with a flop. When we come to 1,000,000 cycles, which corresponds to a wavelength of 300 metres,

On Your Wavelength! (continued)

dielectric losses are only about a thousandth of those at 1,000 cycles.

THE BIG FACTOR

AND here we come to another big *but*. If dielectric losses go down, the frequency losses, due to resistance, soar upwards as the frequency increases. Now, the main cause of big resistance at high frequency is to be found in poor contacts. In the modern condenser positive contacts are the rule so that we need not worry much about these. It comes to this, then. A condenser whose contacts are above criticism will give excellent results even though its end plates are made of ebonite and its vanes are separated by solid dielectric material in the form of mica. To my mind, we shall see a great deal more of the tiny mica dielectric condenser, which is ideal for sets with three or four tuned circuits that can be ganged.

LET'S HOPE THEY DO

THERE is a little high tension in France at the moment on the subject of legislation covering broadcasting. At present the position in that country is rather nebuouls, since there is nothing to prevent the erection and operation of privately owned broadcasting stations. The PTT Ministry has introduced a Bill, the substance of which is that no new transmitting station may be constructed without a Government licence and that, once built, the station must conform absolutely to its authorised wavelength. The minister responsible is determined that the Bill shall be passed before 1932, when the Madrid Radio Conference meets. If it isn't, the representatives of France who attend will be in an almost impossible position, since they will lack the authority possessed by those of other nations.

THE WANDERERS

HOW badly such a Bill is required in France you can see by glancing at any recent report of the Brussels Laboratory of the U.I.R. Those nice straight lines show the doings of stations which stick to their wavelengths. The ones, though, that look like the temperature charts of fever patients in hospital show up the wavelength wanderings of stations which do pretty well as they like. You will find that our own country, Germany, Belgium, and many others, have an almost blameless record, but the same cannot be said of one European country. This country is France, whose stations wander pretty well as they list. During May, for example, Béziers hit his proper wavelength only once, whilst Fécamp travelled from 222 up to 225 and a bit, and down to 217.5 metres. Radio Binche was almost as bad and Bordeaux (S.O.) had the distinction of never using the same wavelength twice during the month. Toulouse PTT was not quite so bad, though he was seldom on his real wavelength. Montpellier and Radio Lyons were pretty well anywhere on any night. Radio Vitus pushed in on an unauthorised wavelength and was very far from sticking even to that. Grenoble and the Post Parisien were never on their proper wavelengths; nor were Algiers or Radio LL.

The only French stations on the medium band that came near to conforming to the conditions of the present Prague Plan were Paris PTT, Toulouse, Lyons Doua, and, Bordeaux Lafayette. The French stations, in a word, cause more interference on the broadcast band than those of any other European country, and the Government, owing to the lack of legislation on the subject, has no power to deal faithfully with them.

INSULATORS—

I WAS reminded the other day of the old trap regarding concrete. Many people regard this as an insulator, whereas, in point of fact, it is a very good conductor. This is due very largely to surface moisture, which, although invisible, is none the less present; but, at the same time, even if the surface is quite dry, the very porous nature of concrete ensures a high proportion of absorbed moisture.

Water, of course, is an insulator. It is only by virtue of dissolved chemicals that water is able to conduct electricity to any appreciable extent. This fact is made use of, by the way, in water-cooled valves. The anodes are of metal and are at a potential of several thousand volts. Yet the leakage through the water which is used to cool them is negligible.

—AND SHOCKS

IN concrete such water as is contained within the pores has absorbed sufficient chemical salts to make it quite a good conductor, and if you happen to be standing on concrete and catch hold of a live wire, you will obtain a very much more unpleasant shock than if you are standing on wood, carpet, or even dry ground. If you are foolish enough, as I was during the recent hot weather, to be groping about on a concrete floor with one moist hand on the said concrete and the other fiddling about with live leads, the probability is that you will discover for yourself the extremely conductive nature of concrete.

It is, of course, the conditions under which you receive the shock rather than the voltage which determines the coefficient of unpleasantness. With moist hands I have received quite unpleasant kicks off 120 volts, while under other circumstances I can stand 240 A.C. without troubling.

THESE BATTERY LEADS

Sometimes you can dispense with terminal connections for the batteries and take the leads direct from the various points in the set. A good method of taking the battery flexes straight out from the various components is shown here.

RADIO ON RAILWAYS

IN common with most radio men, your Thermion is always interested in the slightest sign of radio when on holiday. As I recently passed through France I could not help hearing the strident voice of the loud-speakers on the railway platforms—the French would seem to have developed this function of the loud-speaker to a very much greater extent than in England.

Quality of reproduction is not to be expected from the type of loud-speaker used to announce the arrival and departure of these French trains. Indeed, I tremble to think what music would sound like if, in a gay moment, the stationmaster switched over from his microphone to a gramophone pick-up!

THE TRAIN ANNOUNCER

STILL, in spite of the "tin-trumpet" appearance of these French railway loud-speakers, the announcements were clear enough to be understood, even by an Englishman. I do not know whether the idea is general in France, but at no less than three important stations I noticed this elaborate loud-speaking equipment.

The kindly "announcer" not only informs you of the destination of the train and the places it will stop at *en route*, but also indicates at what part of the platform you should wait for first-, second-, and third-class compartments. Evidently these speakers are not new, because the *voyageurs* listened quite unconcernedly to the bellowing announcements.

LISTENING ON THE TRAIN

ANOTHER aspect of French train radio was brought home to me when I had comfortably settled down in the Paris-Dieppe express, for on each side of the compartment I noticed headphone plugs. Presently a "T.S.F." conductor came along with sets of headphones, inviting us to listen to a concert from Radio Paris or Stuttgart. Having paid a quite reasonable "sub." for this privilege, I donned the headphones and was quite surprised at the amount of enjoyment so obtained. I was able to while away a pleasant hour or so, with very little interference, to the music of Radio Paris and Stuttgart.

I believe that in England the L.N.E.R. has experimented with the reception of Daventry on the London to Leeds express, but there does not seem to be any general development of train radio in this country—not to anything like the extent now prevailing on the Continent.

THERMION.

ALL ABOUT MAINS UNITS

by W. JAMES

An article containing a fund of information of value to mains users

AN alternating-current mains unit contains apparatus having resistance. It, therefore, follows that the voltage of the output is bound to vary with the current.

This cannot be avoided in any possible way. There is always a fall in voltage across a resistance when current passes through it. If, then, the current is reduced or increased, the voltage lost across the resistance is smaller or larger, and so the output voltage varies accordingly.

To take an example, let us suppose that the choking coil in a mains unit has a resistance of 1,000 ohms. Then there will be a voltage drop of 1 volt for each milliampere of current passing through it. With an output of 10 milliamperes the voltage across the negative and positive terminals may be 130, but this will fall by 10 volts, making the output 120 volts if the current increases from 10 to 20 milliamperes.

Voltage Drop

This fall in voltage is due to the choke alone in this example, but actually there will in practice also be a falling off because of other resistances in the circuit. And there are other electrical properties of the parts used in a mains unit which further affect the output.

Let us take as an example a half-wave rectifier connected as in Fig. 1 to a transformer, choke, and filter condensers.

Now the transformer itself, being a fairly compact component, has considerable resistance, with the result that the voltage across its secondary winding varies with the current. The variation from this cause alone is, in some makes, quite considerable and in others is almost negligible. There may also be a fall in voltage as the current increases owing to the construction of the transformer, which is not, of course, theoretically perfect.

Then there is the rectifier itself. This has some resistance. Next we have the condensers used for smoothing These affect the voltage of the output too, the pressure tending to increase as the capacity is raised from a small value, although the voltage cannot increase beyond a certain value.

The total result is this—that if we measure the voltage of the output for

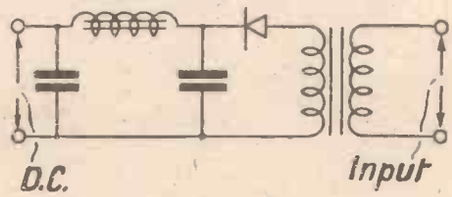


Fig. 1. Circuit of half-wave rectifier

different currents, we shall obtain a result something like that of Fig. 2.

Here we have the output curve of a typical mains unit, which is rated at 120 volts 20 milliamperes. At no load, that is, when the set is disconnected, the voltage is about 200. With a current of only 5 milliamperes the voltage has fallen

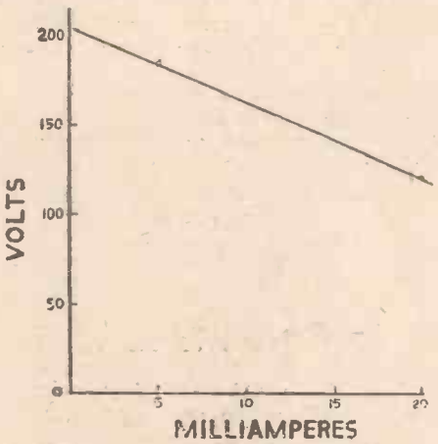


Fig. 2. Output curve of typical mains unit

to 180; at 10 milliamperes we have 160 volts and at the full load of 20 milliamperes the voltage is about 120.

We need not worry much over the changes in the output voltages, however, provided we always remember that these variations do occur. If we switch off the receiver, for instance, leaving the mains unit connected, the voltage applied to the condensers in the unit is much greater than the normal working value.

Will the condensers stand this pressure? If they are of good make they will, of course, but there is always the doubt as to whether the margin of safety is so great that they will safely withstand the pressure if it is repeatedly applied. There are condensers in the set, too. These may break down if often subjected to the full no-load voltage of the mains unit.

A careful user will, therefore, be sure and switch off the mains unit first and afterwards the set itself.

Some mains units have a switch included in their circuit in such a position that, when the receiver is no longer needed for listening, the filament accumulator is connected to a trickle charger and the high-tension circuit is disconnected. Others have no separate switch and the adaptor plug must be removed from the lamp socket or power point, unless, of course, it is controlled by a switch in the house-wiring circuit.

A Risk of Damage

With a current of only 5 milliamperes flowing, the voltage is about 180. If you pull out the power valve from the set and also the detector, leaving, perhaps, a screen-grid valve alone in the receiver, you might very well have about this output from the mains unit.

The point to note is that the 180 volts are applied to the valve. You may damage the valve, but probably you will not. But still, the whole of the apparatus is having 180 volts applied to it, which is much greater than the normal of about 120. It is, therefore, best to switch off the mains unit before pulling out valves from the set, as you may damage something eventually.

Mains units invariably have more than one positive terminal. As a rule there are two others. One of these is usually arranged as at H.T.+1, Fig. 3.

There is a potentiometer and the terminal is connected to the junction of the

(*Continued at foot of next page*)

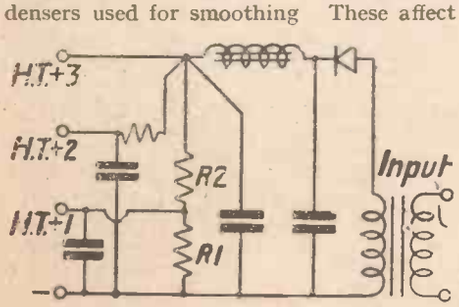


Fig. 3. Circuit showing terminal connections

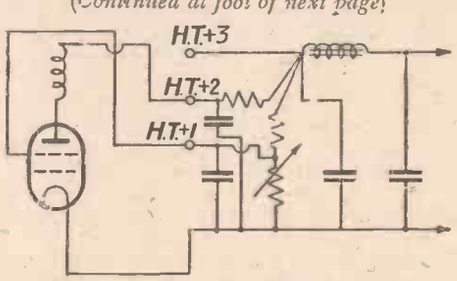


Fig. 4. Connections of mains unit for screen-grid valve

Some Notes on Present-day Short-wave Conditions

Around the Short-wave Dial

By M. BARNETT

DURING the last few weeks the loudest and most consistent station on the short-wave bands has undoubtedly been the Moscow station on 50 metres. He is on the air most evenings, but seldom gives any musical performances, the programmes generally consisting of talks in various foreign languages describing various phases of life in the U.S.S.R. This station operates with a power of 100 kilowatts and at times he appears to be badly over-modulated. Now, is there *anyone* who cannot claim to have heard him? Very often this station and the Vatican short-wave station can be heard operating at the same time because both use very high power and they operate on wavelengths of 50 and 50.26 metres respectively.

The stations on the 50-metre band seem to be coming into their own again and there are several which are well worth trying for. The Americans are rather weak on this band at the moment, but this is due to the time of the year. The 50-metre band is just above the band of commercial code stations which infest the regions between about 33 and 45 metres. Unfortunately, amateur stations, apparently mostly French, occasionally work off their allotted wavelengths and invade these 50-metre broadcasts.

One occasionally sees the most amusing mis-prints and mis-statements in foreign newspapers and magazines. For instance, I have just seen in a certain foreign magazine the announcement that the B.B.C. has a second short-wave transmitter operating at "Bugby"!

I hear that VK3ME, of Melbourne, Australia, has recommenced operations but I have not heard him myself since he closed down some time ago. Can any reader report having heard him during the last few weeks?

Summer-time Reception

A new station at Johannesburg, South Africa—ZTJ, which relays the programmes of the medium-wave station JB on 49.4 metres, is now operating with a power of 5 kilowatts. He stands a fair chance of being heard in England with this power, but he will probably be moving down to a lower wave shortly.

Many people who are making their first acquaintance with the short waves seem to imagine that the summer months are a bad time for listening on the short waves. They do not realise that the short waves vary in an entirely different manner to the ordinary broadcast band wavelengths. Of course, actually it is just as easy to get long-distance reception on the short waves in summer as it is in winter. The only difference is that stations on certain wavelengths in one season may not be heard so well in the next season. But they will be heard on some other wavelength. Partly for this reason, many short-wave stations now in use are capable of being operated on two or more wavelengths, so that when the season is poor for one wavelength they may switch over to the other.

In the same manner as the conditions vary from season to season, so do they vary from hour to hour and if a certain station is heard well at 3 p.m. he may only be heard very faintly at, say, 9 p.m. Many beginners fail to get their full value out of the short waves because they do not attempt to *listen* scientifically and choose their programmes and stations with due regard to time.

"ALL ABOUT MAINS UNITS"

(*Continued from preceding page*)

two resistances. One of the resistances may be of the adjustable pattern, and then the user is able to regulate the output voltage of this tapping over a range.

In the less expensive models the fixed resistances are used, or a single resistance having a tapping. And so the actual voltage at the tapping depends upon three factors. The first is the total voltage across the ends of the resistances. This, we have seen, varies with the amount of the current taken from the unit. Thus it follows that the voltage of the tapping will also vary with the load placed upon the unit as a whole.

The second factor is the relative position of the tapping. If the resistances R1 and R2 are equal, the voltage of H.T.+1 is, with no current passing, exactly half of the full voltage. If R1 is twice R2, the voltage is two-thirds of the total. When one of the resistances is adjustable the voltage can be varied over a wide range, provided the actual resistance values are suitable.

There is a third factor, namely, the actual value of the current taken from the tapping. As the current increases in value the voltage falls, usually rapidly, as the resistances are generally relatively large.

A tapping such as H.T.+1 is employed for a screen-grid circuit and possibly for an anode-bend detector. In both instances the current taken by the circuit is small and so the actual voltage of the tapping is not very different from the assumed value.

To measure the voltage you must use a really high-resistance voltmeter. A misleading value is obtained when an ordinary instrument is used for the purpose, as it passes a current sufficient to produce a material fall in voltage in the mains unit itself.

Most units have a condenser connected between the tapping and the negative terminal. A usual value is 1 microfarad and it helps to smooth the supply.

The second tapping, as at H.T.+2, Fig. 3, has in its circuit a resistance and a condenser, the resistance being fixed or adjustable. With a fixed resistance the output voltage will vary when the current taken changes, the fall in voltage across the resistance being equal to the product of the resistance in ohms of the current in amperes.

Thus with a resistance of 20,000 ohms the drop is 20 volts per milliampere, and so the actual voltage at the tapping point is the total output voltage less the drop across the resistance.

Effect of Bias

If you connect an amplifying valve to this tapping and the grid bias is varied, the actual voltage applied to the anode circuit of the valve changes.

By increasing the negative bias you tend to reduce the current. But, as the current is reduced, the drop in the resistance connected to H.T.+2 falls, and so there is a tendency for the voltage to increase. This brings with it, however, an increase in the current passed by the valve, with the result that the voltage does not increase by as much as you might expect.

The point to note is that the voltage output from the tapping H.T.+2 is not fixed at all, but depends upon the valve to which it is connected and the grid bias of the valve.

Sometimes the tapping H.T.+1 is taken to the screen of a screen-grid valve and H.T.+2 to the anode circuit. When an adjustable resistance is used in the H.T.+1 circuit, in order that the voltage may be varied, you actually alter both the screen and anode voltages.

The valve is shown connected in Fig. 4. With a low screen voltage the anode current of the valve is fairly low, too. Then there is but a small drop in the resistance connected to H.T.+2, and so the voltage applied to the anode of the valve is about the maximum. As the voltage of the screen is increased, the tendency is for the current in the anode circuit to increase also. But this increased current produces a greater fall in voltage across the resistance and the voltage in the anode circuit falls.

It is little points like these which make experimenting with a mains unit so interesting. If you have a good voltmeter and a milliammeter to connect into the circuit, much information can be gained. The voltmeter ought to be a high-resistance one, but even then care must be taken with the screen-grid tapping, such as H.T.+1 in Fig. 3, as the resistances are relatively high in most instances.

A Weekly Programme Criticism—By SYDNEY A. MOSELEY.

Without Fear or Favour

KERBSTONE ENTERTAINERS

THE "PROMS"

A GOOD idea, bringing kerbstone entertainers again to the microphone, for it permitted us to make a comparison between turns inside and outside the studio.

As it was an interesting experiment, it was justified. Alas, it brought out no striking talent, although A. Final and P. Kent did as well as many a regular broadcast turn! There was a comedy vocalist who reminded one of the good old "Knock 'em in the old Kent Road" days.

◆ ◆ ◆

I doubt whether, in these days of "refained" variety, George Lester's "Pass Right Down the Car" would pass muster. Altogether a very interesting experiment, which the B.B.C. might enlarge in its search for hidden talent.

◆ ◆ ◆

The *Tilly of Bloomsbury* production was in every way good. The story was amusing, it was produced well, and, on the whole, the cast was well chosen. It only shows once more the best plays are those which have established themselves and are adapted for broadcasting. I know that this may mean fewer productions from regular members of the staff, but perhaps that is how it should be.

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Thorpe Bates is one of the darlings of musical comedy. I did not altogether like his singing of "The Lute Player," although his other two songs, "Colette" and "Round the Galley Fire," were more suited to his voice.

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Preparations are being made for the Promenade Concerts Season. I am having a chat with Dr. Boult about it, although I cannot see that there is very much room for departure from previous seasons' arrangements.

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I fear that the lawn-tennis commentaries were none too thrilling. I admit it makes a difference when outstanding players, such as Lenglen, Helen Wills, or Cochet, are playing. But alas, this year Wimbledon was robbed of some of its grandness and excitement and that, alas, reacts on broadcast descriptions!

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The "Tea-time Four" are good, but when somebody began to sing "Lady of Spain" I groaned in despair. However, it was good to hear soon after this a parody of this overdone and over-run ditty.

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Hardly good manners to be anything but charming to a guest, but Mr. Peter Gardine, the American who spoke on diving, was hardly more thrilling than the tennis commentaries. By the by, did you notice he spoke about "feathering his cap"?—it sounded rather unusual.

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One of the most enjoyable of recent transmissions was the beautifully soft singing of Emmie Leisner the other Sunday afternoon. She sang songs by Wagner and Strauss, and I wished she had continued beyond her allotted half hour.

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Will Sir John Reith look at the Sunday programmes these days and admit that the three o'clock concerts are an improvement on the stodgy Bach cantatas which have been worn to death?

Will he also tell us why music of the sort I have mentioned cannot be put over

Christopher Stone, who entertains us with gramophone records

THE BACH ORCHESTRA!

OVERDONE "EFFECTS"

in a full programme on Saturday and Sunday.

◆ ◆ ◆

I read with alarm that in sub-dividing the B.B.C. Symphony Orchestra it is declared that "the orchestra accompanying the Bach cantata will be known as the B.B.C. Bach Orchestra." Good heavens! does this mean that it is to become an institution?

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A fine baritone is Leslie Holmes, who sang some good songs as they should be sung. No wonder the B.B.C. is cutting out the amateurs.

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The transmission from Paris of the Haig Memorial Service was disappointing, because each time I switched on an uninteresting Frenchman was speaking.

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"Effects" are still overdone. For instance, in the Kerbstone Entertainment the taxi horns were used to the point of making the whole thing appear ridiculous. The fact is, noise does not come over well, even on the good sets. For that reason I do not appreciate the pageantry which is broadcast. Here, again, the ear is deafened without any compensation. For that reason, also, I did not listen any too long to the Royal Air Force display, although I must say that I liked the running commentary by Squadron Leader Helmore.

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Noise, by the way, has crept into the Children's Hour, and in the opening of the little play *Living Happily Ever After* we were treated to crowd noises, which must have been the delight of "effects" department, but hardly pleasing to listeners.

◆ ◆ ◆

How many crystal-set users are there? I am asked that question again and again, and I fear that I have not the data with which to reply.

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I must apologise to many correspondents whose letters I have not answered before. I have replied by post to the majority, but I must refer to Sydney Baynes' letter dated, I fear, April 18! He explains that playing "Go Home and Tell Your Mother" was not his choice, but that of Stanelli and Edgar, whose act opened with this tune. Good for you, Sydney!

FITTED in the lid or hinged back of the cabinet of the portable "Century Super" is a two-point push-pull switch, a terminal strip having three terminals and the long and medium wavelength frame aerials.

The terminal strip is of the same dimensions as that used in the set itself and the three sets of terminals correspond, the centre terminal being joined to the middle of the frame. We use the two frames in parallel for the medium wavelengths and the long-wavelength frame alone for the long waves. The two frames are wound on separate formers.

SUITABLE VALVES FOR THE PORTABLE "CENTURY SUPER"

First Detector: Mullard PM1HF, Cossor 210HF, Mazda H210, Marconi H210, Osram H210, Eta BY2023.

Second Detector: Cossor 210HF, Marconi HL210, Osram HL210, Mazda L210, Mullard PM1HF, Eta BY2023.

Intermediate Stages: Marconi S215, Osram S215, Mullard PM12, Mazda 215SG, Eta BY6, Cossor 215SG.

Oscillator: Mazda L210, Osram L210, Marconi L210, Cossor 210LF, Eta BY2010, Mullard PM1LF.

Power: Osram P215, Marconi LP2/C, Mazda P220, Eta BW1304, Mullard PM2, Cossor 215P.

There are four ebonite supports fitted near the four corners of the lid. These are composed of ebonite rod, as indicated in the wiring diagram, through them passing a bolt. This bolt is used to fix them to the lid.

For the medium-wave frame aerial, therefore, four holes are drilled in the lid and the four pieces of plain ebonite tube are fixed. Further in are fitted the four supports for the long-wavelength winding. These ebonite pieces are slotted and are bolted in position as the medium-wavelength supports.

If countersunk head screws are used and the screws are put in from the outside of the lid, the fixing is neat.

Winding the Frame

Wind the long-wavelength frame first. Make a loop in the end of wire and fasten it to one of the outer terminals and also to the switch. Then wind on a total of 60 turns, putting 15 in each of the four slots and connecting the centre turn to the middle terminal of the strip.

The outer end is taken to the other terminal. Thus we have the beginning of the winding taken to one of the outer terminals of the strip and also to one of the contacts of the switch fitted by the side of the strip.

The centre of the winding is taken to the middle terminal and the end is taken to the remaining terminal. This finishes the long-wavelength winding.

For the medium-wavelength winding we need 15 turns. Start on the inside of the outer support and take the end to the second contact of the switch. Now put on the 15 turns, winding in the same direction as the long-wavelength coil.

Finish the winding by connecting the end to the outside end of the long-wavelength coil at the terminal strip. You will note now that when the switch is making contact the two coils are in parallel. When the contacts are open only the long-wavelength coil is joined.

The three terminals on the strip in the set are connected to the corresponding terminals on the strip in the lid. To put the set into the cabinet, the back must be removed.

The Portable "Century Super" represents the best type of portable set

Fit the set, the loud-speaker, and the batteries, therefore, and leave three long wires from the frame aerial connecting strip in the set. Afterwards the back can be fitted by putting the screws in the hinges and then the three wires can be joined to the connecting strip in the lid. Make the wires as short as possible.

Loud-speaker Connections

There are two wires coming from the loud-speaker, one for high-tension positive and the other for the anode of the power valve. The wiring diagram given last week shows connecting points and the wires should be cut to length and placed in position when the set is partly in position.

If the loud-speaker unit recommended is not used, a certain amount of fitting will be necessary. A baffle is needed for the unit and this baffle should be cut to the

THE PORT "CENTUR

ASSEMBLING THE FRAME AERIAL VALVES :: NOTE

right size and be fitted in the space provided. If the unit cannot be reached for adjusting purposes when it is fitted, this will have to be seen to when testing the set.

It is just as well to test the set before it is finally assembled in the cabinet. Afterwards a couple of wood screws should be put through the back part of the baseboard in order to fix the set.

A piece of wood should also be fitted in the bottom of the set for the purpose of preventing the batteries from slipping back on to the frame aerial wires.

COMPONENTS FOR THE POR

Special cabinet (Peto-Scott, Readi-Rad, Camco).

Ebonite panel, 12 in. by 8 in. (Becol, Peto-Scott, Wearite, Readi-Rad, Goltone).

Baseboard, 12 in. by 9 in. (Clarion, Camco, Peto-Scott, Readi-Rad).

Two .0005 variable condensers (J.B. special 40 to 1, Readi-Rad, Telsen, Cyldon, Formo, Peto-Scott, Utility, Ormond, Polar).

Coils (Lewcos or Wearite).

50,000-ohm variable resistance (Watmel, Colvern, Regentstat, Sovereign).

Eight-valve holder base (Wearite or Lewcos).

One valve holder (Telsen, Lissen, Benjamin, Clix, Wearite, Lotus, W.B.).

Two 2-mfd. centre-tapped condensers (Ferranti C2C).

Two 1-mfd. condensers (T.C.C., Lissen, Dubilier, Telsen, Formo).

Five condensers: 1 .0002, .2 .002, 2 .001 (Telsen, T.C.C., Dubilier, Lissen, Formo).

One-meg. grid leak (Lissen, Telsen, Dubilier Graham-Farish).

Three spaghetti resistances, 15,000, 20,000, 30,000 (Readi-Rad, Telsen, Tunewell, Sovereign, Lissen, Graham-Farish, Lewcos).

L.F. transformer (R.I. Parafeed, Telsen,

TABLE ::::: RY SUPER"

SET :: THE :: SUITABLE S ON OPERATING

All types of valves have been tried in the set.

Suitable Valves

I used for testing a set of Mullard valves. The table shows further suitable types. For the first detector stage a high-impedance valve is the better type, such as Mullard PM1HF, Cossor 210HF, and so on.

In the two high-frequency stages Mazda 215SG, Mullard PM12, or Cossor 215SG valves are satisfactory and the others mentioned in the table. A valve of the same type as that used in the first detector stage may be fitted in the second detector position, and for the oscillator a valve of lower impedance must be used. Suitable valves are the Mullard PM1LF, Mazda L210, Cossor 210LF, and so on as described in the table.

For the power stage any good power valve may be used. It must, of course, be biased properly and usually —9 volts is satisfactory. This bias is applied through G.B.—2.

The first detector and oscillator are biased through G.B.—1 and 1.5 or 3 volts will be suitable, usually —1.5 volts being the better value. The high tension to the first valve should be adjusted to suit the bias of the yalve used. A usual value is about 70 volts. This is applied at H.T.+1. All other high tensions are connected to the full voltage available.

Notes on Tuning

The set is tuned exactly as the "Century Super." Put the oscillator switch to the medium-wavelength position and set the frame to the medium waves as well. Then switch the set on and with the volume-control potentiometer turned well over to the right or full-on position, the two condensers may be operated.

First put the oscillator tuning condenser at, say, 90 degrees, and then adjust the frame tuning condenser until a slight noise is heard, showing that the two circuits are now in tune. Next slowly move the oscillator condenser and also the frame condenser until a station is heard. The dials must be moved slowly or stations will be missed. It will be necessary to adjust the volume control when a station is heard, and you should also try turning the whole set, as the frame aerial, I have found, is fairly directional.

Having received a station, it is merely necessary to move the dials a degree or so when another station will be heard during the hours of darkness. In the hours of daylight the more powerful stations will be heard. A large number of stations will be brought in and the quality is very good.

Some people may want to fit a pentode, and this is connected in the usual way. The chief points are to adjust the first detector carefully and to tune slowly. The selectivity of the set is the same as that of the "Century Super," and is, of course, very good.

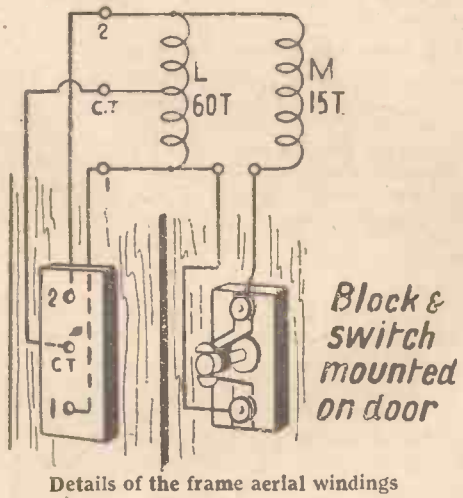
No Snags

There are no snags in the set and anybody can build it with the greatest of ease. Considering what it will do, the cost is relatively low and the appearance of the finished set is very good.

The portable Century Super is much more powerful than the normal self-contained type of set. There is no sacrifice in efficiency through making the set entirely self-contained. This is because the original Century Super was a frame-aerial set, providing a ready means of modification for listeners wanting self-containedness.

The extraordinary sensitivity of the Century Super does not depend upon the use of an outside aerial, consequently in portable form it still gives the 100-station reception service obtainable from the original model.

In its self-contained cabinet this latest Century Super is easy to move from room to room or from the house to the car or garden. The side handles on the cabinet are quite convenient, although still greater portability can be achieved by slipping a carrying strap through the handles. Of course, the total weight of the set prohibits its transportation by hand over any considerable distance. As a powerful, selective, easy-to-operate home set it will undoubtedly prove a big success.



Details of the frame aerial windings

Note the ample space available for the batteries

RTABLE "CENTURY SUPER"

Lissen, Varley, Lewcos, Ferranti, Burton, Voltron).
Three-point switch (Readi-Rad, Goltone, Lissen, Benjamin, Bulgin, Telsen, Junit, W.B., Wearite).
Fuse holder and fuse (Readi-Rad, Telsen, Bulgin).
Terminal strip with three terminals (Peto-Scott, Readi-Rad, Wearite).
Six wander-plugs, marked : H.T.—, H.T.+1, H.T.+2, H.T.+3, G.B.+, G.B.— (Clix, Belling-Lee, Eelex).
Two spades, marked : L.T.+, L.T.— (Clix, Belling-Lee, Eelex).
Frame-aerial wire (Lewcos, Goltone).
Six yards of flex (Lewcos).
Connecting wire (Lewcos, Goltone).
Sleeving (Lewcos, Wearite, Goltone).

ACCESSORIES

Accumulator (Exide W.P.C3 [free acid]; JWJ7 [jelly acid]; C.A.V, Pertrix).
One grid-bias battery, 9 volts (Pertrix, Ever-Ready, Drydex, Lissen, Fuller).
120-volt H.T. battery (Pertrix, Ever-Ready, Lissen, Drydex, Fuller).
Loud-speaker assembly (Ormond).

IN MY WIRELESS DEN

WEEKLY TIPS— CONSTRUCTIONAL AND THEORETICAL

By W. JAMES.

Intermittent "Dis."

A FAULT that crops up now and again and which is fairly easily traced is an intermittent disconnection in the loud-speaker wires.

You will hear a noise when the cord is moved, due to the contacts at the broken part making and breaking. If you hold the cord near the loud-speaker end and move the short length to and fro, the noise will be heard if the fault is at the loud-speaker end. A test at the set end will show whether there is a fault at that end and, having discovered the position of the fault, it is easy enough to cut off the bad part and to make new connections.

If the cord has wire rather difficult to handle, it might be better to fit a new one having prepared ends. Ordinary flex is, of course, suitable if of good quality.

The other connections to the set from the batteries or power unit are also likely to go after an amount of service and should be examined now and again, as you may short-circuit the supply if the insulation wears away and the wires touch.

With a good quality wire the insulation will probably not wear out with handling, but there is so much poor stuff about that faults of this nature occur. They are easily guarded against by inspection carried out at intervals.

Checking up H.T. Voltage

The voltage of the output from a mains unit depends upon the current being taken from all circuits.

In the case of a power unit delivering both high and low tension the voltage of the supply from one circuit will alter with a change in the load taken from the other circuit.

If, therefore, you wish to measure the output from the low-tension circuit, for example, the high-tension circuit must also be loaded. I have noticed when testing a particular mains unit that the low tension was 4 volts at 4 amperes with the high tension disconnected. But when the normal output was taken from the high-tension circuit the voltage fell to a little below 3.8 volts.

My point is that when testing a mains unit one might test one output and so obtain misleading results. A unit should always be tested at full load with all circuits working.

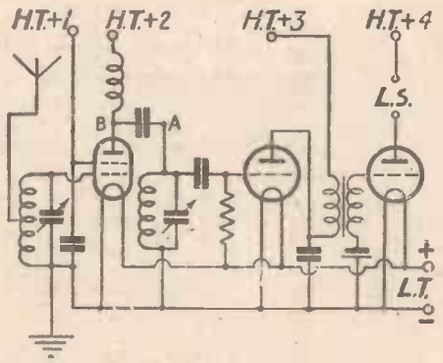
With small transformers the outputs are likely to vary considerably with different loads. This is because relatively fine wire is used with a poor iron circuit. In a good transformer the windings and core are so proportioned that the output voltages do not vary much with the current.

Logical Fault Finding

When a fault occurs in a set it is much better to follow a logical method of testing than to try all sorts of things without system.

A step usually taken is to test the high-frequency stage by cutting it out. To do this the aerial is transferred from the aerial circuit to the tuned-grid circuit. That is, the aerial is taken to point A in the diagram.

The aerial is placed across the whole of the coil and naturally the tuning of the circuit will be different from the normal, less tuning condenser being needed.



This diagram shows the logical sequence in testing for a fault as explained in the text

To overcome this difficulty a fixed condenser of .0001 microfarad may be connected in series with the aerial. This will lower the effective capacity imposed by the aerial across the tuned circuit.

If you connect the aerial directly to point B the results will be approximately as when the aerial is joined to point A. There is this difference to be noted, however, that the high tension is connected to point B and not to point A.

If the valve is removed, the tuning will be a trifle sharper, but not much so, and you may as well test with the valve connected. Of course, if signals are heard with the aerial joined to points A or B and not when taken to the aerial coil there is a fault in the H.F. valve or aerial circuit.

Amateur "Design"

I had occasion the other day to look over a set which was not working properly. It was, as a matter of fact, an amateur's attempt at designing a set and there were several faults.

The first was in the aerial circuit, its wavelength being too high. A pre-set condenser connected in the aerial wire soon corrected this, lowering the band of wavelengths nicely.

The next fault was in the screen-grid stage, which had no condenser between the screen of the valve and the negative side of the low tension. A 1-microfarad was connected here and helped to stabilise the set.

Then the reaction was too fierce and I saw there was no by-pass condenser between the anode of the detector valve and the filament. With a .0002-microfarad added here the results were much better and the set was reasonable.

A little motor-boating was apparent when the set was practically oscillating, but as the battery was old, this was to be expected. A filter feed to the detector circuit would have stopped this. The faults are common ones. There must be many sets that could be improved by a little attention to details such as these.

These "Spaghettis"

Flexible resistances of many makes are now available and the current-carrying capacity of the different makes varies. It is, therefore, necessary to look into this as well as the actual resistance values.

I have noticed one or two of the resistances used experimentally have become quite hot and would have broken down in time.

About H.T.B.s

Dry batteries are so well made these days that it is surprising to hear of cases where a user prefers not to buy a large size because he thinks it may not have the expected life.

A few years ago one used sometimes to obtain a big battery which discharged very quickly or soon developed a high resistance, and so the battery turned out to be expensive. I have had groups of three large batteries to provide 150 volts and found that one of them, perhaps, has gone high resistance long before the others.

We get better batteries in these days, and it pays every time to buy the larger sizes if your set passes a fairly heavy current. Not only does the cost per year work out less when the right size of battery for the set is used, but the results are usually better.

With a small battery you must expect the voltage to fall more rapidly and the resistance to increase more quickly than when a larger one is used. Results cannot be consistent when the high-tension voltage is on the low side.

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KIT A (Less Valves and Cabinet) **£8 : 0 : 0**
or 12 equal monthly instalments of **14/8**

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THE "CENTURY SUPER" PORTABLE
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1 Ebonite panel, 12 in. by 8 in. by 3/16 in. drilled to specification		4	0
1 Readi-Rad cabinet in polished walnut to specified design	2	5	0
2 J.B. .0005-mfd. junior log slow-motion condensers, 40-1 ratio	1	1	0
1 Set Lewcos super-het coils	2	10	0
1 Sovereign 50,000-ohm potentiometer		4	6
1 Readi-Rad 8 valve base		7	0
1 Telsen 4-pin valve holder			6
2 Ferranti C2C condensers		9	0
2 T.C.C. 1-mfd. fixed condensers		5	8
5 Telsen fixed condensers; 2, .001; 2, .002; and 1, .0002-mfd.		2	6
1 Readi-Rad 1-megohm grid leak			10
3 Readi-Rad link resistances; 15,000, 20,000 and 30,000 ohms		4	0
1 R.I. Parafeed L.F. transformer		8	6
1 Readi-Rad 3-point switch		1	6
1 Readi-Rad fuse and holder		1	3
1 Readi-Rad 3-point terminal strip			6
6 Belling-Lee wander plugs; 4, H.T., and 2, G.B.		1	0
2 Spade terminals			3
1 100-yds. reel Lewcos 9/40 frame wire, L.Z. 2140		4	3
1 50-yds. reel Lewcos 27/40 frame wire, L.Z. 2240		5	6
1 Pkt. Readi-Rad "Jifilinx" for wiring		2	6
1 Ormond portable loud-speaker unit and chassis	1	5	0
6 Mullard valves as specified: 2, S.G.; 2, H.F.; 1, L.F.; and 1, Power	3	16	0
6 yds. flex, wire, screws, etc.			9
TOTAL (including Cabinet and Valves)	**£14:1:0**		

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All your goods are very carefully packed for export, and insured, all charges forward

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Build the "Century Super" Portable with a Ready Radio Kit, and make a scientific replica of the designer's own set.

You can now buy any Ready Radio Kit from your local dealer, but be sure it is a genuine Ready Radio Kit.

See also page 42.

ORDER FORM. To: READY RADIO (R. R. Ltd.)
159 Borough High Street, London Bridge, S.E.1

CASH ORDER. Please despatch to me at once the goods specified for which I enclose payment in full of £.....

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RADIO RESEARCH

By J. H. REYNER, B.Sc., A.M.I.E.E.

AT THE NATIONAL PHYSICAL LABORATORY

AN invitation to the National Physical Laboratory is always welcome, though a visit is somewhat humbling in that it gives one just a faint glimpse at the vastness of knowledge, and causes one to realise one's own small store thereof.

The first exhibit to be visited by the writer was the apparatus used for the systematic testing of radio receiving apparatus. This apparatus has been developed in order to form a standard for the performance of receivers from the points of view of selectivity, sensitivity and fidelity; the idea being the development of simple tests the results of which may be made available to the general public in order to

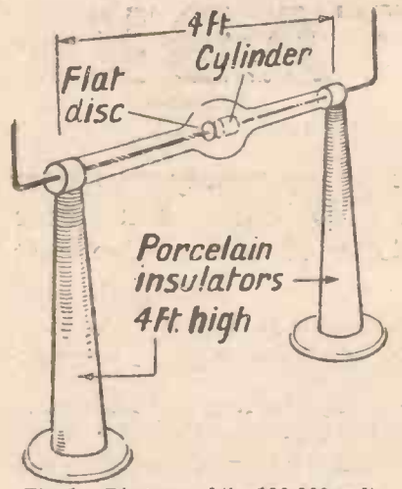

Fig. 1. Diagram of the 100,000-volt rectifier used for X-ray work

guide them in the purpose of complete receiving apparatus.

The apparatus used consists essentially of a miniature transmitting station coupled through a dummy aerial to the receiver under test, arrangements being provided for measuring the voltage input and the power output from the receiver. The sensitivity is gauged by finding the input required to give 50 milliwatts output. This output is only small—a loud-speaker requires several hundred milliwatts to give good volume—but it is now accepted as a standard figure.

The selectivity test consists in plotting resonance curves for various points throughout the tuning range, while for the fidelity test the modulation frequency is varied from 50 to 10,000 cycles per second, and the variation in output noted, so that any serious cut-off in bass or treble, due either to too sharp tuning or poor L.F. equipment can easily be detected.

The testing apparatus is very elaborately screened. The oscillator and modulating arrangements are housed in a cabinet completely covered with sheet tin, while the receiver under test and the voltage and current measuring arrangements are housed in another metal cabin, communication between the operators in these two cabins being accomplished by means of speaking tubes.

A somewhat surprising fact in connection with these tests is that no definite scheme has been devised to deal with the problem of the reaction control during the tests. It is not sufficient to leave the reaction control in the zero position, or even to disconnect it, for it is obviously unfair to use this method to compare a receiver which is inherently stable but fitted with a reaction control against another receiver which is nearly unstable throughout the whole range, but is not fitted with a reaction control. Once this point is solved the rating of receivers in scientific terms will follow very rapidly, which will be to the advantage of the public and the manufacturer alike. Simplified forms of testing apparatus are already in use in many manufacturers' laboratories.

Short-wave Research

Another very interesting exhibit consisted of a short-wave transmitting and receiving apparatus for wavelengths varying from 1.5 to 5 metres. The apparatus used is absurdly simple, and is such as any amateur might possess in his store cupboard. There is a very interesting field for experiment in this region. If any reader should consider trying his hand at such experiments it is necessary to bear in mind that precautions must be taken against unwanted capacity effects, as small capacities cause very large variations in frequency when one is working on a wavelength of a few metres only. Such precautions as de-capped valves and air-spaced coils are essential. The aerial should consist of a short length of wire one quarter of a wavelength long, mounted vertically.

These remarks apply, of course, to both receiving and transmitting arrangements. For modulating the transmitter aerial currents a gramophone can very conveniently be used, and a skeleton circuit is shown by Fig. 1.

In a different quarter was the apparatus for receiving signals from the rotating-beam wireless beacon. As readers will probably already know, one of these beacons has been erected at Orfordness in Suffolk for the purpose of giving ships their true bearings. The complete aerial is rotated at a speed of one r.p.m. and transmits a definite signal at different points of the compass. A receiver at the N.P.L. is tuned to the signals which are applied to a recorder so that any drift in the bearing or the timing can be checked continuously.

A spectacular exhibit was that showing the method of testing the flash-over voltage of a high-tension insulator. Before the test commenced everyone was turned outside the building to watch the insulator, which was hanging from a lattice tower of the type which may be seen carrying overhead power lines all over the country. After the power had been turned on and the voltage was being gradually raised, a curious phenomenon was noticed. The cable leading from the high-tension apparatus to the insulator appeared to be shaking along its whole length and emitting a queer squealing noise, which ceased abruptly when the flash-over occurred. As the experiment was conducted in full sunlight it was not possible to see the various effects just prior to the flash-over, such as the formation of the corona discharge, etc., but only the discharge itself, which appeared as a short and very vicious flash of lightning. The flash-over was, of course, accompanied by a loud noise. The voltage used for the test was approximately half a million!

Fine Apparatus

In the physics building was an arrangement used for providing the necessary voltage on the anodes of the X-ray tubes. A voltage doubling scheme was used similar to that employed in high-tension eliminators for radio receivers, but the rectifiers were of somewhat unusual construction. They consisted of a long glass tube several inches in diameter with a bulb formed in the middle. Running down the centre are two electrodes as shown in Fig 2. The voltage on each anode is 100,000, giving 200,000 volts D.C. output, which is fed to all the apparatus in this particular part of the laboratories by means of heavy copper conductors suspended from the ceiling and very well spaced from one another. The whole of the rectifying apparatus is mounted behind heavy wire screens. These elaborate precautions are, of course, necessary because of the high voltage.

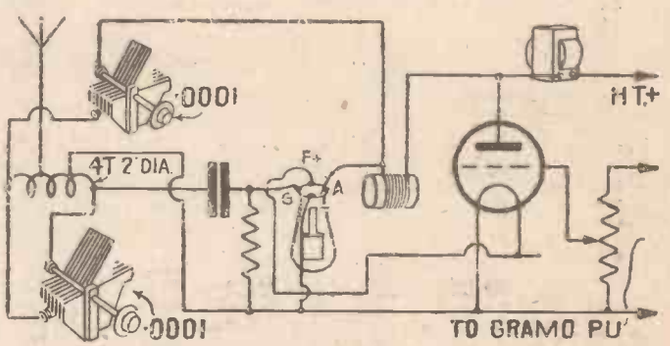

Fig. 2. Schematic diagram of 1½-5-metre transmitter. The receiver is similar except that no modulator valve is required

One of the most lasting impressions left on the mind when leaving the laboratories is the very workmanlike manner in which all the apparatus is finished and the tests carried out. There is nothing shoddy, everything giving evidence of a careful forethought and pride of workmanship.

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THIS fine KIT is just what you have been waiting for—the wonderful 'Century Super' with all the first quality specified components, easy to assemble and costing you very much less!

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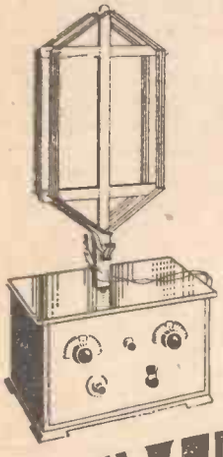

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OVERSEAS CENTURY SUPER *de Luxe* KIT

OVERSEAS RECEIVERS LTD., Overseas House, 18 Ganton Street, Regent Street, W.1

SPECIFICATION

1 Mahogany finish ebonite panel.
1 Cabinet, complete, 12 in. by 7 in., with baseboard, 12 in. by 9¾ in.
1 Lewcos Frame Aerial kit complete with instructions.
2 Jackson .0005-mfd. variable condensers, Tiny No. 2.
1 Watmel 50,000-ohm Potentiometer.
1 Bulgin 3-point shorting switch.
1 Set Lewcos Super Heterodyne coils.
1 Lewcos 8-way base.
5 T.C.C. 1-mfd. fixed condensers.
2 T.C.C. .001-mfd. fixed condensers.
1 Lewcos L.F.T. 3 constant inductance transformer.
1 Terminal strip, fitted 3 terminals.
1 Sovereign 15,000-ohm link resistance.
1 Sovereign 20,000-ohm link resistance.
1 Bulgin fuse and holder.
1 Lewcos 9-way cord.
Necessary connecting wire, screws, sleeving, etc., etc.

KIT 'A' As specification above, but excluding Cabinet **£6 : 17 : 6**

KIT 'B' As specification above, with six TUNGSRAM VALVES, but excluding Cabinet .. **£9 : 7 : 6**

KIT 'C' As specification above, with six TUNGSRAM VALVES, including Cabinet **£10 : 2 : 6**

KIT 'D' As specification above, with six MULLARD VALVES, including Cabinet **£11 : 12 : 6**

WE TEST FOR YOU

A weekly review of new components and tests of apparatus.

Conducted by J. H. REYNER, B.Sc., A.M.I.E.E.

Wates Gramophone Motor

ONE of the first essentials of a modern radio gramophone is a first-class motor. Such a motor must run at an absolutely constant speed and must be silent both electrically and mechanically. Very often one hears otherwise good gramophone reproduction ruined by a motor the speed of which is not perfectly constant, for the human ear is very sensitive to small changes of pitch. In introducing their new gramophone motor Messrs. Wates have borne these points well in mind. Not only is this new motor silent, but constancy of speed is obtained by adopting a principle not hitherto applied to this class of work. The motor, in fact, is of the "synchronous" type, which means that its speed is determined by the frequency of the electrical supply and is not affected by the voltage or the load, provided this is not excessive. Since the frequency of the average A.C. supply is constant to within a very small value, the speed of the motor will thus remain constant under all conditions.

These motors are not self-starting, it being necessary to give the turntable a gentle spin, after which the motor will pull into step and continue to rotate. A further point of difference is that if the full load is

Wates gramophone motor and turntable

exceeded the motor will not slow down, but will stop altogether. Indeed, to stop the motor it is merely necessary to put a little pressure on the side of the turntable, when it will stop.

On test we found the motor satisfactory, being very nice to use. It is generously designed, and after a long period of connection to the electrical supply it was only slightly warm. The current consumption was found to be only 100 m.a. at 240 volts. Full instructions are provided for installing the motor, and when fitted in accordance therewith, the machine is almost noiseless in operation.

Atlas Pentode Choke

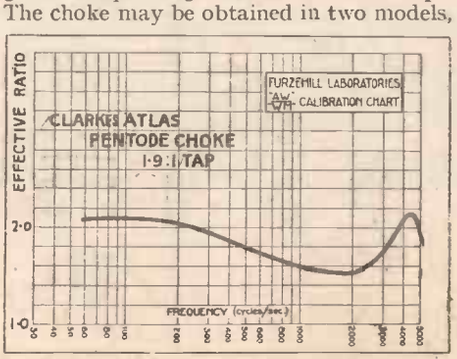
THE increasing popularity of pentodes is causing much more attention to be paid by manufacturers to the problem of the design of useful output arrangements for matching the loud-speaker to the pentodes in use. As readers will know, it is essential that some impedance-matching device be used with a pentode in order to prevent the high voltages which may be developed in

The Clarke Atlas pentode choke

the anode curcuit of the valve, if the loud-speaker is connected directly in this circuit.

The new pentode choke just placed on the market by Messrs. H. Clarke & Co., Ltd., Atlas Works, Manchester, is a good example of the latest development in this line. It is designed on generous lines, and is provided with tappings to give ratios of 1, 1.2, 1.3, 1.6, 1.9, 2.1, 2.7, 3 and 5 to 1. With these ratios it is possible to get good matching with all normal pentodes when using loud-speakers with impedances between 350 and 8,000 ohms. It should be noted that this choke is not suitable for use with low-resistance moving-coil instruments.

A test was taken on the 1.9 : 1 tapping to investigate the variation of the ratio with frequency. The result of this test can be seen in the accompanying curve. The inductance was found to be 35 henries at 30 milliamps and 30 henries at 60 milliamps. The choke may be obtained in two models,



Characteristic Curve of Clarke pentode choke

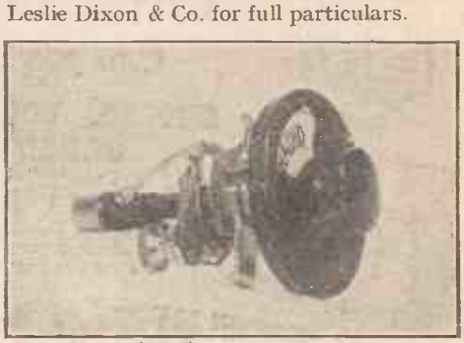
shrouded and unshrouded, selling at 21s. and 15s. 6d. respectively, and can be recommended to all who use pentode valves. The overall dimensions of the shrouded model illustrated are 3½ in. by 6½ in. by 4¼ in.

Low-priced Headphones

ALTHOUGH some people regard headphones as having gone out of fashion, there are still numerous occasions on which they may be used with advantage. They are very convenient for monitoring a circuit, i.e., listening in at some suitable point, usually in the anode circuit of the detector valve in order to find out what is happening. Where a receiver is situated in one room and the loud-speaker in another some such arrangement is essential.

There are many other cases where the serious-minded amateur will find telephones indispensable, such as for heterodyne wavemeters, bridge measurements, etc., or even for learning morse.

We are interested, therefore, to learn that Messrs. Leslie Dixon & Co., of Upper Thames Street, E.C.4, are selling off a large number of government surplus headphones. They range from 120-ohm models with single ear pieces up to 8,000-ohm phones. Most of these headphones are being sold at prices of a few shillings, so that they are a distinctly profitable investment. Anyone who is interested should write to Messrs. Leslie Dixon & Co. for full particulars.



Gripso indicating switch

Gripso Indicating Switch

THERE is no doubt that an indicating nameplate on a switch is a convenience. Although one may know the correct position one's self, others may have no idea as to whether a switch should be in or out.

The Gripso switch illustrated herewith carries a circular indicating disc on the front. When the switch is operated a disc inside the housing rotates, giving the correct indication.

The advantage of this particular switch is that it only requires a small hole for the fixing, which may thus be carried out by any amateur having a $\frac{1}{16}$-in. drill. It should be a popular component.

BROADCAST ARTISTES IN PICTURE

GEORGES HAECK.—The leader and director of his own orchestra at Frascati's restaurant in Oxford Street, London

GRACIE FIELDS.—One of the most popular comediennes of to-day. A great favourite on stage, wireless and gramophone records

ROBERT NAYLOR.—A favourite Midland baritone singer, Mr. Naylor was heard most recently in a special concert given by Fred Adlington's New Octet

ELSIE SUDDABY.—One of the earliest of broadcast stars. Miss Suddaby has sung in every type of concert

AGNES MILL.—Miss Mill joined issue on June 25 at a special concert with Theresa Gordon and M. Etcheverria

WILFRED WORDEN.—A child prodigy pianist. He is well known for his wide repertoire of classical works

DOROTHY HELMRICH.—Miss Helmrich hails from Australia, and is a mezzo-soprano. She has figured prominently at the "proms"

MR. P. A. HARDIDGE.—A well-known authority on swimming, Mr. Hardidge gave a talk on "Channel and Long Distance Swimming" recently from Midland Regional

MARY POLLOCK.—A charming soprano who frequently broadcasts in the Children's Hour concerts

HERBERT MENGES.—A brother of the well-known violinist Isolde Menges, he carries on the family tradition for musical work

THELMA NURICK.—This brilliant young pianist has now broadcast on several occasions with Muriel Cohen

ARTHUR CRANMER.—A well-known baritone, who has a wide provincial reputation

CYRIL SCOTT.—Composer and pianist himself, Mr. Scott's works are well known to pianists of the younger school of art

SETS OF DISTINCTION

THE OVERSEAS CENTURY SUPER KIT

Makers: OVERSEAS TRADING CO., LTD.

Price: £6 17s. 6d.

I HAVE just had a taste of really good selectivity—as rendered by the Overseas "Century Super", a kit of parts recently submitted to me, ready assembled, for my tests and comments.

First of all, let me explain that this kit follows the original "Century Super" circuit implicity, although the layout differs very slightly owing to the use of a Lewcos 8-valve holder. Actually, this holder simplifies the wiring considerably.

The price of the kit of parts quoted above does not include the cabinet or valves, but does include a frame-aerial kit. I think this is fine value for money, enabling the listener with limited means to purchase the nucleus of a really first-class set. Kit A, then, is £6 17s. 6d.

Kit B includes frame-aerial and six Tungsram valves, and the price is £9 7s. 6d. Kit C is similar to Kit B, with the addition of an oak cabinet, the price being £10 2s. 6d.

Lastly, there is Kit D, which differs from Kit C only in valves. Kit D price is £11 2s. 6d., and one has a choice of a set of valves such as Mullard, Marconi, Cossor, Osram, or Mazda.

So much has been written and said about the original "Century Super," described very fully in recent issues of AMATEUR WIRELESS, that I have no need to rhapsodise over the particular virtues of the Overseas Kit.

There are very many points of interest in the "Century Super." Altogether there are six valves. Two of these are high-frequency amplifying valves, which are fixed tuned to a wavelength of 2,400 metres. These two valves form the intermediate-frequency amplifier.

Preceding these two valves is the first detector valve, in whose grid circuit is the tuned frame winding. Coupled to this frame winding is a separate oscillator valve, the function of which is to create with the incoming frequency a beat frequency, which is amplified by the two screen-grid valves and then detected by the second detector, which immediately follows the intermediate high-frequency amplifier.

The output power valve is coupled to the second detector valve by means of a low-frequency transformer. Wherever necessary, fixed condensers are inserted, to preserve the stability of the circuit.

Good Quality

I should like to emphasise the fact that when this circuit is interpreted with modern valves, it can provide not only very great sensitivity and extraordinary selectivity, *but also first-rate quality of reproduction.* In fact, due to the band-pass intermediate coils, there is less top-note loss with this circuit than in the normal three- or four-valver.

I have been examining the layout of the Overseas "Century Super" Kit, and I must say it is extremely simple. No one could make a mistake in assembling the kit, and in wiring up the comparatively few components. The Lewcos coil and valve platform saves quite a number of connections.

On this platform are fitted all the valves except the separate oscillator valve and all the coils except the oscillator coil, which is mounted on the panel so that its wave-change switch is readily accessible.

I note that Lewcos coils are used, as well as a Lewcos low-frequency transformer.

A front view of the completed Overseas "Century Super"

The rest of the apparatus is also first-class, for the tuning condensers are Polar, and the fixed condensers T.C.C.

Below these main controls are two subsidiaries. On the left is the knob of the potentiometer, which, by controlling the sensitivity of the screen-grid valves, admirably controls the volume. On the right, under the oscillator dial, is the switch for the oscillator coil, providing ultra-short, medium and long wavelengths.

The only other control is the filament on-off switch mounted at the centre of the panel. Coming from the back of the set is a Lewcos battery cord, providing neat connections for the high-tension, low-tension, and grid-bias batteries.

My first test of the Overseas "Century Super" kit was done with a milliammeter. With this I found the total anode consumption was 12 milliamperes.

London National was tuned in—without any fiddling—at 26 degrees on the frame tuning condenser, and 47 degrees on the oscillator. London Regional was logged at 50 and 67 on left and right dials respectively. Midland Regional came in at 59 and 77, and North Regional was loudly heard at 65 and 95.

I have given these readings merely to show the relative settings of the two tuning dials. Between these readings I have logged so many foreign stations that the original claim of 100 stations certainly cannot be called an exaggeration.

Wonderful Selectivity

The most impressive result of my tests was the selectivity. London Regional and National stations, which usually occupy at least 10 degrees on a 100-degree dial, disappeared in *less than the space of one degree.* This test was carried out some 15 miles from Brookmans Park.

Quality of reproduction, using the small-power valves specified and a new Amplion cone loud-speaker, was not merely tolerable but really enjoyable. Altogether, the Overseas "Century Super" kit comes up to the high standards set by the original James production. What better praise can I bestow upon it?

SET TESTER.

R.R. LIMITED (Ready Radio)

R.R. LIMITED, better known to wireless constructors as "Ready Radio," has recently been converted into a public company with a nominal share capital of £50,000. Subscriptions are being invited from the public for an issue of 34,000 7½ per cent. cumulative preference shares of £1 each, and of 68,000 ordinary shares of 1s. each at par value.

Applicants for preference shares will have the right to subscribe for two ordinary shares for every preference share subscribed for, but applications for ordinary shares only will not be considered.

The preference shares are payable 5s. per share on application, 5s. on allotment, and the balance of 10s. on August 15, 1931, the ordinary shares being payable in full on application.

The objects of the issue are to enable the company to acquire a larger and more modern factory and additional showrooms to cope with increasing sales and to provide further working capital to enable the company to take full advantage of favourable buying opportunities. The list of subscriptions will be closed on July 10.

Applications for the full prospectus should be made immediately to the Registrar, R.R. Ltd., 1 Ironmonger Lane, London, E.C.2.

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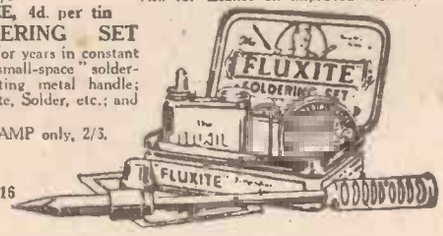

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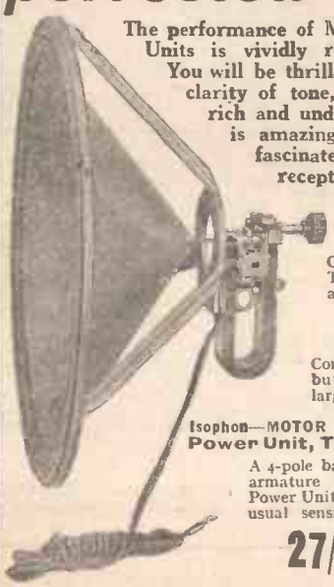

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Isodyn—MOTOR Chassis, Type C55
Complete with Type S5 Unit as illustrated. **35/-**

Isophon—MOTOR Super Unit, Type S5
Compact in size, but generously large in power. **22/6**

Isophon—MOTOR Super Power Unit, Type S4 **27/6**
A 4-pole balanced armature Super Power Unit of unusual sensitivity.

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Type C46 15" Cone **47/6**

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CENTURY SUPER PORTABLE

Described in this and last week's issues

	£	s.	d.
Ebonite panel, 12 in. by 8 in., Peto-Scott		4	9
Baseboard, 12 in. by 9 in., Peto-Scott		1	6
2 .0005-mfd. variable condensers, J.B. slow-motion type JL2	1	1	0
Super-het coils, Lewcos or Wearite	2	10	0
50,000-ohm Variable resistance, Sovereign		4	6
2 2-mfd. centre-tapped condensers, Ferranti C2C		8	0
2 1-mfd. condensers, Telsen type W78		4	6
5 Condensers 1, .0002; 2 .002; 2, .001, Telsen		2	6
1-meg. Gridleak, Telsen			9
3 Spaghetti resistances, Lewcos.		4	6
L.F. transformer, R.I. Parafeed		8	6
3-point Switch, Telsen		1	3
Fuse holder and fuse, Telsen		1	0
Terminal strip with 3 terminals, Peto-Scott			6
6 Wander plugs, Belling-Lee		1	6
2 Spades, L.T.+, L.T.—, Belling Lee			9
Frame aerial wire		5	6
6 yds. flex, connecting wire and sleeving		Gratis	
	£6	2	0

KIT "A" Less Cabinet, Valves L.S. Unit and Batteries **£6.2.0**
or 12 monthly payments of 11/3

ACCESSORIES

	£	s.	d.
Peto-Scott Special Cabinet in Walnut	2	5	0
6 Mullard Valves	3	16	0
Exide 2-v. Accumulator type W.P.C.3		15	6
Pertrix 120-v. H.T. Battery	1	5	6
Pertrix 9-v. G.B. Battery		1	6
Ormond Loud-speaker Unit	1	5	0

KIT "C" Including all the above Accessories. **£15.10.6**
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Any parts supplied Separately
CASH or C.O.D.
If value over 10/- sent post free.

CENTURY SUPER
Battery Model

KIT "A" Less Valves, **£5.0.0**
Cabinet and Frame Aerial
or 12 monthly payments of 9/2
With Frame Aerial £6.0.0
or 12 monthly payments of 11/-

KIT "B" £8.16.0
As above with valves but less Cabinet and Frame Aerial
or 12 monthly payments of 16/2
With Frame Aerial £9.16.0
or 12 monthly payments of 18/-

KIT "C" £10.11.0
Complete with Valves, Cabinet and Baseboard, Panel and Frame Aerial.
or 12 monthly payments of 19/5

FINISHED INSTRUMENT
Royalties paid.
Batteries excluded. **£13.17.6**
or deposit **£3.17.6** and 11 monthly payments of **£1**

Immediate delivery

CENTURY FRAME AERIAL

As specified for the original Century Super-het. Three-way lead and six spacers. Each strand of wire is enamelled and covered overall, which ensures maximum results. Correct centre tap. The only Frame Aerial complete with wave-change switch and base.
SENT C.O.D., PAY THE POSTMAN, OR FROM YOUR DEALER. **£1**

17/- CASH or C.O.D. **VARLEY CONSTANT SQUARE PEAK COIL** with Dubilier .04 mfd. condenser as recommended Specified in Square Peak 3.

● ACCESSORIES FOR BETTER RADIO

ATLAS A.C. ELIMINATOR TYPE A.C.244. 3 Tappings, S.G., Detector and Power. Output 120 volts at 20 m/a. Send **5/6** only
Cash price or C.O.D. **£2 19 6**
Balance in 11 monthly payments of **5/6**

WUFA 60-POLE UNIT, WITH CHASSIS. Send **5/-** only
Cash price or C.O.D. **£2 0 0**
Balance in 8 monthly payments of **5/-**

EPOCH PERMANENT MAGNET MOVING-COIL SPEAKER. Type A.1. Send **5/9** only
Cash price or C.O.D. **£3 3 0**
Balance in 11 monthly payments of **5/9**

EPOCH PERMANENT MAGNET SPEAKER, with type B5 unit only. Send **7/9** only
Cash price or C.O.D. **£4 4 0**
Balance in 11 monthly payments of **7/9**

NEW COSSOR EMPIRE MELODY MAKER, MODEL 234 S.G., H.F., det. and power. Employs new Cossor high efficiency metalised S.G. valve. Send **10/-** only
Cash Price or C.O.D. **£6 15 0**
Balance in 11 monthly payments of **12/6**

LAMPLUGH OR FARRAND INDUCTOR SPEAKER for perfect reproduction. Unit and Chassis complete, ready mounted. Send **6/5** only
Cash price or C.O.D. **£3 10 0**
Balance in 11 monthly payments of **6/5**

BLUE SPOT SPEAKER UNIT TYPE 66R. 4 pole balanced armature with Major Chassis and Cone (37 cm). Send **6/-** only
Cash Price or C.O.D. **£2 10 0**
Balance in 8 monthly payments of **6/-**

EXIDE 120-volt Type W.H., H.T. ACCUMULATOR, in crates. Send **8/6** only
Cash price **£4 13s.**
Balance in 11 monthly payments of **8/6**

TRADE NOTE Peto-Scott Frame Aerials, Super-Heterodyne Equipment, S.W. Adaptors, available to the Trade. Terms upon application.

PETO-SCOTT CO. LTD.

Head Office: **77 CITY ROAD, LONDON, E.C.1** *Clerkenwell* 9406
62 HIGH HOLBORN, LONDON, W.C.1. *Chancery* 8266.
MANCHESTER: 33 WHITELOW ROAD, CHORLTON-CUM-HARDY. *Phone: Chorlton-cum-Hardy* 2028. NEWCASTLE, STAFFS: 7 ALBANY RD. *Phone:* 67190

Broadcasting and the Highlands

SIR,—I am glad to see you are taking up the question of broadcasting in the Highlands of Scotland. It is a perfect scandal the way we are treated. I have a five-valve screen-grid set and it is with difficulty I can get Glasgow, and at times not at all. The other Scottish stations are useless. I am wondering how your new super-het would do in this district.

D. J. K. (Gollanfield).

(There is no doubt but that the "Century Super" would be quite effective for this district.—ED.)

"Around the Short-wave Dial"

SIR,—I was interested to read in a recent issue of AMATEUR WIRELESS of reception of W3XAL, Bound Brook, N.J., on approximately 25 metres. I had the same experience earlier in the year, and in March last wrote a letter to the N.B.C., owners of the station, and asked if it was a harmonic or an experimental transmission, to which I received the following reply :—

"Thank you for your interest and co-operation in advising us of the reception of W3XAL on a wavelength of approximately 25 metres. This is W3XAL's second harmonic, and steps have been taken to eliminate it."

I may add that the 25-metre reception was always as loud and quite frequently of better quality, due to less fading, than the transmission on 49.18 metres. If it is still possible to get the second harmonic at good strength, the N.B.C.'s efforts at eliminating it do not seem to have been very successful. W. H. A. (Tunbridge Wells).

"Century Super" and Range

SIR,—Having given the "Century Super" a week's test I have come to the conclusion there is something radically wrong with my attempt at building or operating it. There seems to be an excess of frying noises in my reception and do what I may I seem to be unable to get more than about 10 stations on the medium waves. Adjustment of the volume control seems to have little or no effect and although the "feel" of the set gives one the impression that the other stations are there, I cannot resolve them. Perhaps from these very meagre symptoms you can explain my trouble or put me on the track of better results.

R. H. (Orpington).

(Your screen-grid valve voltage-controlling potentiometer appears to be faulty and if you are not using a wire-wound type of potentiometer we suggest you do so. If you are using such a potentiometer, we suggest you return it to the makers for test. Be sure to use a triple-capacity dry-cell H.T. battery if you are restricted to the use of dry-cell batteries. Then check up the anode and grid-bias voltages to your first detector valve. If you have a milliammeter, use it in the anode circuit of the first detector and adjust the above voltages so that the normal anode current consumption of the valve is between .1 and .2 of a milliampere. On no account should the anode current to the first detector valve be allowed to exceed .2 of a milliampere.—ED.)

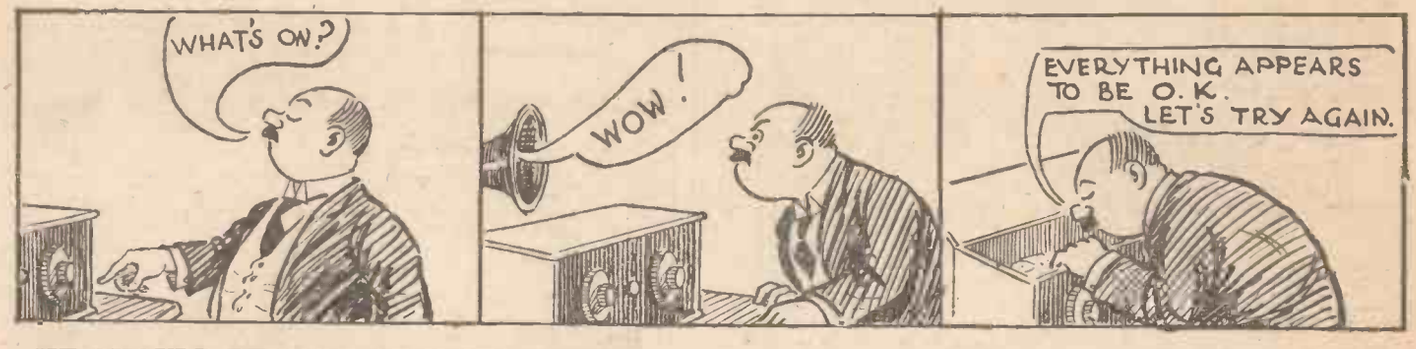
"Summer-time Distance Getting"

SIR,—In the article "Summer-time Distance Getting" in a recent issue of your valuable paper, there is one point which I consider not clear, and I trust that you will forgive my presumption in bringing up the matter; I refer to the actual connections between the adaptor and the set.

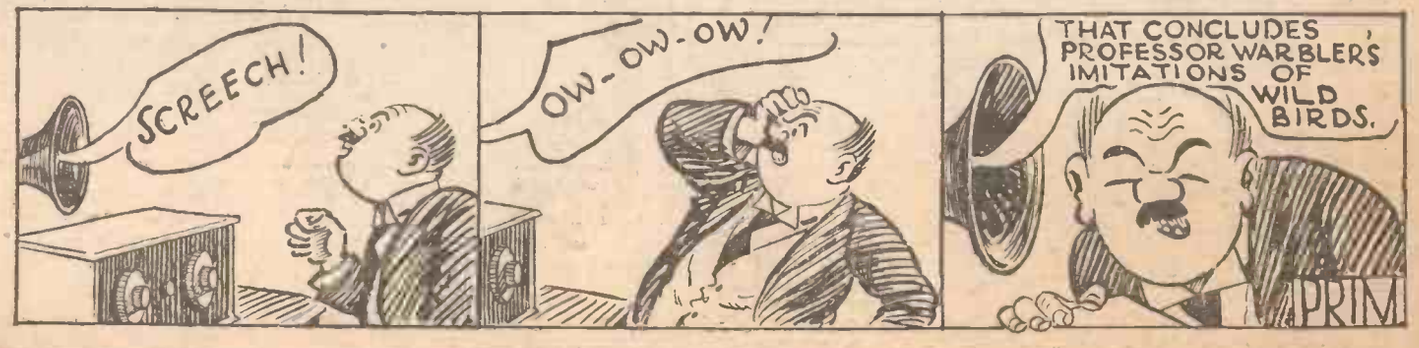
According to the article, two spade terminals from the unit are connected to the L.T. battery, as well as those of the set; as no switch is fitted on the unit, its S.G. valve will be "lit" permanently unless one spade terminal is detached when closing down the set. If, instead of connecting the unit direct to both poles of the L.T. accumulator, one of the terminals is so connected and the other taken to the set's earth terminal, the unit will be switched off automatically together with the set. The terminal going to the accumulator should, of course, be attached to the pole *not* connected to the switch on set. In this way the actual wire may be left on the set, and the earth terminal on the unit is superfluous; alternatively, the two earth terminals (set and unit) could be coupled, in which case one of the L.T. leads would not be used.

L. A. McL. (Lanark).

WHEN MR. FLEX GETS THE REAL "WOW-WOW" STUFF ON HIS MIND—



—HE SHOULD BEWARE OF IMITATIONS



RADIOGRAMS

THE Philips short-wave transmitter installed at the Carlton Hotel, Amsterdam carries out experimental broadcasts every Saturday night between 9.40 p.m. and 12.40 a.m. (Sunday morning) on a wavelength of 7.85 metres. For the purposes of tests a relay is made of dance music by the local Carlton orchestra.

The most powerful telephony transmitter in the world is now starting to carry out its initial tests at Noginsk, near Moscow. According to announcements made in the course of the Trades Unions programmes, it will be capable of radiating 200 kilowatts in the aerial. It is to be used for propaganda purposes and talks are to be given in Russian, English, German, French, Spanish, and Italian.

Radio Tananarive is the call of an official broadcasting station on the island of Madagascar off the east coast of Africa. It has been installed by the French authorities and works daily from 6 p.m. until 8 p.m. and on Saturdays from 7 until 11 p.m. B.S.T. The wavelength is 50 metres, and the power 500 watts.

The German Posts and Telegraphs administration has opened a small station at Cuxhaven for the transmission of medical advice to ships at sea. Broadcasts are carried out in several European languages on 160 metres. The call is *Elbe Weser Radio*.

Poste Colonial, the French short-wave transmitter at Pontoise, near Paris, broadcasts daily on three different wavelengths. On 19.68 metres from 4.30 to 6.30 p.m.; on 25.63 metres from 7.30 to 9 p.m.; and again from 10 p.m. B.S.T. until midnight on 25.20 metres.

The Rotary Club of Bath is organising a gigantic Carnival from July 15 to 18 in the Institution Gardens, Bath, and a relay will be given for West Regional listeners on July 15. The Carnival has been organised to raise funds to build a children's ward at the New Royal United Hospital, Bath. The broadcast will enable listeners to hear the Carnival music and all "The Fun of the Fair," and will include performances by Citizen House Players, the Low Brows Concert Party and The Pump Room Dance Orchestra.

Postcard Radio Literature

Marconiphone H.T. Unit

I HAVE just received two folders dealing with the AC7 and DC7 H.T. units. As these designations imply, these units are for A.C. and D.C. mains respectively. Full technical details are given and if you are on the lookout for a better way of getting H.T., than you have at present, you should write for one of these folders. **296**

"The Best Way"

"The Best Way to All Stations" is the title of a neat little folder from Columbia, dealing with the new Columbia model 306 four-valve suitcase portable. There are many interesting technical points about this which you should note, so write to Columbia for a copy of this folder. **297**

Tunewell Mains Parts

Here is a useful book from Tunewell giving a wealth of interesting information about Tunewell mains transformers and chokes, output chokes, safety fuses and complete mains eliminators. A section is also devoted to the new Tunewell wire-wound spaghetti resistances. **298**

Mullard Valve Information

Three new folders have just come to hand from the Mullard Wireless Service Co., Ltd., and if you are one of the wise folk who keep a Mullard valve loose-leaf file, then you should insert these three leaflets. These deal with the DO25 power amplifier, the Mullard PM252 two-volt power valve and the PM1A. **299**

A Record Changer

I have just seen one of the new Capehart record changers marketed in this country by the Sun Electrical Co., Ltd. This plays continuously either 10-in. or 12-in. records and holds sufficient for over half an hour's continuous playing. You can get full details through my free catalogue service. **300**

H.M.V. Radio-Gramophone Conversion

I have just had a note from the Gramophone Co., regarding alterations to standard models of the H.M.V. radio-gramophone model 521. Existing D.C. models can be converted for A.C. drive at a comparatively small cost. **301**

Polar "Tubs"

The new Polar "tub" condensers are gaining a good name for themselves, for they incorporate several novel features, and the workmanship is of a very high order. I have just had a folder which I recommend to your attention, describing the "tubs" available. **302**

OBSERVER.

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.

SERVICEING RADIO GRAMOPHONES

WITH the interest of the listening public in mind, a series of fortnightly courses for H.M.V. dealers has recently been initiated by the Gramophone Co., Ltd. These training courses are being held in the H.M.V. factory at Dagenham, where a lecture room and fully-equipped workshop have been built for the purpose.

A lecturer explaining the switch mechanism of the H.M.V. Radio-Gramophone, Model 521, to a class of "His Master's Voice" dealers attending the Gramophone Company's summer training courses

Each bench, and there are twenty of them, has separate supplies of A.C. and D.C. current and is fitted with a separate aerial and earth system. The dealers may even choose the type of soldering iron they are accustomed to, electric- and gas-heated irons being available. A member of the AMATEUR WIRELESS Technical Staff recently visited the school and was impressed with the thoroughness with which instructors dealt with their subjects.

In addition to general radio work, part time is devoted to repairs of mechanical gramophones and the H.M.V. automatic record-changing instruments.

BROADCAST TELEPHONY

Broadcasting Stations classified by country and in order of wavelengths. For the purpose of better comparison, the power indicated is *aerial energy*.

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN			
25.53	11,751	Chelmsford (G5SW)	16.0
242	1,238	Belfast	1.2
261.3	1,148	London Nat.	68.0
*288.5	1,040	Newcastle	1.2
288.5	1,040	Swansea	0.16
288.5	1,040	Plymouth	0.16
288.5	1,040	Edinburgh	0.4
288.5	1,040	Dundee	0.16
288.5	1,040	Bournemouth	1.2
288.5	1,040	Aberdeen	1.2
301.5	995	North National	70.0
309.9	968	Cardiff	1.2
356.3	842	London Reg.	70.0
376.4	797	Glasgow	1.2
398.9	752	Midland Reg.	38.0
479.2	626	North Regional	70.0
1,554.4	193	Daventry (Nat).	35.0
*testing on 479.2 m. (626k.)			
AUSTRIA			
218	1,373	Salzburg	0.6
246	1,220	Linz	0.6
283	1,058	Innsbruck	0.6
352	851	Graz	9.5
453.2	666	Klagenfurt	0.6
517.3	581	Vienna	20.0
also testing on 1,249 m. from 8.0 p.m. (Mon. Wed. Sat.)			
BELGIUM			
206	1,456	Antwerp	0.4
246	1,220	Schaerbeek	0.2
338.2	887	Brussels (No. 2)	20.0
508.5	590	Brussels (No. 1)	20.0
BULGARIA			
318.8	941	Sofia (Rodno Radio)	1.0
CZECHO-SLOVAKIA			
263	1,139	Moravska-Ostrava	11.0
270.5	1,073	Bratislava	14.0
293	1,022	Kosice	2.5
341.7	878	Brunn (Brno)	34.0
487	617	Prague (Praha)	5.5
487	617	Cesky Brod (testing shortly)	75.0
DENMARK			
281	1,067	Copenhagen	1.0
1,153	260	Kalundborg	10.0
ESTONIA			
296.1	1,013	Tallinn	0.7
405.8	644	Tartu	0.5
FINLAND			
220.8	1,358.3	Helsinki	15.0
291	1,031	Tampere	1.0
291	1,031	Viipuri	15.0
1,796	167	Lahti	54.0
FRANCE			
219.7	1,365.6	Béziers	0.6
235.8	1,272	Fécamp	5.0
237.2	1,265	Nimes	1.0
238.5	1,258	Bordeaux-Sud-Ouest	2.0
249.8	1,201	Juan-les-Pins	0.5
265	1,175	Toulouse (PTT)	1.0
265.4	1,130	Lille (PTT)	15.0
272	1,103	Rennes	1.2
284.6	1,054	Montpellier	2.0
287.4	1,044	Radio Lyons	0.5
294.6	1,018	Limoges (PTT)	0.5
304	936	Bordeaux (PTT)	20.0
314.3	954.5	Natan-Vitus (Paris)	0.5
316	950	Marseilles (PTT)	1.5
328.2	914	Grenoble (PTT)	3.0
329.3	911	Poste Parisien	1.2
345.2	869	Strasbourg (PTT)	15.0
367.2	817	Radio LL (Paris)	0.5
385	779	Radio Toulouse	8.0
447.1	671	Paris (PTT)	2.0
466	644	Lyons (PTT)	2.3
1,445.7	207.5	Eiffel Tower	15.0
1,725	174	Radio Paris	17.0
1,725	174	,, ,, (testing shortly)	85.0
GERMANY			
31.38	9,560	Zeesen	15.0
217	1,382	Königsberg	1.7
218	1,373	Flensburg	0.6
227	1,319	Cologne	1.7
227	1,319	Münster	0.6
227	1,319	Aachen	0.3
232.2	1,292	Kiel	0.31
239	1,256	Nürnberg	2.3
246.4	1,217.2	Cassel	0.3
253.8	1,182	Gleiwitz	5.6
259.3	1,157	Leipzig	2.3
269.8	1,112	Bremen	0.3
276.5	1,085	Heilsberg	75.0
283.6	1,058	Magdeburg	0.6
283.6	1,058	Berlin (E)	0.6
283.6	1,058	Stettin	0.6
318.8	941	Dresden	0.3
325	923	Breslau	1.7
360	833	Mühlacker	75.0
372	806	Hamburg	1.7
390	770	Frankfurt	1.7
418	716	Berlin	1.7
452.1	662	Danzig	0.2
473	635	Langenberg	17.0
533	563	Munich	1.7
550.7	536	Kaiserslautern	1.0
559.7	536	Augsburg	0.3
566	530	Hanover	0.3
570	527	Freiburg	0.35
1,635	183.5	Zoesen	75.0
1,635	183.5	Norddeich	10.0
HOLLAND			
31.28	9,599	Eindhoven (PCJ)	30.0
298.8	1,004	Huizen	8.5
298.8	1,004	Radio Idzerda (The Hague)	3.0
1,053	285	Scheveningen-Haven	10.0
1,875	160	Hilversum	8.5
HUNGARY			
550	545	Budapest	23.0
ICELAND			
1,200	250	Reykjavik	21.0
IRISH FREE STATE			
224.4	1,337	Cork (6CK)	1.5
413	725	Dublin (2RN)	1.5
ITALY			
25.4		Rome (3RO)	9.0
247.7	1,211	Trieste	8.0
296.4	1,012	Turin (Torino)	8.5
312.8	959	Genoa (Genova)	1.5
332	905	Naples (Napoli)	1.7
441	680	Rome (Roma)	75.0
457.5	655	Bolzano (IBZ)	0.2
501	599	Milan (Milano)	8.5
540.5	555	Palermo	3.7
LATVIA			
525	572	Riga	13.0
LITHUANIA			
1,935	155	Kaunas	7.0
NORTH AFRICA			
363.4	825.3	Algiers (PTT)	13.0
416	721	Radio Maroc (Rabat)	10.0
1,250	240	Tunis Kasbah	0.6
NORWAY			
235.5	1,274	Kristianssand	0.625
240.6	1,247	Stavanger	0.625
364	824	Trondelag	1.35
368.1	815	Frederiksstad	0.7
453.2	662	Porsgrund	0.8
493.4	608	Bergen	1.35
587.1	511	Hamar	0.8
1,071	280	Oslo	75.0
POLAND			
214.2	1,400	Warsaw (2)	1.9
234	1,283	Lodz	2.2
244.1	1,229	Wilno (tests)	16.0
314.2	954.8	Cracow	1.5
335	896	Poznan	1.9
381	788	Lvov	21.0
408	734	Katowice	16.0
1,411.8	212.5	Warsaw —Raszyn	158.0
PORTUGAL			
290.5	1,033	Lisbon (CTIAA) also on 42.9 m.	2.0
ROMANIA			
394	761	Bucharest	16.0
RUSSIA			
427	702.5	Kharkov	25.0
720	416.6	Moscow (PTT)	20.0
800	375	Kiev	20.0
937.5	320	Kharkov (RV20)	25.0
1,000	300	Leningrad	100.0
1,060	283	Tiflis	10.0
1,073	279.6	Rostov Don	4.0
1,103	272	Moscow Popoff	40.0
1,304	230	Moscow (Trades Unions)	165.0
1,481	202.5	Moscow (Kom)	40.0
SPAIN			
255.3	1,175	Barcelona (EAJ15)	1.0
266.5	1,125.4	Valencia (EAJ13)	8.0
349	860	Barcelona (EAJ1)	8.0
368.1	815	Seville (EAJ5)	1.5
424	707	Madrid (EAJ7)	2.0
453	662.2	San Sebastian (EAJ8)	0.6
SWEDEN			
230.3	1,304	Malmö	0.75
257	1,166	Hörby	15.0
306.9	977.2	Falun	0.65
322	932	Göteborg	15.0
436	689	Stockholm	75.0
542	554	Sundsvall	15.0
770	389	Ostersund	0.75
1,229.5	244	Boden	0.75
1,352	221.9	Motala	40.0
SWITZERLAND			
244.7	1,226	Basle	0.65
246.7	1,215.7	Berne	0.5
403.5	743	Söttens	32.0
456.6	657	Beromuenster	75.0
760	395	Geneva	1.5
TURKEY			
1,216.2	246.6	Istanbul	5.0
1,538	195	Ankara	7.0
YUGOSLAVIA			
307	977	Zagreb (Agram)	0.7
430.4	697	Belgrade	3.0
574.7	522	Ljubljana	2.8

NEXT WEEK:

A SIMPLE SELF-CONTAINED TWO-VALVER

PREPAID ADVERTISEMENTS

Advertisements under this head are charged THREEPENCE PER WORD, minimum charge THREE SHILLINGS. DEPOSIT SYSTEM

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Intending purchasers should forward to the Publishers the amount of the purchase money of the article advertised. This will be acknowledged to both the Depositor and the Vendor, whose names and addresses must necessarily be given. The deposit is retained until advice is received of the completion of the purchase, or of the article having been returned to and accepted by the Vendor. In addition to the amount of the Deposit, a Fee of 6d. for sums of £1 and under, and 1s. for amounts in excess of £1, to cover postage, etc., must be remitted at the same time. In cases of persons not resident within the United Kingdom, double fees are charged.

The amount of the Deposit and Fee must be remitted by Postal Order or Registered Letter (Cheques cannot be accepted), addressed to

"AMATEUR WIRELESS" ADVERTISEMENT DEPARTMENT,
58/61 FETTER LANE, LONDON, E.C.4

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