

THE "B.B.C. SELECTIVE THREE"—FULL DETAILS

PRACTICAL SUPER-HET IDEAS FOR YOU

Amateur Wireless

Every Thursday 3^d

and
Radtovision

Vol. XVIII. No. 472

Saturday, June 27, 1931

-PRACTICAL SUPER-HET IDEAS

for YOU

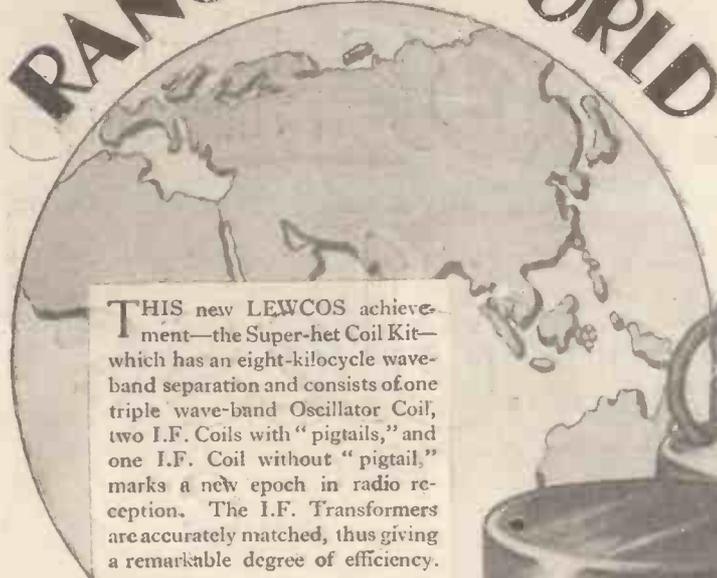


Registered at the G.P.O. as a Newspaper

Opening Circuit Speaker 3-0-0 10/13

3-11-6
1-9
39-9

RANGE THE WORLD



THIS new LEWCOS achievement—the Super-het Coil Kit—which has an eight-kilocycle wave-band separation and consists of one triple wave-band Oscillator Coil, two I.F. Coils with “pigtails,” and one I.F. Coil without “pigtail,” marks a new epoch in radio reception. The I.F. Transformers are accurately matched, thus giving a remarkable degree of efficiency.

This Kit, which is specified for the A.C. “Century Super,” can also be fitted with extraordinary ease in any set of similar design and the results will be truly astounding!

The small space available is completely inadequate to give even a short description of these wonderful new LEWCOS Coils, and you are invited to write for an illustrated explanatory leaflet.

with The LEWCOS (Regd)



SUPER-HET COIL KIT

(Provisional Patents Pending)

(Designed and manufactured at our Leyton Works),

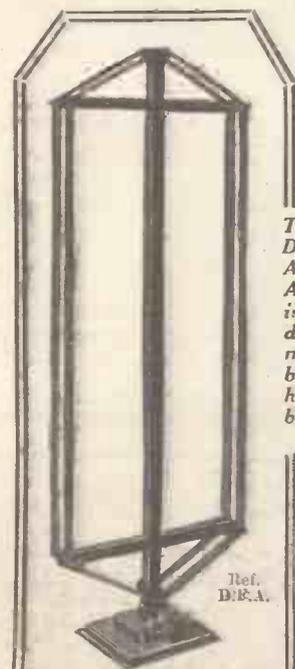
which is specified for the

A.C. “CENTURY SUPER” receiver described in this issue of “A.W.”

Price 50/-

Ref. S.H.K. No. 1.

BRITISH THROUGHOUT



BLACK

GREEN

RED

WHITE

BLUE

This is a photograph of the LEWCOS Dual Range Centre-Tapped Frame Aerial which is specified for the A.C. “Century Super.” The Frame is wound with silk-covered Litzen-draht wire and the switch and terminals are mounted on the moulded base, thus presenting a neat and handsome appearance. The wave-band change is effected by the turn of a knob.

Size: 30" high x 10" wide

PRICE 32/6

Ref. D.F.A.



A TRIPLE COIL BASE FOR I.F. COILS (Ref. I.F.B.3)
Price 2/6
IS NOW AVAILABLE.

LEWCOS “Spaghetti Resistances” are specified for the A.C. “Century Super”

LEWCOS RADIO PRODUCTS FOR BETTER RECEPTION

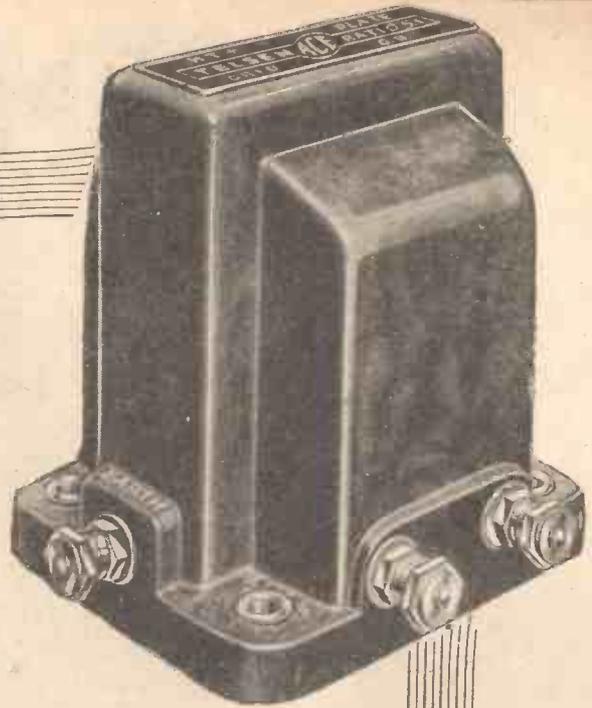
THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED, CHURCH ROAD, LEYTON, LONDON, E.15

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makes possible

ASTOUNDING PRICE REDUCTION



Telsens Valve Holders
 Prov. Pat. No. 20286/30. An improved design in Valve Holders, embodying patented spring contacts for split or solid valve legs, low capacity and self locating.
 Prices: four-pin, 6d. each; five-pin, 8d. each.

6^d



Telsens Fixed Mica Condensers
 Prov. Pat. No. 20287/30. Made in capacities up to .002 mfd. .0003 supplied complete with patent Grid Leak Clips to facilitate series or parallel connections, can be mounted upright or flat; tested at 500 volts.
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6^d



Telsens Standard H.F. Choke
 designed to cover the whole broadcast range. Exceptionally low self capacity; inductance 150,000 microhenries; resistance 400 ohms.
 Price 2/- each.

2/-

The World-Famous Telsens Transformers
 need no introduction to the Radio Public—their sterling qualities of life-like reproduction cannot be excelled. Their characteristics are being continually improved, and the new Telsens range embodies the latest improvements that technical research and design can produce. They are now more than ever "Radio's Choice" for "Better Radio Reception."

	Price
Ace, ratios 3-1 and 5-1	5/6 each
Radiogrand, ratios 3-1 and 5-1	8/6 "
Radiogrand Super, ratio 7-1	12/6 "
Radiogrand Transformer, ratio 1.75-1	12/6 "
Output Transformer, ratio 1-1	12/6 "
Multi Ratio Output Transformer, ratios 9-1, 15-1, 22.5-1	12/6 "
Pentode Output Transformer	12/6 "

ACE
5/6

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8/6

Telsens Grid Leaks
 Absolutely silent and non-microphonic, practically unbreakable, cannot be burnt out and are unaffected by atmospheric changes. Telsens Grid Leaks are not wire wound, therefore there are no capacity effects. Made in capacities of 1/4, 1/2, 1, 2, 3, 4, and 5 megohms.
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TELSEN

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

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The new Telsen policy is a proved success. Radio enthusiasts both professional and amateur have been staggered by the new prices. Already the new additions to the famous Telsen range of components still further enhance the name and fame of Telsen.

Consider the new components and the amazing prices shown here—consider the high standard of quality and performance rigidly maintained and you'll demand Telsen when buying components.



Telsen Mansbridge Type Paper Condensers

are of the Mansbridge non-inductive type, and will not deteriorate in use, owing to the method of sealing and an exclusive vacuum process employed during manufacture.

Made in capacities from .01 upwards. 500-volt test 1,000-volt test

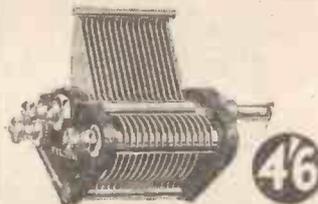
	Capacity	Price	Price
W83	.01 mfd.	1/6	2/6 each
W80	.25 "	2/-	3/- "
W79	.5 "	2/3	3/3 "
W78	1.0 "	2/3	3/6 "
W77	2.0 "	3/-	6/- "



Bakelite Dielectric Tuning Condenser
Made in capacities of .0003 and .0005. Price 2/- each.



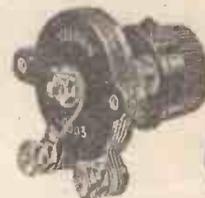
Bakelite Dielectric Differential Condenser
Made in capacities of .0001, .00015, and .0003. Price 2/- each.



Telsen Logarithmic Variable Condensers

Substantially constructed and of high insulation and low minimum capacity. The Vanes are clamped by a new process and frame is triple braced against distortion.

Substantial terminals are provided with alternative connection to the stator. Made in capacities of .0005, .00025, and .00035. Price 4/6 each.



Bakelite Dielectric Reaction Condenser
Made in capacities of .0001, .00015, and .0003. Price 2/- each. Capacities of .0005 and .00075. Price 2/6 each.



Telsen Pre-set Condenser
has a very low minimum capacity, giving a wide range of selectivity adjustment when used in the aerial circuit. Substantially made and easy to adjust. Made in capacities of .002 mfd., .001 mfd., .0003 mfd., .0001 mfd. Price 1/6 each.

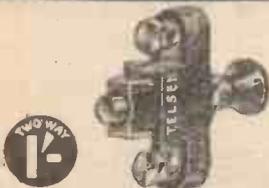


Telsen Slow-motion Dial
has an exceptionally smooth action with an approximate ratio of 8-1. There is no toothed gearing, so that it is impossible to strip the Dial. The figures are clear and arranged to provide for right- and left-hand Condensers. Price 2/6 each.



The Telsen Fuse Holder
is a definite precaution against burnt-out valves. The terminals are easily accessible and the Fuse Bulb is held firmly, giving perfect contact. Price 6d. each (without fuse.) Telsen Radio Fuse, price 6d. each.

THE RADIO WORLD

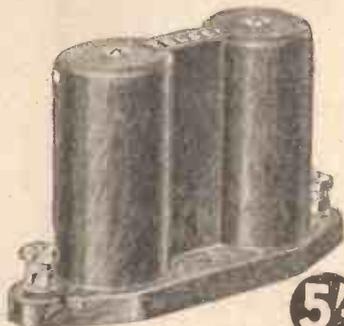


1/-



1/3

Telsen Push-pull Switches. Prov. Pat. No. 14125/31. These Switches have many salient features—self-cleaning knife contacts, positive snap action: The spindle cannot rotate, (eliminating all crackle), and is insulated from both contacts. The low self capacity makes it suitable for use in H.F. circuits.
2-way. Price 1/- each. 3-way. Price 1/3 each.



5/-

The Telsen Binocular H.F. Choke has an exceptionally high impedance and low capacity resulting in an excellent performance curve.

It has a restricted field and covers the whole broadcast. Free from parasitic resonances.
Inductance: 180,000 microhenries.
Self Capacity: .000002 microfarad.
Resistance: 750 ohms.
Price 5/- each.



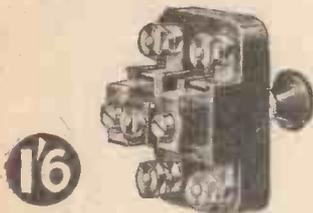
5/-

TELSEN L.F. INTERVALVE COUPLING CHOKE

Specially designed for use as coupling chokes in the anode circuits of modern radio receivers. Made in a range of three inductances—40, 100 and 125 henries.

Price 5/- each.

Telsen Heavy Duty Power Grid L.F. Choke, 40 henries, price 8/-.



1/6

Telsen "4-point" Push-pull Switch Prov. Pat. No. 14125/31. This model is a two-pole Switch with an insulated Spindle highly suitable for use in wavechanging on two coils or an H.F. transformer.

Telsen "2-Pole" Push-pull Switch Price 1/6 each.



7/6

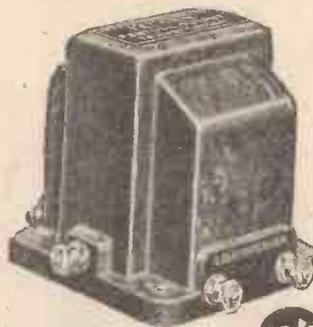
The Telsen Aerial Coil

is the latest development in Dual Range Aerial Coil Design. It incorporates a variable series condenser which can be set to give any desired degree of selectivity, making the coil suitable for ALL districts. This adjustment also acts as an excellent volume control. The wave-band change is effected by means of a three-point switch. A reaction winding is included. Price 7/6 each.

Telsen Dual-range H.F. Coil and Transformer

This coil is designed for H.F. amplification in conjunction with screen grid valves. It can be connected as a Tuned Grid or Tuned Anode Coil, or by removing a link, as an H.F. Transformer. This Coil also makes a highly efficient aerial coil where the adjustable selectivity feature is not required. Reaction winding is incorporated. When used as an H.F. Transformer the wave change is effected by means of a 2-pole switch.

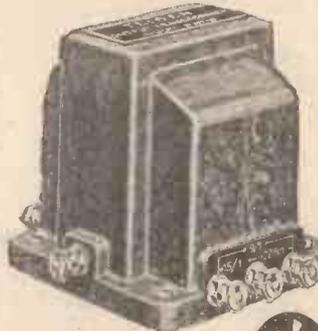
Price 5/6 each.



12/6

Telsen Pentode Output Transformer

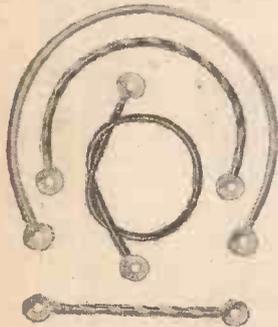
Price 12/6 each.



12/6

Telsen Multi Ratio Output Transformer

Ratios 9-1, 15-1, 22.5-1.
Price 12/6 each.



From Telsen Spaghetti Flexible Resistances

6d

Terminal tags firmly fixed to the wire, clearly marked with resistance values, protected from corrosion by application of special insulating compound. Made in the following values:—

Resistance Ohms	Max. Current	Price
300-600	42 mA	6d. each
750-1,000		
1,500-2,000	23 mA	9d. "
3,000-4,000		
5,000	6 mA	1/- "
10,000-15,000		
20,000-25,000	3 mA	1/6 "
30,000		
50,000-60,000	1 1/2 mA	2/- "
80,000-100,000		
150,000-200,000		



5/6

Telsen Loud-speaker Unit

has been designed to provide at a low price a reliable Loud-speaker Unit which will give a performance pleasing to the most sensitive ear. Employs cobalt steel magnets. A detachable rod which carries the cone is fitted with cone washers and clutch. The entire unit is enclosed in a beautifully moulded bakelite dust cover. Price 5/6 each.



Telsen Grid Leak Holder

Will hold firmly any standard size or type of Grid Leak, ample clearance being provided between the terminal screws and the base-board. The terminals and fixing holes are accessible without removing the Grid Leak. Price 6d. each.

6d

TELSEN

RADIO COMPONENTS ARE ALL BRITISH



Send for the Telsen Component Catalogue—use the coupon below, and it will be sent post free.

To: THE TELSEN ELECTRIC CO., LTD.,
ASTON, BIRMINGHAM.

Please send, post free, the new Telsen Component Catalogue.

NAME

ADDRESS

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

Convert your Battery Model "Century Super" to A.C. Mains

**GREATER RANGE—MORE POWER
—IDEAL FOR A MOVING COIL SPEAKER**

You can easily convert your battery driven "Century Super" to a trouble-free A.C. set — banish both high and low tension batteries — and at the same time noticeably improve both range and power!

Marconiphone have prepared complete instructions showing how simply this can be done; the modified circuit is remarkably sensitive and free from mains hum. Its performance has been tested and fully approved by "A.W." technical experts.

Send for Instruction Leaflet To-day!

**All that
you need!**

« The Unit

Marconiphone Model A.M.7 A.C., H.T. and L.T. unit forms the basis of the conversion. This unit provides a generous supply of high-tension current at voltages up to 250, together with 4 volts for the first five valves and 6 volts for the super power output valve. It has a neat pressed steel case and complies entirely with the regulations of the I.E.E.

« The Valves

The special Marconi A.C. valves are:—

Oscillator	MHL.4
First Det.	MH.4
I.F. Stages	2-MS.4
Second Det.	MH.4
Output	P.625

These are considerably more efficient than the original battery types.



First and Foremost
Name in Radio

Why not a Moving Coil?

This conversion is of particular value to moving coil enthusiasts; it provides for a P.625 output valve operated under optimum conditions — ideal for good moving coil volume. For very best results the new Marconiphone Permanent Magnet speakers Models 131 (cabinet) or 91 (unit) are strongly recommended.

MARCONIPHONE

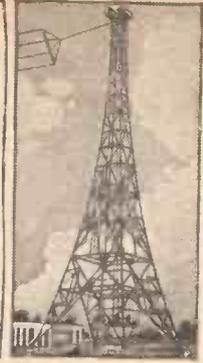
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Amateur Wireless

and
Radiovision



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

RESEARCH CONSULTANT:
W. JAMES.

ASSISTANT EDITOR:
H. CORBISHLEY.

NEWS & GOSSIP OF THE WEEK

FOR "CENTURY SUPER" OWNERS
ON page 1,000 you will find many useful hints and tips in connection with both the battery and mains-driven models of the "Century Super." Intense interest has been aroused among all types of listeners by this one-hundred-station set and in this handy collection of hints and tips "Century Super" enthusiasts will find much useful advice.

THE KING'S NEW "MIKE"

THE KING will speak for the first time into a new microphone when he opens, on July 18, the King George Hospital, at Ilford. This will replace the microphone which has been used on so many important occasions in the past, the most recent being the opening last year in the House of Lords of the Naval Disarmament Conference and the India Round Table Conference. The new microphone, which has been specially prepared by the Marconi-

phone Company for the exclusive use of the King, is a Marconi-Reisz instrument with silver fittings and bearing the Royal cypher in gold. It rests on a handsome chromium-plated pedestal carrying a silver panel, embellished with the Royal Arms in gold, on which will be engraved the dates when the instrument is used.

RADIO FLYING SQUADS

WE are proud of our Scotland Yard radio flying squad, but it seems as though soon we must look to our laurels. The New York police will shortly add a further 200 radio-equipped cars to their fleet. In the States a wavelength of 240 metres has been specially reserved for police use.

CUTTING OUT INTERFERENCE

THE campaign now being waged in Germany against radio interference is already showing good results," says a

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TALKING ABOUT THE "CENTURY"!



Members of the New Mayfair Dance Band, during an interval n making records at the "His Master's Voice" small Queen's Hall recording studio, discuss the merits of the A.C. "Century Super"

correspondent. "The most up-to-date methods are being used by the campaign organisers, including the exhibition of special films showing the public how to guard against interference." Some of our Northern listeners who are troubled with electrically-noisy trams would like to see some of these up-to-date methods!

RADIO DOCTORS

RADIO TURIN provides facilities for listeners to submit in writing particulars of their ailments. Subsequently these ailments and their remedies are discussed by the medical man before the microphone! News also comes that the German medical authorities have established a coastal station Elbe-Weser-Radio through which any ship can obtain medical advice. A ship which broadcasts for assistance is connected directly through this station to the National Hospital at Cuxhaven.

DO YOU NOTICE IT?

SUN-SPOTS, tidal waves and earthquakes are all blamed for bad wireless reception; and often wireless is blamed for causing them! But here is a new one. The radio operator of an American expedition, operating in the Arctic, reports that the Aurora Borealis adversely affects medium-wave broadcasting. As soon as the Aurora

NEXT WEEK: First Details of the PORTABLE "CENTURY SUPER"

NEWS & GOSSIP OF THE WEEK —Continued

was apparent, a great many stations usually received at full strength became almost inaudible. A noticeable feature of the phenomenon was that the short waves did not appear to be affected.

B.B.C. ECONOMY

WHILE economy is certainly the order of the day at Savoy Hill, we are assured that programmes will not suffer. All the administrative expenditure is under review and we are told that the money saved in this direction will be put into the programmes.

FREE WIRELESS FOR UNEMPLOYED!

WE give free licences to blind listeners, but Germany is ahead of us in also making provision for free licences for unemployed. There are 3,731,681 listeners in Germany. Of this number 134,131 are blind listeners, disabled ex-service men and unemployed, who are all exempt from licence fees. These figures show an increase in listeners of 6.3 per cent., and compared with the figures for the previous year the increase is 15.2 per cent.

NEW ITALIAN STATIONS

AT a meeting of the Italian Ministry of Transport and the Italian broadcasting authorities, it was decided to erect in Milan a new transmitter having a power of 50 to 60 kilowatts, to be ready for service by 1932. Florence is to have a 20-kilowatt transmitter to be ready by October of this year, and at Bari a new 20-kilowatt station

is to be ready by April, 1932. The power of the Genoa transmitter is to be increased to 10 kilowatts, and the Bozen transmitter is also to have its power put up.

RADIO AT THE AIR PAGEANT

THE R.A.F. Pageant will be broadcast as usual, and as it promises to be an exceptionally good event this year, it should make an interesting broadcast. The commentary will be given by Squadron-Leader Helmore.

THE 'PLANES DESCRIBED

THE Pageant broadcast this year will be so arranged that listeners will be able to follow the events quite easily, and the new machines will be described. Event No. 7 will be given first, this being upside-down flying and aerobatics by instructors of the Central Flying School. The other five events which will be broadcast will be the fly-past by the huge flying boats, flight aerobatics, parachute descents, parade and fly-past of experimental 'planes, and the catapult event. This is a demonstration of apparatus which enables very big 'planes to take off after a short run, a gigantic catapult being used to give them a start. Make a note of the Pageant broadcast—this Saturday, June 27.



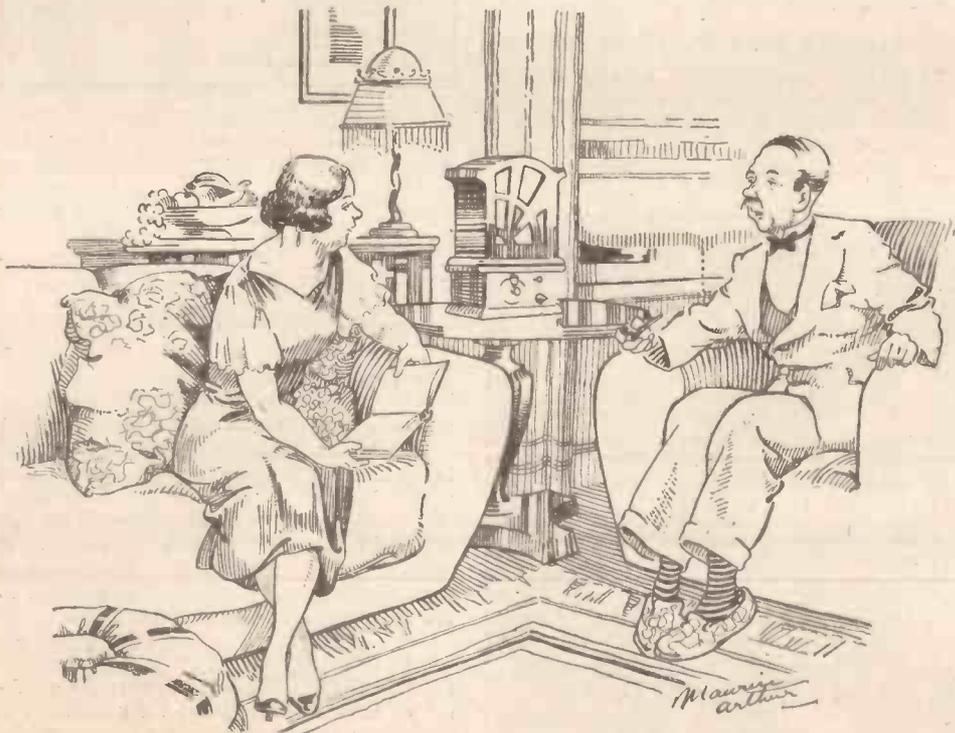
This is the King's new microphone which is being "christened" by an initial speech on July 18

ANOTHER W. JAMES
"WINNER"—THE PORT-
ABLE "CENTURY SUPER"

WIRELESS BURGLAR-ALARMS

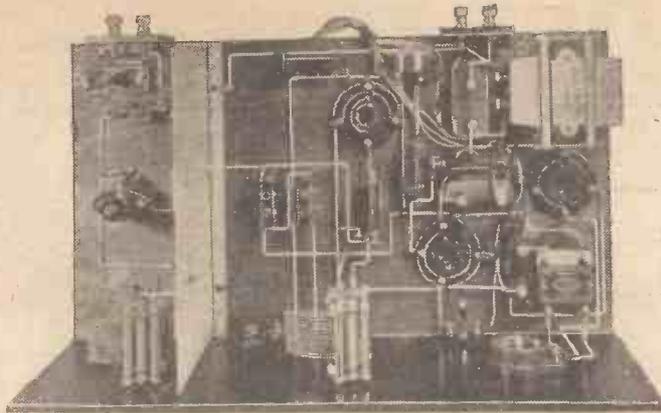
A FRENCH inventor is responsible for an ingenious application of an ordinary wireless receiver to the rôle of burglar alarm, during those hours between midnight and dawn when the set is normally off duty. At bed-time the set, instead of being shut off, is switched "on guard." This means that it is connected up to a series of oscillatory circuits surrounding the doors and windows of the house. The back-coupling is simultaneously increased until the whole of the circuits are just on the threshold of oscillation. At the same time an alarm bell is substituted for the loud-speaker. Under these conditions any attempt to enter the house through a door or window alters the effective capacity of the circuit "guarding" those points. This "detunes" the circuit and creates a sudden change in the output circuit which thereupon operates the alarm bell.

Following upon the protest at Inverness Town Council against the lack of broadcasting reception facilities in the Highlands of Scotland, similar protest motions are announced from Nairn and Forres. The agitation is spreading rapidly throughout the whole of the area concerned, and it seems not improbable that the B.B.C. will be forced by public opinion to take some further steps towards bettering wireless conditions there.



HE. "Thank heaven we are not the sort to grumble about Sunday programmes. A few sermons do us all a world of good."
SHE. "Yes. Why not write to the B.B.C. and tell them so."
HE. "What! and let 'em catch me with no licence!"

LET "A.W." SOLVE YOUR
WIRELESS PROBLEMS.



Compare this plan view with the wiring diagram below

neutralising condenser and, as will be explained later in the operating notes, the adjustment of this is at first critical.

The detector operates in a very efficient circuit, the anode being by-passed by a .002-microfarad condenser and the output stage of resistance coupling being stabilised by an anti-motorboating circuit. The anti-motorboating resistance has a value of 20,000 ohms, the anode resistance itself having a value of 60,000 ohms; the coupling condenser is a .006-microfarad job. Following this R.C. stage is a by-pass-fed low-frequency transformer stage, and there are several points in this which you should note. The feed resistance has a value of 30,000 ohms, and the anode is coupled through a .01 condenser to the primary of the Ni-core 2-type L.F. transformer. Across the secondary of this is a volume control—a very handy fitting.

The power valve will, on most occasions, be used with plenty of high tension, in order to get a good output volume and for safe working a choke output has been incorporated. A 30-henry choke is used with a 2-microfarad speech by-pass condenser.

The set is made up on a fairly generous-sized panel and baseboard, to avoid undue crowding of the parts. No constructional difficulties will be experienced. You can get the right positions for the mounting of the parts either from the full-size blueprint or by scaling them off from the reproduction of the wiring plan given here. The construction is simplified by the use of spaghetti-type resistances in three places and by the use of battery flexes in place of terminals. Terminals are used only for the aerial and earth connections and for the loud-speaker output leads, for it would not be convenient to have flexes to these points.

Valves to Use

To get the best results from a set of this description you must have the right valves. Below are given recommended types for the detector, low-frequency stage, and power valve, and whether buying new valves or using present ones, choose types as nearly as possible in conformity with these:—

Detector: Mullard PM1HF, PM1HL, Cossor 210HF, Mazda H210, Marconi H210, Osram H210, Eta BY2023. First L.F.: Mazda L210, Osram L210, Marconi L210, Cossor 210LF, Eta BY2010, Mullard PM1LF. Power: Osram P215, Marconi LP2, Mazda P220, Eta BW1304, Mullard PM252, PM2, Cossor 215P, 230P.

For the medium waves you will need a No. 50 or 60 coil in the filter circuit (that is, the coil socket on the smaller side of the screen) and in the detector grid circuit, in the socket close to the screen on the other side. Generally speaking, a slightly smaller coil, perhaps No. 35, will be needed for reaction in the socket to the extreme left, looking at the set from the back.

Take care in adjusting the filter at the outset, for otherwise you will not get good results.

Screw in the aerial pre-set condenser and the neutrodyne-type coupling condenser on the right-hand side of the screen, looking from the back. Set the main condenser here to about the half-way position and with the other big tuning condenser and the reaction condenser tune in a local station.

Now bring the main condenser of the filter into tune, readjusting the first condenser if this is found necessary. You can try slacking off the pre-set condenser and the small coupling condenser. This will upset the tuning, and readjustment of both the big condensers on the panel will be needed to bring the set back into tune.

Try to get as low a value as possible for the small coupling condenser. It is surprising what a small value for this is possible without cutting down the signal strength too much.

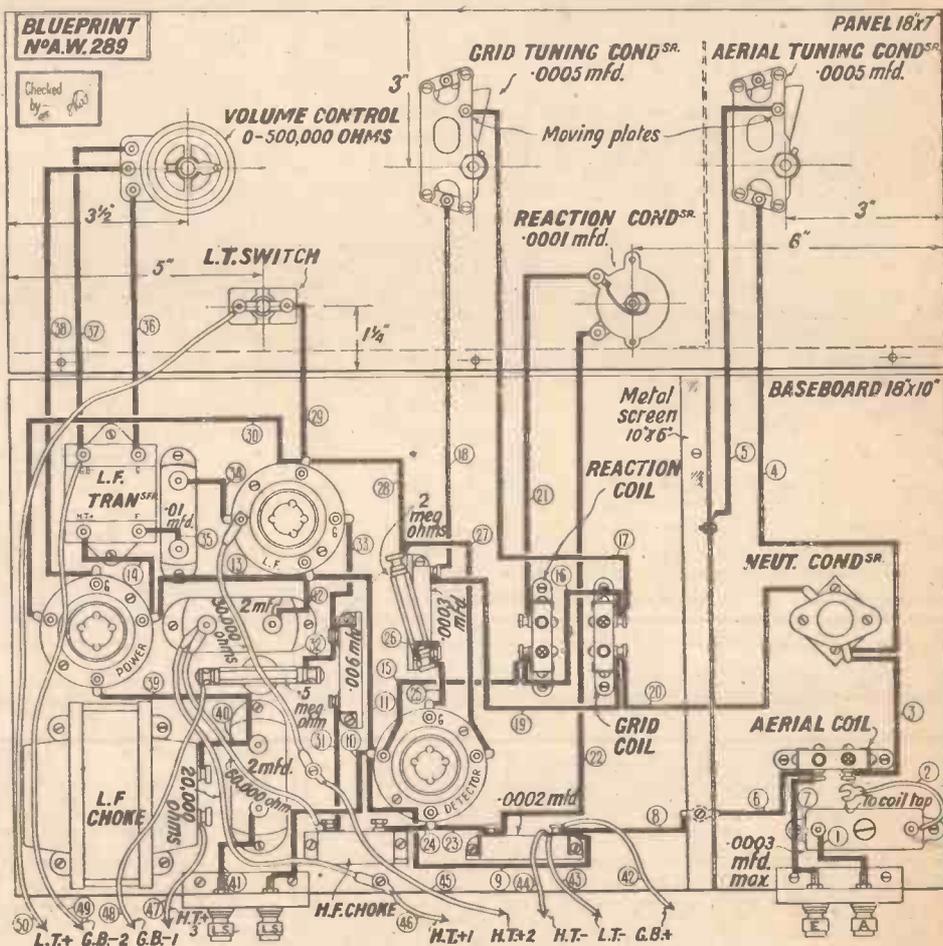
The filter does not need special adjustment for each station but, of course, the two main condensers on the panel must be separately adjusted.

See the set itself this week in the Radio Department windows of Selfridges.

PERCENTAGE MODULATION

IT is essential in broadcast transmission to know exactly what percentage of modulation is being superposed on the carrier wave. An excessive amount is liable to produce distortion at the receiving end, whilst too little means that the transmitter is being run below maximum efficiency. In practice a check is kept on percentage modulation by means of an oscillograph which is coupled to the main oscillatory circuit through a two-electrode rectifier valve. The arrangement is adjusted so that the normal carrier-wave with no modulation throws the "beam" from the oscillograph on to the zero point of an indicator scale. As soon as speech is superposed on the carrier, the beam flashes to and fro across the scale, marking out by its width the depth of modulation employed.

M. B.



The layout and wiring diagram of the "B.B.C. Selective Three." A full-size blueprint is available, price 1/-



Every summer the question crops up—does the aerial attract lightning flashes during storms? There are several elementary safeguards that all listeners should know about and these "Hotspot" describes below.

TO attempt to divert a million-volt charge of electricity—lightning flashes are of that order!—is just silly. But the atmospheric influences that cause lightning cause also what is known variously as static, atmospherics and "Xs"—rendered audible, sometimes very audible, by wireless sets, in the form of grinding crashes or a persistent hissing.

surge went through the aerial wire. Here was a clear case where the proper earthing of the aerial would have saved considerable damage.

The three orders of safety may be seen from Fig. 1. At A is shown the normal connection of aerial and earth to set, the dotted line indicating the complete path to earth via the set.

sanest and simplest summer safeguard, the lightning arrestor has a certain glamour—but it does not deserve it. Lightning arrestors—what could these puny bits of metal do to arrest (the word is used in the sense of stop) lightning?

Nothing at all; as a matter of fact lightning arrestors are quite useless in the unlikely—the very unlikely—event of a direct hit. But they serve one good function, in draining away any accumulated static charge from the aerial, such as might be developed at any time during the hot weather, when even the nearest storm is a thousand miles away.

The most elementary method of using a lightning arrestor is shown by Fig. 2A, where the two contacts are connected to the aerial and earth wires, which also go to the set. This arrangement certainly prevents static charges damaging the set, but, so far as lightning is concerned, it obviously leaves the set in the vulnerable position indicated at Fig. 1A. For this reason a

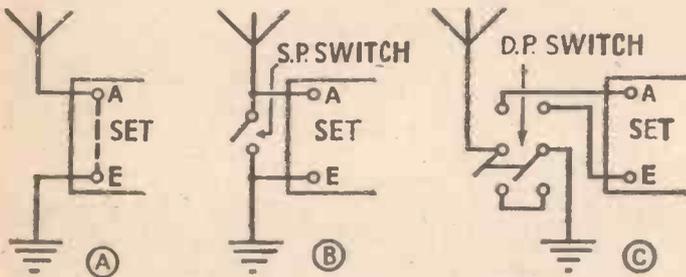


Fig. 1. Three diagrams of aerial arrangements showing how the set can be protected

These crashes are often the preliminary to a storm of thunder and lightning. The first safeguard is, therefore, to switch off the set when such audible warnings of the atmosphere are noted in the loud-speaker. Remember, a storm has got to start or develop somewhere and it may be the first flash that does the damage! So, be prepared and switch off, unless the sky is obviously clear, in which case one may risk the proverbial bolt from the blue.

Switch off, then, when the sky threatens and the loud-speaker issues its audible storm warning. Just to switch off the batteries is not quite enough. For if the aerial is left connected to the aerial terminal of the set and the earth to the earth terminal, any possible electrical discharge from the angry heavens that decides to go to earth via the unoffending aerial wire will have to do so through the set. In other words, if we admit at all that an elevated aerial wire is a source of attraction for lightning, an unearthed aerial is the least safe arrangement.

I remember investigating a particularly sensational case of a small set, struck by lightning, as the saying goes, down in a village near Colchester. The aerial wire had been disconnected from the set—no doubt, the owner thought the set was the attraction and not the aerial—and the aerial wire had been left free to dangle. It dangled to some effect near the lace curtains which were set on fire when the lightning

remember that a lightning flash is not a tame little trickle of current ready to be diverted where one desires. If—and please remember that it is a big if—lightning comes down the aerial to the set it will, with the Fig. 1B arrangement, enter the house. Who wants lightning in the house? No one, save perhaps a few mad scientists!

The Safest System

Well, then, go out for the arrangement shown at Fig. 1C, where a double-pole change-over switch is so connected that, when the aerial is earthed, it does not enter the house. Mounting the switch on the wall outside, the two centre contacts should be used for the connection of the aerial and earth leads. The two top-switch contacts can then go to the set, one to the aerial and the other to the earth terminal. The two bottom switch contacts are then joined together. When the switch is up the aerial and earth are connected to the set, but when the switch is down the aerial is connected to earth—without entering the house.

When fitting up one of these double-pole change-over switches, which are obtainable for a shilling or so from any radio store, see that stout wire is used, and, if possible, arrange a cover to go over the contacts, otherwise the inevitable corroding effects of the atmosphere, particularly in towns, will soon lower the efficiency of the aerial through partial short circuits to earth.

Compared with the hum-drum double-

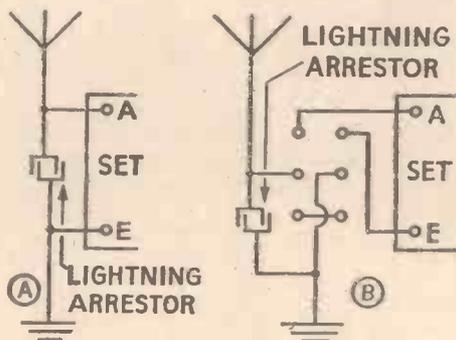


Fig. 2a. How a lightning arrestor is installed. Fig. 2b. Arrangement of lightning arrestor and earthing switch

combination of Fig. 1C and Fig. 2A is to be recommended, where, as can be seen at Fig. 2B, both a lightning arrestor and a double-pole change-over switch are fitted.

No one has yet proved that the ordinary aerial wire has the slightest attraction for lightning. That is to say, no one would care to state that lightning found its way to earth at a particular point because of the presence of an aerial. Indeed, when one considers the miles of telegraph wires all over the country, as well as the complicated networks of power cables, and the many other so-called sources of attraction for

(Continued at foot of next page)

The Talking-tape Machine at Savoy Hill

The B.B.C. is using the Blattnerphone for "bottled" broadcasts. The type of machine that has been installed is here described by Kenneth Ulyett

"A.W." readers may remember that way back in 1928 a description was given in these pages of the first talking-tape machine brought into the country.

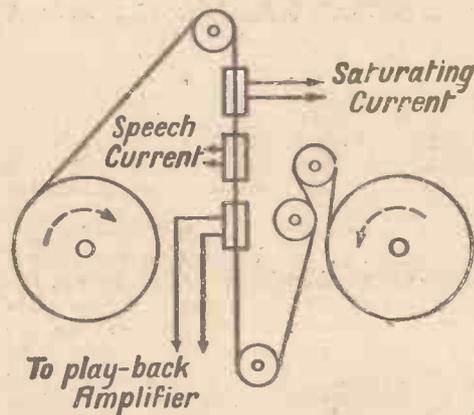
Great improvements have been made with the idea since then. Steel tape is now used instead of steel wire, and the B.B.C. has definitely installed one of the machines at Savoy Hill for "bottling" items for later broadcasting.

The machine is a very convenient form of home recorder, the recording being done by the impression of magnetic charges on a steel tape running at a speed of 1.2 metres a second between two magnet poles.

The speech is "stored" in the tape in this way and is released by simply running the tape past the magnet poles again and connecting the magnet bobbins up to an amplifier and speaker. It is possible to impress speech on the tape without any amplification stages, a microphone, battery and microphone transformer being simply connected to one set of magnets. For B.B.C. work, though, at least three stages of low-frequency amplification will generally be used. While the record is being made the speed has to be kept constant. Speed variations have exactly the same effect as they have in a gramophone, that is, they

cause a distinct variation in the pitch.

The strange thing is that the magnetic changes impressed on the tape by the speech currents do not spread appreciably along its length, although it has been found advisable to have a running speed for music



Schematic design showing the principle of the Blattnerphone talking-tape machine

greater than that necessary to get good recording of speech.

When the speech is to be drawn from the

tape, the "playback" set of magnet bobbins is connected to an amplifier—two or three stages generally being needed to give good speaker reproduction.

The recording is not harmed by the bobbins being dropped or knocked about and an advantage is that the tape is very adaptable; for example, the magnetic recording can be wiped off simply by putting on a new impression. There is no elaborate "wax" to prepare as there is with the making of a gramophone record.

The B.B.C. has the talking-tape machine on a year's trial. If it is a success then probably other machines will be installed; nothing definite can be said at the moment.

For several months the machine has been down at Clapham, where the B.B.C. engineers have been trying to find the best way of using it with standard B.B.C. apparatus, and now it is in regular use at Savoy Hill.

One small difficulty is brought about by the copyright question. The engineers have definite instructions to use the tape machine only on items which are entirely B.B.C. copyright. Outside broadcasts and running commentaries can therefore be "bottled," but it might be an infringement of copyright to record and rebroadcast musical items, for instance.

"SUMMER SAFEGUARDS"

(Continued from preceding page)

lightning, the special attraction of an aerial does not seem great.

Everyone who has investigated the result of a fire or other calamity following a lightning flash must have been impressed with the extraordinary vagaries of the path to earth taken by the lightning surge. All we can do, really, is to adopt one of the common-sense precautions already mentioned, not to worry unduly, and to content ourselves with the certain knowledge that the aerial in itself is not adding to the risk we must all take of "getting it in the neck" from lightning.

So far I have been referring to outdoor aerials. If the normal elevated wire is almost immune from risks of being struck by lightning the indoor wire is absolutely so. No one need have the slightest fear that an indoor aerial adds one jot to the risk of lightning. No more, in fact, than an iron bedstead or a steel fender. Remember, it is the elevation of an object that attracts lightning.

Summer radio safeguards must include less exciting affairs than storms. Many a storm in a tea cup has been caused by inattention to batteries during particularly sticky spells of warm weather! Keep the dry-cell type of battery in a cool dark place, remembering that the effect of sunlight and heat rapidly deteriorates the dry cell's activities.

Accumulators, too, need special attention in the summer. It is so easy to forget

that the water mixed with the sulphuric acid of the accumulator evaporates—and that it must be frequently replenished during the summer. Before going away on holiday one should be especially careful to leave the accumulator with its full supply of acid solution, otherwise the tops of the plates, becoming dry, will sulphate and so ruin the whole accumulator.

Finally, I switch back, as one should always do in the summer, to earth—or rather earths. Deterioration in summer-time reception is all too often due to a dry earth connection. Probably when the earth tube was sunk in the winter months it had more than enough water around it. But during the summer the tube, metal plate or biscuit tin will tend to become a very poor conductor owing to the surrounding dryness. So don't reserve all the pails of water for the shower bath—save at least one to throw over the earth connection!

TAKE YOUR "CENTURY SUPER" OUT OF DOORS :
NEXT WEEK—THE "CENTURY SUPER" AS A PORTABLE

The Ystalyfera Town Prize Band, conducted by E. J. Evans, will play during a Welsh programme on June 30. The vocalist will be Idris Daniels.

UNDESIRE SCREENING

THE screening effect of modern reinforced-concrete is particularly noticeable in the case of portable sets with self-contained aerials. For instance, a set which had given excellent results in an old-fashioned building near the centre of London was taken with the object of giving a demonstration to a modern block of offices close by. The difference was most marked, and equally disappointing to the owner of the set. In one of the outer rooms, the signal strength fell to barely half that normally obtained, whilst in an inner room, where the received waves had to pass through several layers of reinforced concrete, the set was practically "dead." As soon as it was taken back to its original quarters, barely a hundred yards away, reception was as good as ever, showing that the falling off was caused entirely by local screening.

M. B.

Speaking in Scottish Broadcasting House, Edinburgh, to a gathering of teachers and educationists, Sir Charles Cleland stated on behalf of the Scottish Sub-Council for School Broadcasting that they believed the time was approaching when they would have such a bulk of indisputable evidence with regard to the value of school broadcasting that no teacher or educationist in the country would be able to ignore this medium.

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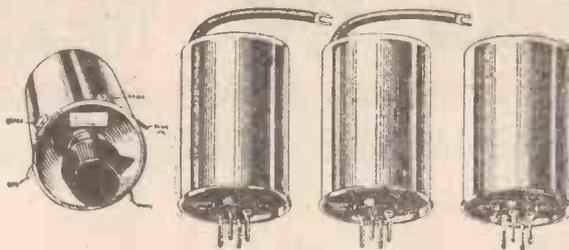
CENTURY SUPER A.C.

CENTURY SUPER

Chosen by
Mr. W. James

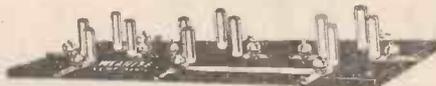
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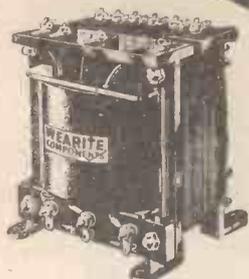
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On Your Wavelength!

THE ROYAL "MIKE"

THE KING will make use of his new microphone for the first time on July 18 when he opens the King George Hospital at Ilford. The original microphone used by the King is now out of date, and it is hoped that it will be placed in one of the museums, for it is an interesting historical object. Engraved on its gold and silver case is a record of the many State and National events in which it has been used. The new "mike" is of the Marconi-Reisz type, which has silver fittings and bears the King's monogram in gold. It is supported by a chromium-plated pedestal bearing the Royal Arms. On this pedestal will be engraved a record of the events in which the instrument is used, together with their dates.

PERMANENT-MAGNET M.C. SPEAKERS

FOR some little time now I have had in use one of the latest type of permanent-magnet moving-coil loud-speakers. Actually it came into my possession whilst it was still in the hush-hush stage. So far as I am concerned, I want nothing better as a reproducer of wireless programmes or gramophone records.

At one time I thought that the balanced-armature unit was likely to be the only solution of our difficulties, and I must say that I have been able to obtain wonderful reproduction by arranging two of these units in series. One is chosen especially for its good "top" and the other for its success in dealing with the bass. By means of an arrangement of resistances and condensers, it is possible to make one unit cut off just where the other begins to be useful. There is thus very little overlap in the middle of the musical scale. The permanent-magnet moving-coil, though, has the advantage of giving you both top and bass from one and the same instrument.

IT'S WORTH IT!

THE permanent-magnet speaker is not cheap, but it is worth every penny of its cost. Some weeks ago I resolved to see just what it could do. I don't in the ordinary way want great volume myself, for the rooms in my house in which loud-speakers are in use are not very large. Still, there are times when something like realistic volume is very pleasant to listen to. I can throw two rooms into one by means of big folding doors, and you get a wonderful impression of a big concert if you work the loud-speaker in one room and listen in the other. Very well, then. I made up a low-frequency amplifier capable of handling something like grid-voltage swings and coupled up the permanent-magnet loud-speaker to it. So far as I could see, I was likely to be deafened long before I succeeded in overloading the loud-speaker.

Don't imagine, though, that this kind of speaker will turn a bad set into a good one. It won't. Unless the set itself is above suspicion, no loud-speaker can reproduce

properly, and if your set is only so-so you will probably do better with balanced-armature units than with any kind of moving-coil speaker. The reason is that the moving-coil speaker reproduces exactly what the set gives out, whereas the balanced-armature speaker not infrequently flatters the set.

WHAT IS A DOODLESOCKER?

I AM sure you don't know, and I am equally sure that I don't. Anyhow, he or she is one of those who entertain the great American wireless public. Doodlesockers have created one of those queer "hours" of which I will tell you in a moment. They come on at 12.40 a.m. Eastern Standard Time, which is 5.40 a.m. by our time. I have, though, heard them once or twice from WLW or W8XAL when I have been up early in the morning, and I can assure you that theirs is one of the wittiest turns that I have come across in wireless. Another question that I would like to ask is what is an "hour"? In America everyone who goes before the mike has an hour, but, curiously enough, few of these hours last more than twenty minutes. The average Women's Hour, for example, lasts from about 10 to 10.20 a.m., and we have Farmers' Hour, Traders' Hour, Children's Hour, and other hours all of about the same duration.

AND NOW TORNADOES

WHAT are we coming to? First, we have an earthquake which is so violent that it makes our valves utter microphonic noises. I have had some awfully funny accounts, by the way, of the earthquake from people who were probably asleep at the time, though, as I told you recently, I was awake and sitting up for America. The tremors in my part of the world were just about as violent as those produced by the passing of a heavy lorry at fairly high speed. But a friend who lives next door assures me that he felt seasick owing to the violent rocking of his bed.

And after the earthquake we had a tornado, and my house happened to lie almost—though, luckily, not quite—in its track. I was glad that I had taken down my own aerial pole, having discarded outdoor collectors in favour of indoor aerials and frames, for not a few badly stayed masts were brought down and aerials automatically became earths. I told you that there would be people who would say that wireless had caused the earthquake. Now that we have had both an earthquake and a young tornado in the same week, wireless has got the blame for both, and there are honestly not a few people who genuinely believe that the comparatively minute power pushed out by broadcasting stations is rocking the old world of ours to its very foundations. Funny, isn't it?

LOOK BEFORE YOU LEAP

SOME years ago there was a song enormously popular with those who had, or fancied that they had, bass voices.

Its slogan was "Sailor Beware," and in giving the advice the singer could go, so to speak, right down into his boots. I cannot sing, but I have a slogan for you on the lines of this song, and that is "Saler Beware." What I am driving at is that you will be well advised if you think very carefully before you spend your money on one of those absolutely given-away American sets that are to be seen over here nowadays. These sets are not specially designed for the British market. They are simply surplus American goods, and conditions in America are very different from what they are here. Electricity over there is cheap, so that it doesn't really matter how much current a set eats. Further, nothing in America is built to last. You may expect, therefore, from the American set a short life and, if not a gay, at any rate a rather expensive one.

SERVICE

But there is one very important point which those who don't look before they leap often do not realise. The price of a British-made set of repute includes service after purchase. If any defect not caused by misuse, carelessness, or neglect develops in a set made by a good English firm you can feel jolly well sure that it will be put right for you. The reputation of the firm is at stake. American manufacturers have no reputation to keep up, though. All that they want to do is to get rid of surplus goods, which they cannot sell in the States, at almost any price. They have, as a rule, no service organisation, and if your set goes wrong—well, you are unlucky, and that is that.

PENNY WISE—

AND it is not only in the purchase of complete sets that you should look before you leap. In wireless the old proverb, "Penny wise, pound foolish," proves its truth to the hilt again and again. Take valves. Our home products are not cheap—in fact, to my mind, they are still more costly than they ought to be—but they are good and they are completely reliable. In the very unlikely event of purchasing a dud valve made by one of our own big firms, you can always be sure that you will receive courteous and fair treatment when you report the matter.

SAD, BUT TRUE

READERS may know that I am very interested in high-tension batteries and that I conduct regular laboratory tests covering the majority of those on the market. One thing that strikes me is this. In response to pressure of public opinion, manufacturer after manufacturer has had to reduce prices, and the results have not been good. We ought to be having better batteries to-day than ever we did, and it is perfectly true that this is the case with batteries of the highest class which are sold at the lowest prices consistent with good design, good workmanship, and good

On Your Wavelength! (continued)

materials. But the cheaper batteries are growing worse, and every price reduction sees some deterioration in their service-giving qualities. When I tell you that by paying the price of a battery of first-rate quality you can expect at least three times the service that you would get from a cheap one, you probably won't believe me. Still, it is so, and you cannot get away from the results of laboratory tests. Perhaps if I mention that not a few cheap batteries have passed through my hands which have proved incapable of supplying the voltage and current needed by the plates of a three-valve set for more than a week you will realise that there is something in the question of price and quality.

VALVE PATENTS IN AMERICA

SEE that the de Forest Radio Company has won its appeal in the Supreme Court of the U.S.A. against a decision in the lower Court relating to the use of high-vacuum valves. The first patent for the modern highly exhausted valve, as distinct from the old gas-filled variety, was taken out by Dr. Langmuir, and was of enormous value since it covered the manufacture of every valve used to-day for broadcast reception. The present decision, which declares the Langmuir patent to be invalid, is the result of litigation lasting over several years. Since it comes from the Supreme Court, from which there is no appeal, it would seem to be the last word in the matter.

ON THE TRANSMITTING SIDE

THE latest attempt to improve the quality of broadcast transmission comes from Budapest. It has always been recognised that the conductor of a studio orchestra is at a disadvantage in hearing the performers' music directly. His radio audience on the other hand only hears it after it has passed through the microphone and has been transmitted from the aerial. The consequence is that the conductor does not know to what extent the proper "balance" has been affected by attenuation of the high or low notes as they pass through the microphone and modulator. This difficulty is now to be overcome by placing the conductor inside a soundproof glass case, through which he can see and be seen by the performers, though he cannot hear them directly. Instead he is provided with a pair of headphones fed by a wireless receiver, so that he hears the music exactly as it is received by distant listeners, and can therefore conduct the performance so as to allow for any imperfections in the radio transmitter.

THE LANGUAGE TANGLE

BEROMUNSTER, the new Swiss station—rated at 77 kilowatts—has been specially designed to serve the German-speaking inhabitants of that country. Although twice as powerful as its French-speaking counterpart, Sottens, there is very little difference in signal strength between the two programmes as received here. This is probably due to the fact that a part of the Bernese Oberland lies in the direct path between us and Lucerne where the

giant transmitter is located. Luckily Beromunster does not "sit on top" of any of our own stations—unlike Sottens, which works rather too close to the Midland Regional.

Having provided for their French and German speaking inhabitants, the Swiss Government is now faced with the problem of catering for the Italian-speaking cantons in the south. Accordingly a third high-powered station is shortly to be erected at Tessin. This trio of stations certainly ought to satisfy all the parties concerned in Switzerland, though it must inevitably tend to accentuate congestion elsewhere. Still it is all part of the price Europe has to pay for being polyglot.

SHORTENING THE AERIAL

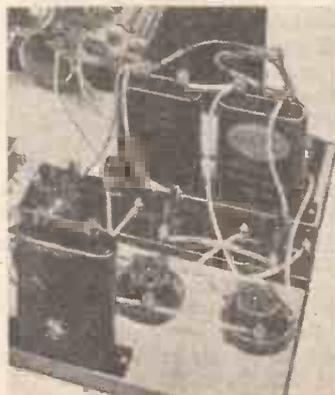
IN the early days of broadcasting, nearly everybody who had sufficient garden space followed the P.M.G. maximum of 100 ft. as closely as they could. Conditions are very different now, and where selectivity is the main object in view it pays to cut the 100 ft. down to roughly half. Of course, the simplest solution is to shorten the wire "electrically" by inserting a small series condenser. But this can be overdone.

THE PORTABLE "CENTURY SUPER" FULL DETAILS NEXT WEEK

For instance, it is not advisable to use a small screw-down condenser, with a maximum capacity amounting to only a few micro-microfarads, because it involves a serious falling-off in signal strength. This does not matter so much if you have lots of H.F. amplification, but otherwise it is better to do the thing properly and shorten the aerial by cutting the wire, even if it does

SPAGHETTI RESISTANCE CONNECTIONS

When a number of flexible resistances are used in a set and it is necessary to join them together at one point, then take care that this junction point cannot



short-circuit with any other part of the set. Put a small bolt through the ends of the flexible resistances connected together and twist these ends up so that they cannot touch any metal parts.

mean a certain amount of hard labour. Naturally the shorter aerial will have a slightly smaller "pick-up," but there is no noticeable loss in signal strength.

YOUR WET-WEATHER FRIEND

WE certainly have not had much to boast about in the way of summery weather so far. Perhaps it will come along in good time, and in any case I don't believe in being pessimistic. But I notice one rather interesting reaction to the prevailing climatic conditions. The orthodox method of advertising portable sets was to dwell upon their advantages as an asset to life in the open—whether on the river, or picnicking in the country, or for alfresco dancing. In short, what might be called "picnic and punt publicity."

The new slogan, however, is: "The portable makes wet weather fine," or words to that effect. Very good psychology too, in my opinion. After all, if you do start off on an outing, and Jupiter Pluvius proves to be unfavourable, it is just then that a decent portable set will go a long way towards saving the day from being an utter failure.

CAN YOU HELP?

I AM very mystified just now over the fluffing out of one cell of what is apparently a perfectly good filament accumulator. It is a sixty actual-ampere-hour battery consisting of three first-rate cells housed in glass cases. Though it is three years old, it has always received the best of treatment in my hands, and I have kept a careful check on the doings of the charging station. This particular battery came back refilled a fortnight ago. I then found the gravity of each cell just about what it should be and all the plates appeared to be in good condition. The normal load on this battery is half an ampere, and it happened that it had been used very little since recharging.

The other night, when I had been listening to a fine programme from Brussels No. 1 for half an hour, signal strength began gradually to decline. "Hullo, fading," thinks I. "Rather unusual for Brussels." But the apparent fading went on, the volume growing less and less as the minutes went by. A glance at the milliammeter in the common H.T. negative lead showed that the plate current was down. Something wrong with the H.T.? No, for the filament ammeter was also reading below normal, and as I watched I saw its needle dropping very slowly. Leaving the batteries under load, I put the voltmeter across the filament accumulator cell by cell. The middle one of the three showed barely 1 volt. I switched off, took out the cell, and had a look at it, suspecting that a short might have occurred through the growth of one of those "trees" which sometimes appear on old positives. There was nothing of the kind and the plates looked perfectly normal. I have absolutely no idea why that cell should have given out and the service station can offer no explanation. Can any reader make a helpful suggestion?

THERMION.

TUNING *the* A.C. CENTURY SUPER



The construction of this amazing 100-station set was described in the two preceding issues. Below are some operating notes by its designer—W. JAMES

THE chief point to remember when tuning the "Century Super" is that the oscillator tuning condenser must be turned very slowly.

Selectivity is so good that you will probably pass over stations unless this tuning condenser is handled with care. A further point is that the condenser tuning the frame aerial should always be brought into tune.

I know that the tuning of the oscillator is by far the sharpest and that it may seem possible to bring in stations by using this condenser and not caring too much about the frame aerial circuit. But for the best results the frame aerial should be tuned as accurately as possible.

The Usual Procedure

A normal tuning procedure is to find the station by setting the oscillator with the frame roughly adjusted and then to adjust the frame aerial tuning condenser. This is a satisfactory method, but the tuning of the frame must not be regarded as of little importance in comparison with that of the oscillator.

Then there is the volume control—a most important one, too. This must be used in order to avoid overloading.

When tuning to the local station the best results may be obtained with the frame aerial turned away from the station. This is particularly true when the set is being used near a powerful local. The strength of the signal collected may be great enough to overload the first stage and this is avoided by turning the frame.

Frame Aerial Directional Effects

A set of this type has been tried within a few hundred yards of the aerial of the Brookmans Park transmitters and the stations were cut out in a degree of the tuning and a foreign station brought in.

Its selectivity is remarkably good. You get Mühlacker free from interference from the London Regional. This selectivity is due to the super-heterodyne action.

There is the selectivity of the frame to commence with. Then you have the first detector, which is a great help. The frequency changing helps and, of course, the band-filters in the long-wavelength amplifiers add greatly to the selectivity. Actually, on the long-wavelength part of the set are six tuned circuits, made up of the three band filters, each having two coils tuned accurately to the mean fre-

quency of 126 kilocycles. The selectivity is, therefore, very good and the beauty of it is that there are only the two tuning condensers to be operated.

Now you will understand why careful tuning is so necessary; a degree change on the oscillator means another station.

A number of adjustments can be made to vary the strength. The first is that of grid bias. We have an anode-bend first detector which obtains its high tension from a fixed potentiometer, consisting of two resistances joined across the high tension. With fixed high tension the bias must be adjusted to give a suitable working characteristic. Try -3 volts and then lower and higher, using a fairly weak signal.

If you have several valves of the same type it is possible that one of them may be a better rectifier than the others. You can try changing them about, although I don't suppose you will discover much difference.

For the screen-grid valves a bias of -1.5 or -3 volts should be tried. If the bias is increased, the volume control potentiometer, which is connected to the screen of the valves, will have to be turned further towards the maximum position. There will be no difficulty in finding the most suitable bias as this is not critical by any means.



A rear view of the A.C. "Century Super" showing the interior with a Regentone S60 mains unit in place

For the power valve the bias recommended by the makers should be used, or a little more.

If you have a milliammeter to include in the circuit so much the better, as power valves are fairly sensitive.

There is no hum from this set. It is perfectly stable and no more mush or noise is heard than from any good powerful set. With practically the full high tension on the screen-grid valves and a good voltage on the detector, the set will deal with strong signals. The power valve when fully loaded gives a good output and the quality ought to be first class.

Wavelength Changes

To change the wavelength range involves turning the switch of the oscillator and the frame aerial, for the ordinary broadcast ranges. If you want to receive the short-wavelength stations a special frame or aerial coil must be connected in place of the standard frame aerial.

There is a short-wavelength position on the oscillator switch. Quite a number of short-wavelength stations are to be received at good strength during the evening, and I have described in earlier issues short-wavelength coils and aerial connections. On the short-wavelengths the tuning of the aerial coil seems very flat, but the oscillator condenser must be turned extremely slowly or stations will be passed over.

It will be noticed that a station may be tuned in on the oscillator in two positions. This is normal and applies to the other waveband as well. When tuning on any waveband do not jump about all over the dials, but having heard a station proceed from that point moving the two tuning condensers forward or backward together.

In this way the tuning is easiest. Make notes of the settings of the dials and presently note the second position of the oscillator for a station. The tuning is not as difficult as that of an ordinary screen-grid three-valve set having reaction, and you will quickly master it.

Normally the set will be connected to the mains unit and so all circuits are switched off or on together. When testing you must be careful not to pull out the valves, leaving one or two in circuit as the voltage applied to the heaters might rise above a safe value. Do not disconnect the high tension from the set and leave the mains unit connected, as this will strain the parts.

THE HOW AND WHY OF RADIO—XLII

THE SCREEN-GRID VALVE

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

I PROPOSE to conclude this series of valve articles by explaining, firstly, the screen-grid valve, secondly the pentode valve, and, thirdly, the mains valve, three types that include some of the most interesting valve developments.

This week, then, the screen-grid valve.

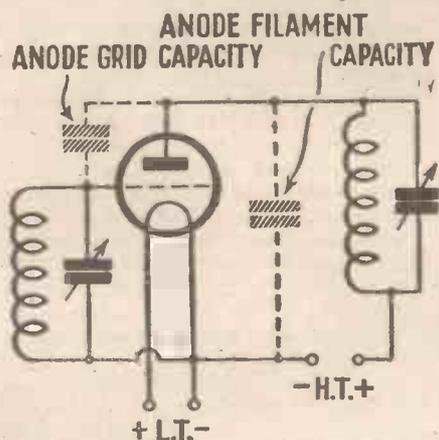


Fig. 1. Connections of three-electrode valve as H.F. amplifier

Why so named? Because the grid is screened from the anode by the insertion of a second grid—called the screening grid.

To see why this extra grid is so valuable we must go back to the early type of high-frequency-amplifying valve. Fig. 1 shows a typical three-electrode valve—a valve without a screening grid—connected up as a high-frequency amplifier.

Such an arrangement, with stabilising devices, was in common use several years ago. Very little real amplification could be obtained, because of the capacity effects between the anode and grid, and between the anode and filament.

As the anode circuit is tuned, the presence of the anode-filament capacity is not a very serious drawback. But the capacity between the anode and the grid is distinctly undesirable. This capacity is, of course, extremely small, so that when the valve is used for low-frequency amplification its effect is negligible.

At the high frequencies, as with an incoming signal, the anode-to-grid capacity is sufficiently big to act as a feed-back of anode energy. In this way a form of reaction is developed; as soon as the anode circuit is brought into tune with the grid circuit the voltages developed in the anode circuit are greatly increased and uncontrollable oscillation is produced.

To overcome this defect in the use of a three-electrode valve for high-frequency amplification, we used to employ a capacity-bridge circuit, which had the effect of neutralising the current flowing back to the grid from the anode.

Then Hull in America and Round in this country saw the possibilities of curing this trouble at its source, namely inside the valve. So an extra electrode was introduced.

In brief, this extra electrode is simply a shield between the grid and the anode. In order not to impede the progress of electrons from the filament to the anode, this shield is made in the form of a wire mesh and a high positive voltage is applied to it as an additional attraction for the electrons.

The capacity between the anode and the operating grid is reduced very considerably by this intervening screening grid. So much so that great amplification can now be obtained, without the need for complicated external neutralising circuits.

Fig. 2 shows a modern screen-grid valve connected in a simple tuned-anode circuit.

Provided that the grid tuning is screened from the anode tuning, such an arrangement will provide a considerable degree of high-frequency amplification with complete stability.

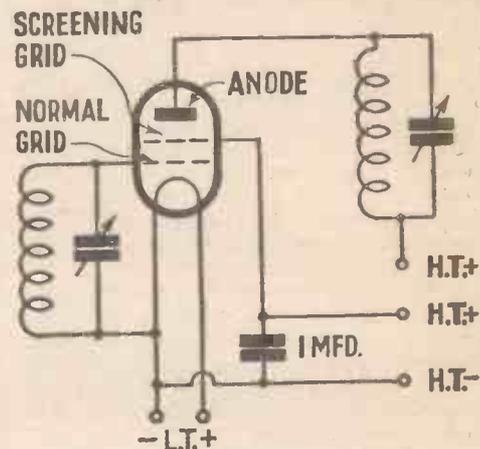


Fig. 2. Connections of screen-grid valve in tuned-anode circuit

The very high magnification factors obtained with the screen-grid valve on paper are not obtained in practice, owing to the very high valve impedance. The mutual conductance of the average screen-grid valve has not, until now, exceeded one.

During the coming season we may expect to get more amplification from the screen-grid valve, because impedances are being lowered through improved construction. Consequently the goodness factor—mutual conductance—is being greatly increased, in some valves to a figure as high as three.

HOTSPOT.

THE PICO-FARAD

THE standard unit of capacity—the Farad—is seldom used in wireless practice. The usual value of the capacity in a tuning circuit is only a fractional part of a microfarad. For instance, .0003 microfarads is three ten-thousandths of a microfarad, which is itself only the millionth part of the major unit—the farad. Accordingly another unit of capacity has been set up—though it has not yet won general acceptance. This is the “pico-farad,” which is equivalent to the millionth part of a microfarad measured by this unit, .0003 microfarad would become 300 picofarads, which is a much more convenient figure for most people to handle, particularly when it comes to multiplication or division.

B. A. R.

DO YOU KNOW

— that some valves specified as detectors take more current than others and a detector which takes 4 or 5 milliamperes may quite upset the working of the transformer which is placed in its anode circuit?

— that in a grammo-radio set undue record wear is caused if the pick-up is not free to move on its arm? A pick-up carrier arm with a ball pick-up support is a great advantage, but in any case this bearing should be quite free. If it is not then the record grooves will wear badly.

— that if your set motorboats it is a good plan to disconnect the lead to the grid terminal of the detector valve and to short-circuit the grid and filament terminals on the holder? This will show if the motor-boating is in the H.F. or L.F. side of the set.

VALVE-HOLDERS

IT is well worth while to keep all valve-holders reasonably clean and free from dust. There may be a potential difference of anything from 60 to 120 volts, between the plate and filament legs. If the small intervening distance is covered with dust or grime it forms a high-resistance shunt path between the two. Very often this leads to persistent “crackling” caused by the intermittent passage of small pulses of current across the high-resistance path. This does not occur constantly, but at more or less regular periods, say, every twenty or thirty seconds. Incidentally the leakage is liable to occur whether the filaments are lit or not, so that it may lead to a serious waste of H.T. “juice,” even when the set is idle.

M. A.



B.B.C. Plays

An Exclusive Interview

In this interesting article our Special Correspondent interviews a B.B.C. Radio Play Official who gives details of the new dramatic productions to be given from now on till the end of the year

"CAN you tell me what plays are down on the Production List schedule for 1931?" I asked a Savoy Hill official last week.

"Well, as a matter of fact, I have just had the advance schedule up from the producers," he said, "and I think I can give you a good idea of the plays which we are putting on—that is up to the beginning of December.

"There is just one point I ought to make clear. We have had a huge number of letters about last season's plays and the productions which we have given up to now. There have been an extraordinary number of requests for repeat items.

"It has been rather difficult to arrange these because just now we feel that more listeners than ever are enjoying radio plays and while one listener may think that a certain production deserves an *encore*, it may not make such a wide appeal to, say, a hundred other listeners.

"We have overcome this difficulty, I believe, in the only way possible. We have arranged the schedule so that the plays which have already been given and which are repeat items come early on in the sum-

mer season, while from about October on to the end of the year, practically every play is a new production.

Fixing the Date

"I must make it quite clear that as the year goes on one or two alterations in dates may take place. I should like to take this opportunity of giving you advance news so that readers may know what plays to expect, but they must not be disappointed if, say, in November, they find that perhaps owing to the rehearsals for a particular play not being through in time, it has to be postponed for a week.

"Now let us start off in August. We are to have a short forty-minute playlet, *The Bunker at the Fifth*. This is so near at hand that I will not spoil it by giving away details. There is a shorter play by Peach, called *Fireside*. Peter Cresswell is producing this and he says that it will not last longer than about twenty minutes. Later we were to have given a repeat performance of Munro's *The Rumour*, but I have just learned that *The House Fairy*, by Housman, is to be given in its place. These are both repeat items.

"If" Again

"Lance Sieveking is producing another performance of Lord Dunsany's *If* and another repeat item to be given is *The Romantic Young Lady*, which Peter Cresswell is producing and which will last for about one hour and fifteen minutes.

"Another Housman play is *Consider Your Verdict* in September—it lasts for about twenty minutes, while a Shakespeare play, *Coriolanus*, is due early in September. *Oranges and Lemons* by Wade and *To See Ourselves* by Delafield, produced by Val Gielgud, are also in the same month.

"October will be a good month for radio plays. First we have the short twenty-minute play by Beeston, produced by Lance Sieveking, *Traitor*. Later is a play which, I think, will appeal to every one—*Chopin* by Rooke-Ley and Martin and produced by Gielgud. This is really the story of Chopin's life and, true to type, will be a romantic type of play with plenty

of music. It should last for about one hour and forty minutes, but none of these advance plays has yet been accurately timed. Early on is another good play, *Ann and Harold*, by Goodrich, while later is a play written and produced by Harding, *Villon*.

"There are five good plays down for November. *Mary Celeste* will be given again, Peter Cresswell producing it, while on the list also are *Boite à Joujoux*, produced by King Bull, *Jane Eyre* and *The Voyage to Lilliput* (Swift-Sieveking), produced by Sieveking himself.

"We have in mind broadcasting *Tit for Tat* sometime during November, but the copyright has not yet been arranged.

"As the film magnates say, we are 'featuring' Shakespeare in December, for a production of *Othello* will be carried out by E. A. Harding and Val Gielgud. *Eric* by Farrar-King Bull and Allen, will also be given in December, while I suppose you must put down the outside broadcast of the St. Hilary Play, also in this month, on the list of radio plays."

No War Plays

"You don't seem to be specialising in war plays?" I asked.

"No," said the Radio Play Official. "You must remember that last year we created an impression in the broadcasting world by producing *Brigade Exchange*, which set a definite standard for the future in this kind of thing and we feel that in the production schedule for the latter part of this year we should not be justified in specialising in war plays of the same kind.

"Remember that the B.B.C. last year broadcast over fifty plays and everyone cannot be a success. Probably ten or a dozen can be counted among the failures, but from these failures we have learned much in radio play technique and I think you will find that our next batch of plays will be even better than those which have already been given. You will find that among this new group the B.B.C. is not lacking in originality. Old favourites such as *The Prophetic Camera*, *Matinee*, *Copy*, and *Obsession*, have taught us much in producing these original microphone plays which make good entertainment without being experimental.

"Make a note of the dates I have given you, and impress upon listeners the necessity for listening to the whole of a radio play. Too many people fail to get the most enjoyment because while the play is in progress they will not concentrate.



Vivid acting before the "mike." A scene in the studio on the occasion of a recent broadcast play

TELEVISION IN AMERICA NEXT YEAR?

That is a possibility foreshadowed by Mr. William F. Paley, President of the Columbia Broadcasting Chain of Stations in America, in an interview with ALAN HUNTER.

WHEN I was in America—just two years ago—there were, if I remember rightly, 43 stations in the Columbia chain of broadcasting stations. Knowing something of the amazingly rapid way “big business” grows bigger in America I was, nevertheless, surprised at the President's first statement.

“We now have 83 stations in the Columbia network. Yes; they stretch from coast to coast and up into Canada, where we have two stations, one at Montreal and the other at Toronto.”

Well, that makes the B.B.C.'s simultaneous broadcasting system look a bit small! In comparing American and English broadcasting, we are always apt to overlook the fact that England is a little island and America a whole continent. And overlooking that rather obvious geographical difference leads to all kinds of misconceptions about American broadcasting.

Programme Exchanges

“You ask me,” went on Mr. Paley, “what is our aim in fixing up programme exchanges between your country and mine. Well, you may think we are after picking up stunt broadcasting from Europe, like the recent nightingale effort, which was very much appreciated, by the way. But stunt relaying is not my idea.

“We of the Columbia organisation want to use international broadcasting to bring to America the things that we just can't get in America.

“We are taking our international broadcasting efforts very seriously. We honestly believe it to be an instrument for building up an immense amount of goodwill between the nations.”

Mr. Paley reminded me of that recent series of Sunday talks from a Savoy Hill studio by some of our most eminent thinkers—relayed by the trans-Atlantic telephone and broadcast over all the Columbia chain to interest and enlighten thousands of American listeners.

“These talks have appealed to the thinking people in America. Perhaps you do not realise it, but one of the most important things broadcasting has done in America is to make people think.

Jazz and Advertising

“It is wrong to imagine all American broadcasting is just jazz and advertising. What about the New York Philharmonic Orchestra relayed by Columbia every Sunday? We broadcast some of the finest orchestras in the country—the Detroit Symphony, the Minneapolis Symphony and others.

“These are the broadcasts American listeners talk about. There has been a tremendous elevation in the standard of public appreciation—directly due to broadcasting.”

Mr. Paley mentioned that he had met

Sir John Reith during the Director General's recent visit to America. I asked Mr. Paley whether the B.B.C. chief's policy of giving the public what he thinks it ought to want is adopted in America.

“It's a difficult problem. We try to preserve a balance between things the public has always wanted and the things we think it ought to want.

Catering for a Continent

“In American broadcasting we have the additional problem of trying to cater for a continent, where you have but a country to deal with. Think of the immense difficulty of relaying over the whole of America, through the Columbia network, an entertainment that will appeal as much to the South as to the West, to the North as to the East.

“You might say the problem is insuperable. But broadcasting has wrought a curious evolution in entertainment appreciation. I should say that broadcast

CARRY YOUR “CENTURY SUPER” WITH YOU!
Build the portable model. First details in next week's issue

entertainment in America is now ‘universal.’ You don't hear people say ‘Oh, that's O.K. for Dixie, but no good for us in New York.’ Broadcasting over the large American networks, such as the Columbia, has undoubtedly eliminated the ‘sectionalised’ form of entertainment.”

That point of view is new to me and is in considerable contrast to our policy of fostering regional talent through the B.B.C.'s twin-station system of programme distribution.

As readers may know, one of the missions of Columbia's President during his brief visit to this country is the fixing up of transatlantic relays between England and America. I asked whether the Columbia organisation intended to continue to hire the rather expensive transatlantic phone for these relays.

“No; at the moment we are building a special station for short-wave transmission and reception. This should be completed by the end of the present year.”

A Television Forecast

Mr. Paley's last remarks were, I think, specially significant.

“You ask me whether television is really going ahead in America. I think the answer is most decidedly ‘yes.’ As you may know, we have several television transmitters in the Columbia organisation. The big corporations are not saying much about television, but they are certainly working hard on it. I, myself, think that



Mr. William F. Paley, President of the Columbia Chain of Broadcasting Stations in U.S.A.

in a year's time, or perhaps it would be safer to say in the ‘fall’ of 1932, we shall have commercial television in America.”

BROADCAST RECEPTION IN THE SCOTTISH HIGHLANDS

DURING the past few years, the increasing popularity of wireless, together with the gradual reduction in costs of receiving sets and accessories, has resulted in more and more dissatisfaction, being expressed by the inhabitants of the Northern and Western Highlands of Scotland regarding the inefficiency of broadcast reception.

It is a curious fact that notwithstanding the position of Aberdeen on the north-east coast, this transmitter is almost useless for any receiver with less than three valves in Sutherlandshire.

Residents in the county of Ross and Cromarty, also victims of very poor reception, have attributed the comparative silence of their radio sets to the contour of the country. The Grampians are, to many parts of the Western Highlands, a shield against the programmes transmitted from southern stations.

While a two- or three-valve receiver will, under ordinary weather conditions, bring in several British, German, and other foreign stations if worked in the Midlands of Scotland, the same set, if operated in the Highlands beyond the Grampians, will experience considerable difficulty in even receiving Glasgow.

On the Scottish coast between Lossiemouth and Fraserburgh, a two-valve set brought in the Scandinavian stations at good loud-speaker strength, and, of course, Aberdeen, but was useless for the English stations. Glasgow came in weaker than Copenhagen.

It has been suggested that a relay station be established at Inverness. Such a station would be an inestimable boon to the inhabitants of the north of Scotland.

The Inverness Town Council has petitioned several Scottish M.P.'s, urging that broadcasting conditions in the north of Scotland should be remedied.

A Weekly Programme Criticism—By SYDNEY A. MOSELEY.

Without Fear or Favour



THE MISSING ANNOUNCER

NATIONAL OPERA

I WAS unable to fathom the mystery of the announcer the other night who read out the news bulletin. He did so in plain, downright Cockney fashion, so that at one time I thought there was a spoof on. By and by, the real announcer came on, and I wondered whether through some unforeseen circumstances somebody unused to the microphone was brought into service.

Since writing the above I have made inquiries and have discovered the mystery. This is that the regular announcer was missing, and it was necessary to hunt round and try to get someone else to deputise. Most people who were approached refused. Finally, there was a meeting of the engineering staff and lots were cast, and somebody, apparently not well up in elocution, did his best, and in the circumstances did quite well.

I have every sympathy with the idea of National Opera, and my friendship with Mrs. Snowden, who is a moving spirit in this thing, leads me to be as helpful as I can. But, frankly, I do not think the Covent Garden people have realised that millions of listeners are indirectly paying part of the cost of these operas.

Putting on old-fashioned operas and experimenting with new ones may be all right in normal circumstances, and then when such experiments are offered in small doses. But the Italian season commenced with three unpopular operas.

This was seen in the fact that the place was half full. Now, I submit that it is necessary to see opera as well as hear it to obtain full enjoyment. If these operas do not appeal to the regular subscribers, how could they appeal to the millions of listeners, who, unfamiliar with the music, had not the help of vision?

The result of my protest was that one of the newer operas was substituted by *Tosca*.

You probably heard *Traviata*. This attracted a full house. It is no use Covent Garden grumbling about not making things pay if they do not give the public what it wants.

I have had many letters about Jack Payne and his singing. A good many think he ought not to sing at all, and when I conveyed the hint Jack dried up. Now people want to know why he is not singing.

Listening to recent vaudeville items, I find that the applause question is getting worse and worse. Prolonged applause is allowed, and the new people who are controlling the studio do not seem to be able to cope with it. This is one of the matters I shall be able to discuss with Sir John Reith.

I am not altogether certain that Cicely Courtneidge realises the kind of fare needed for wireless. Singing a song about "Loving Elizabeth Brown" is utterly stupid. I know they tried to put over the fact that she was dressed up as a man, but we could not see her. So that it was thoroughly sickening to hear the reiteration of "being in love with Miss Elizabeth Brown."

I am sorry that Claude Hulbert has obtained a successor to "Good-night Michael,

good-night Mike." At any rate, I did not hear it the other night.

"The Party Affair," compered by Jack Hulbert, was a mixed affair, but, on the whole, good.

Winifred Bury has a voice of quality and charm, and I liked her old songs, "There is a Ladye," "I Know Where I'm Going," "Silent Worship," and "Sweet Nightingale"; but I thought the songs by Leo Peter were stupid.

The talk by Charles Scott, the intrepid airman who flew to and from Australia in record time, was quite good, although Scott forgot my advice at first and hurried too much. He has a good broadcasting voice and told his story with due modesty, but with the real picturesque touch. I do not see why he could not be asked to give another talk, when he would have more time to rehearse what he had to say. As it was, I am afraid the thing was rather rushed, although listeners could hardly have realised that.

Noel Eadie, who is known to wireless listeners, got away with her "Gilda" in *Rigoletto*, although, to be perfectly frank, she was not ideally cast for the part, apart from being extremely nervous. At the same time, it is a British operatic subsidy, and British singers should be given their chances.

Dennis Noble in *Traviata* was also miscast, but his voice certainly compared well with some of the best foreign singers.

Here is an important point which I should like readers to debate upon. The well-known owner of one of London's leading restaurants told me that no British band comes up to American or Tzigane bands. He says that British bands lack personality and do not make people want to dance as an American leader can with his band. What truth is there in this sweeping statement?

Crisis in Spain was put down as "the first English example of the report in radio form of contemporary events." As a matter of fact, it was reminiscent of other productions, but it was quite well done and is worth following up. E. A. Harding and John Watt must have worked hard on it.



Arthur Catterall, well known to listeners

FOR selectivity, sensitivity, and quality, the super-heterodyne receiver is difficult to better.

An example of the super-heterodyne principle is to be seen in the "Century Super," recently described in AMATEUR WIRELESS.

This set has created immense interest throughout the country. Large numbers have been built. From all parts we have had letters of praise.

Cheap to Build and Run

So you see, those of you who have not yet tried the "Century Super" in its battery or mains form, that you have so far missed the very latest in receivers. Its easy operation, its fine tone, and its sharp tuning all receive praise. And, of course, the construction is so simple that anybody can build it and use it.

The cost of the parts is reasonable enough and the current taken by the battery set is well within the discharge rates of ordinary types of batteries.

I have claimed for the "Century Super" set that it costs very little more to build or to run than an ordinary three-valve set.

If you can build a three-valve set you can certainly build the "Century Super." It could be said, in fact, that it is more easily built and put into operation than many modern three-valve receivers, as those who have tried ganging will agree. A glance at the diagrams and photographs in recent issues will show the simplicity of these designs.

One of the most interesting parts is the band-filter. Three are used in the set. A filter consists of two coils tuned to the mean frequency of 126 kilocycles by condensers.



Features of the modern super-het are the few parts needed and its simple construction

:: UP-TO-DATE INFORMATION ON THE

Ordinary tuning condensers are not used. The condensers are formed with insulated wire and are so constructed that the capacity can be varied very easily during manufacture. But when the primary and secondary coils have been tuned to exactly the right

connection is needed. The three band-filters working together in the set provide good tuning and part of the wonderful selectivity is due to these three units which are a most effective filter.

In the set described a frame aerial is used as the collector. It has a centre tap.

Much depends upon this frame aerial.

If it is a poor one the signals will be weaker than when a good frame is used, and further interference may be experienced. Actually, the better

PRACTICAL SUPER

mean frequency the parts are fixed. Great care is taken to be sure that the tuning of the coils shall not alter with handling and will remain constant for a long period of time.

The coils are beautifully made and adjusted, with the result that the separate band-filters tune accurately and no external trimming is necessary. The two coils of a band-filter are arranged as in Fig. 2. Note the space between the two coils. This is fixed in order that the tuning characteristics shall be good. The filters pass a band of frequencies, in order to minimise distortion and the width of the band depends upon the inductance of the coils, the capacities of the tuning condensers, the resistances of the circuits, and the coupling of the coils.

The Coils

In the manufacture, therefore, it is necessary to watch a number of factors in order that the finished coils shall have really good characteristics. If the coils are too far apart the band of frequencies passed will be too narrow, and with the two coils too close, the tuning will be too broad and a double hump may be found when working the set.

The three coils used in a receiver are alike except that one is without a flexible connection from the top. They are made like this for convenience in the receiver.

Each coil is carefully shielded in a copper container. The shield is important; screening the coils and protecting them. A connection is made between the shield and the end of the coil, going to —L.F. or to the grid bias and so no external

the frame aerial, the better the results.

It is not really a question of signal strength, but of interference; and if you make tests using a poor frame and a well-made one you will notice a considerable difference in the number of stations that can be received clear of whistles and other stations.

The Oscillator

A super-heterodyne receiver behaves in a different way from other sets. There is an oscillator in the set. This is used to provide, with the signal being received, a new signal having the mean frequency of the long-wavelength amplifier. The mean frequency of the band-filters used is 126 kilocycles. If, therefore, the frame aerial is tuned to a signal working on 300 metres, or, say, 1,000 kilocycles, the oscillator must be set at a frequency of 1,126 or 874 kilocycles.

Let us suppose that the oscillator is set at the frequency of 1,126 kilocycles. Then, although this provides, with the 1,000-kilocycle signal to which the frame is tuned, a signal of the beat frequency of 126 kilocycles which passes through the

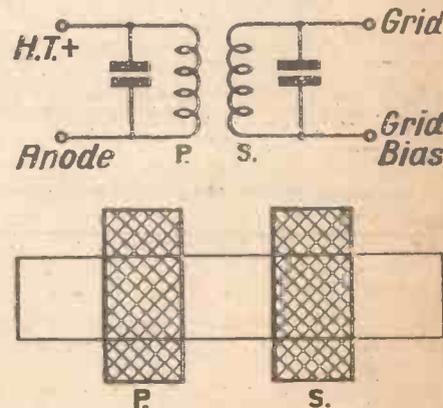


Fig. 2. Band-filter coil for super-het

MOST MODERN TYPE OF RECEIVER ::

amplifiers and is heard with this setting of the oscillator; we could also hear a station working on a frequency of 1,252 kilocycles were the frame aerial tuned to it.

However, the frame aerial is tuned to 1,000 kilocycles and it is not likely that a signal of 1,252 kilocycles would interfere provided the tuning of the frame is reasonably good.

Let us suppose now that the oscillator is tuned to 748 kilocycles in order to receive the 1,000-kilocycle signal. Then a signal of 748 kilocycles could be received by adjusting the frame aerial to this and the tuning would have to be poor for interference to be present when the frame is tuned to 1,000 kilocycles.

The point to note here is that the frame aerial itself must be able to tune so sharply that a signal of 252 kilocycles away from the frequency to which the frame is tuned is not received at all.

connected to the oscillator and to the grid of the first valve as shown in Fig. 3. The valves are biased by the grid battery.

Oscillations of good strength are needed, and if you were to vary the strength by altering the value of the anode-feed resistance, for example, you would discover that the best results are obtained when the oscillations have a certain strength. A milliammeter connected in the high-tension supply lead to the detector will show the relative strengths of the oscillations.

H.T. Adjustments

If the high tension to this valve is first adjusted so that the anode current is .1 or .2 milliamperes with the oscillator disconnected and then the oscillator is connected, the current will increase. Do not tune the oscillator to the same frequency as the frame aerial, but tune in a signal and notice how the current varies as the oscillator is ad-

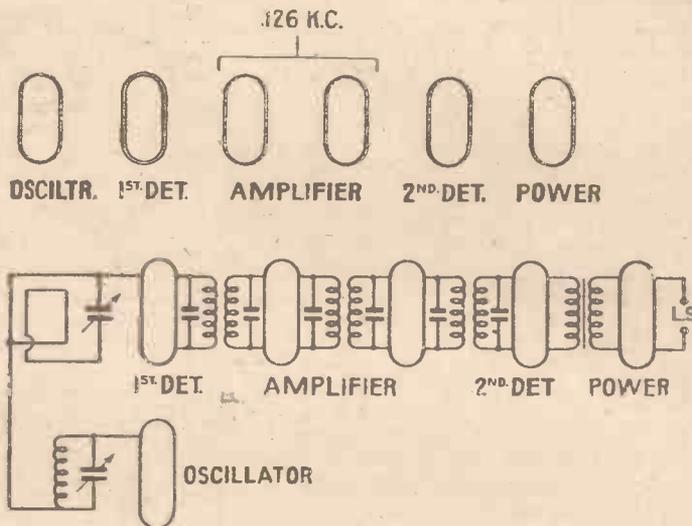


Fig. 1. Arrangement of valves in super-het receiver

justed to bring the signal in at the full

This is not necessary when only the power valve is biased from the battery, but if you should try giving the two screen-grid stages a bias, and the battery is at all old, a 1-microfarad condenser might have to be connected across the bias to the screen-grid valves in order to avoid instability.

At the second detector care must be taken to stop the long-wavelength signal from passing to the low-frequency amplifier. The wavelength corresponding to 126 kilocycles is about 2,400 metres, greater than the highest wavelength of the normal broadcast band.

A small by-pass condenser is, therefore, of no great value and two .001-microfarad
(Continued in this column of next page)

ER-HET IDEAS
FOR YOU

AN
INFORMATIVE
ARTICLE

By W. JAMES



Any ordinary frame will do this easily enough and with a good frame the tuning is much better.

But still, some users so tune that interference is produced. They do not tune the frame aerial accurately enough. And so they hear the local stations in several positions.

The setting of the oscillator has something to do with this as well. Sometimes the high tension should be increased a little, or it may be decreased with advantage, and if you have noted interference, the setting of the oscillator should be adjusted.

We use a centre-tapped frame aerial

strength. Then, if you vary the value of the anode-feed resistance, you will see that the anode current increases or decreases and you will probably notice a variation in the strength of the signal.

Selective Working

The selectivity will also be affected if the oscillator is adjusted over a wide range. In the set described, the values were chosen to provide as nearly as possible the best results over the whole range. The anode-feed resistance should not be left out as it helps to make the value of the feed current

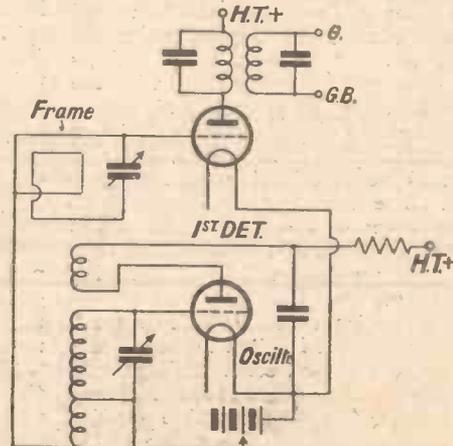


Fig. 3. Connections of first detector and oscillator



IN MY WIRELESS DEN

WEEKLY TIPS—
CONSTRUCTIONAL AND THEORETICAL

By W. JAMES.

High Notes Lost

A POINT that the set designer always has to face is where shall the high note cut off commence. We all know that with a set designed to deliver to the loud-speaker high notes up to say 8,000 or 9,000 cycles, interference in the form of whistles is often so strong as to spoil reception.

You can sometimes meet with this difficulty when changing from an ordinary to a good loud-speaker. If you cut the interference out by sharpening the tuning in the set the quality naturally suffers a little and this also applies when a low-frequency filter is used to cut off the higher notes.

There is no doubt about reception being more pleasant when free from whistles and mush, so it would seem that the very high notes are not wanted.

In many instances the detector and other circuits weaken the higher notes as much as can be tolerated from the point of view of reasonable quality, but the more scientific way of dealing with the difficulty is surely to fit a filter in the low-frequency circuit for cutting off the unwanted top notes. Loud-speakers have such widely different characteristics, however, that no single filter is likely to be the best in all circumstances.

Cheap Moving Coils

There are now available moving-coil speakers costing hardly any more than the ordinary reed-driven cone types.

Some of those which I have examined are very good. There is an electromagnet type, taking 15 milliamperes at 200 volts, which may, therefore, be supplied with current from an ordinary medium-sized mains unit when direct-current mains are not available. The current of 15 milliamperes is relatively little compared with the current taken by a good-sized set.

Then there are permanent-magnet types having small magnets it is true, but still fairly sensitive and having good characteristics. The manufacturers appear to have got down to the production of less expensive moving-coil loud-speakers and, no doubt, many more will be used during the coming season.

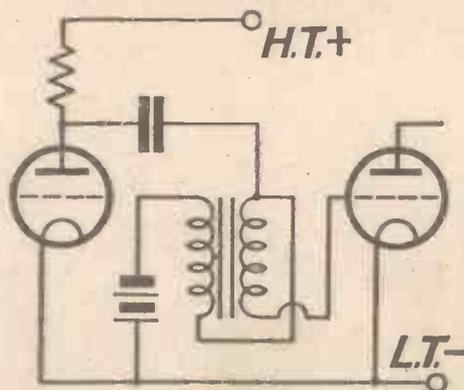
When used with a suitable baffle, a small moving-coil speaker is often better than a large type reed-driven cone. Being small, too, such loud-speakers are readily included in compact sets and acceptable quality is obtained, of course. The shape of the cabinet used and the arrangement of the parts included within it affect the results, but with care, quite compact arrangements may be satisfactory.

New L.F. Transformers

I was interested in the new R.I. low-frequency transformer, designed particularly for the "Parafeed" circuit.

The transformer has a core of nickel steel and when I saw some being tested for inductance I was invited to strike one several times with a hammer. To my surprise the inductance of the transformer was not noticeably affected by this rough treatment. Thus the transformer is stable enough.

In the Parafeed circuit illustrated here, a resistance is included in the anode circuit



This is the special resistance-feed circuit for an L.F. transformer, referred to by W. James in the accompanying paragraph

of the valve and a condenser of .5 or 1 microfarad capacity is included between the primary coil and the anode. Therefore no direct current passes through the transformer itself and its high volume of inductance remains.

The condenser in series with the transformer acts to give good bass magnification and the published curves show that the amplification over the whole range of audio-frequencies is high and uniform. Clearly such a combination is a desirable one and can be used in most circuits.

Metal-panel Matters

One of the difficulties associated with metal panels and the use of metal or foil generally is that unless care is taken, unwanted contacts between the parts of the metal may occur.

Thus some valve holders are so constructed that when a valve is inserted, the prongs may just touch the foil or metal base. Other parts such as coils are also likely to prove not very suitable owing to too little clearance between metal terminals and the base.

A fuse ought always to be inserted in a

set having metal shields or panels in its construction, but it is possible, of course, for a fault to occur and not to blow the fuse.

If the part has considerable resistance, for example, the current flowing through it in the event of a faulty contact with the base may be only a few milliamperes. The part itself may suffer, however, become hot and soon burn out.

The fuse will be a safeguard in the event of a dead short-circuit, such as may occur, and it will save the valves. Too much reliance should not be placed upon ordinary flash-lamp bulbs, as some of them pass a fairly heavy current. There are types which normally pass as little as 100 milliamperes and these are satisfactory as fuses.

Choosing the Aerial Wire

The size of wire used as an aerial is not very important electrically. If you carried out tests, using the different aerial wires available and also wires such as numbers 18 and 20, you would have difficulty in detecting the least difference in the results unless the earth circuit and the aerial tuner happened to be particularly good.

Those who use indoor aerials may therefore feel that they have lost nothing to speak of by using a medium size of wire instead of the thick stranded conductor. For outdoor use the thinner wire is not strong enough and here is the chief reason for the use of stout wires. But electrically there is no need for such heavy conductors.

"PRACTICAL SUPER-HET IDEAS FOR YOU"

(Continued from the preceding page)

condensers may be used as in the "Century Super," or a .001 microfarad and a grid-leak stopping resistance.

Sometimes a larger condenser is needed and also one across the loud-speaker at the power valve. If squealing is experienced the condenser across the loud-speaker should be tried.

A high-frequency choke is rarely necessary in the detector circuit.

Practically any good combination of valves may be used if the correct voltages are applied. Those specified should normally be used, but if others of similar characteristics are available there is no reason why they should not be used. With such sharp tuning good slow-motion condensers are a necessity and slipping is fatal to success.

USE THE RECOMMENDED FRAME AERIAL WITH YOUR CENTURY SUPER

A.C. CENTURY SUPER

1 Ebonite panel, 16 in. by 8 in. by 3/16th in. drilled to specification	£ 6 0
1 Readi-Rad cabinet to specified design	1 15 0
1 Readi-Rad centre tapped frame aerial	1 0 0
2 Readi-Rad .0005-mfd. variable condensers	5 0
1 Sovereign 50,000-ohm potentiometer	4 6
1 Set Lewcos super-het. coils	2 10 0
1 Readi-Rad triple coil base	2 9
6 Telsen 5-pin valve holders	4 0
5 T.C.C. 2-mfd. fixed condensers	19 2
2 Ferranti C2C fixed condensers	9 0
2 Readi-Rad grid-leak holders	1 0
3 Telsen fixed condensers; .0003 mfd., .001 mfd., and .002 mfd.	1 6
1 Telsen "Radiogrand" L.F. transformer	8 6
1 Atlas 20-henry L.F. choke	1 1 0
2 Readi-Rad 50,000-ohm link resistances	3 6
2 Readi-Rad 30,000-ohm link resistances	3 0
1 Readi-Rad 20,000-ohm link resistance	1 3
1 Readi-Rad 5,000-ohm link resistance	1 0
1 Readi-Rad 1-meg. grid leak	10
1 Ediswan 100,000-ohm grid leak	1 6
2 Brownie slow-motion dials	5 0
1 Readi-Rad 3-point frame connector	6
1 Packet Readi-Rad "Jillinx" for wiring	2 6
6 Valves as specified: 2, 84V, 2 AC/HL, 1 4LH/J.C., 1 AC004	5 11 0
Screws, flex, etc.	6
TOTAL (including valves and cabinet)	£16.2.0

KIT "A" £8.16.0

Less valves and cabinet but including Wound Frame Aerial. Or twelve equal monthly instalments of **16/-**

KIT "B" £14.7.0

With valves, less cabinet but including Wound Frame Aerial. Or twelve equal monthly instalments of **£1.6.0**

KIT "C" £16.2.0

With valves and cabinet but including Wound Frame Aerial. Or twelve equal monthly instalments of **£1.9.4**

A.C. MAINS UNIT

1 Baseboard, 16 in. by 7 in.	£ 1 6
1 Junit mains transformer	1 10 0
1 Atlas L.F. choke	1 1 0
1 Westinghouse H.T.7 metal rectifier	1 1 0
4 Dubilier 4-mfd. fixed condensers, type L8B	1 14 0
1 Bulgin F11 fuse holder with fuse	2 6
Wire, flex, plug adaptor, etc.	2 6
TOTAL	£5.12.6

Or twelve equal monthly instalments of **10/4**
 OR 1 Regentone model S60 Mains unit **£4.10.0**
 Or twelve equal monthly instalments of **8/3**
 Loud-speaker to match.

THE BATTERY OPERATED "CENTURY SUPER"

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(Less Valves and Cabinet but including Wound Frame aerial) **12/8**
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KIT B £10:14:6

(Including Valves, Wound Frame Aerial, but less Cabinet) **19/8**
 or 12 equal monthly instalments of

KIT C £11:9:6

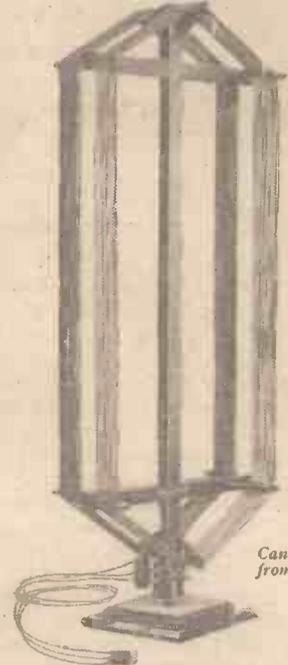
(Including Valves, Cabinet and Wound Frame Aerial) **21/0**
 or 12 equal monthly instalments of

CENTURY SUPER

Completely assembled with valves, cabinet and wound frame aerial, ready for use and aerial tested. Or 12 monthly payments of **26/6**

B.B.C. SELECTIVE THREE

1 Black Polished ebonite panel 18" x 7" x 3/4"	£ 5 3
drilled to specification	5 3
1 Oak Cabinet with 10" baseboard	1 7 6
2 Ormond .0005 mfd. variable condensers with slow motion	12 0
1 Readi-Rad .0001 mfd. reaction condenser	2 6
1 Sovereign 500,000 potentiometer	4 6
1 Readi-Rad filament switch	10
3 Telsen 4 pin valve holders	1 6
3 Readi-Rad single coil holders	2 6
6 Lewcos plug-in coils 60x, 60, 40, 200x, 200 and 150	1 7 3
1 Neutralising condenser	3 6
1 Formodenser type "J"	1 6
2 Readi-Rad .0002 mfd. and .0003 mfd. fixed condensers	1 8
1 Graham Farish .006 mfd. fixed condenser	1 6
1 T.C.C. .01 mfd. fixed condenser	2 6
2 T.C.C. 2 mfd. fixed condensers	7 8
2 Readi-Rad 20,000 and 30,000 ohm flexible resistances	2 9
1 Lewcos 60,000 ohm flexible resistance	1 6
1 Telsen H.F. Choke	2 0
1 Telsen "ACE" L.F. Transformer, 5-1 ratio	5 6
2 Readi-Rad 1 meg and 2 meg Grid Leaks	1 8
1 Igranic L.F. Choke	10 6
1 Readi-Rad Standard screen 10" x 6"	2 0
8 Belling Lee wander plugs 5 H.T. and 3 G.B.	1 4
2 Spade terminals	3
2 Junit terminal blocks	1 4
4 Belling Lee "R" Terminals	1 0
1 Pkt. Readi-Rad "Jillinx" for wiring	2 6
3 Valves to specification Det. L.F. and Power	1 7 6
Flex, Screws, etc.	1 0
(TOTAL including Valves and Cabinet)	£8.3.0



Can be obtained from your local dealer.

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Dual-range, centre-tapped. Definitely superior in every respect. Actually recommended by the designer of the "Century Super." **£1.0.0**
 Price complete

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

TO INLAND CUSTOMERS

Your goods are despatched Post Free and Carriage Paid.

B.B.C. SELECTIVE THREE

KIT "A"	(less valves and cabinet)	£5.8.0
	or 12 equal monthly instalments of 10/-	
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	or 12 equal monthly instalments of 12/6.	
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Name.....

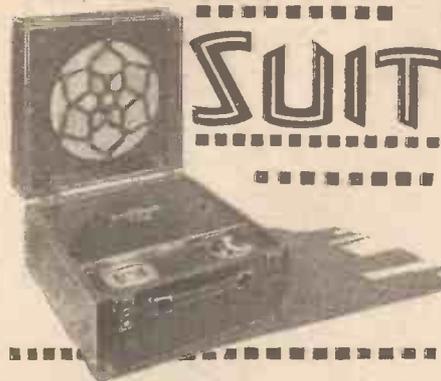
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SETS OF DISTINCTION



COLUMBIA SUIT-CASE PORTABLE 4

Makers: Columbia Graphophone Co., Ltd.

Price: 17 Guineas

HERE is another inexpensive suitcase type of portable set—this time produced by Columbia. I have been using this set for the last few days and I must say that, price for performance, this is one of the best suitcase portables yet tested.

The general lines of the new Columbia portable are conventional. The loud-speaker and frame aërials for medium and long-wave tuning are in the lid of the case. The four-valver and the batteries are fitted in the main part of the case, with a neat and easily removable cover over the batteries.

These batteries fit more snugly than is usual in this type of set. I am glad to be able to say that the filament battery can be removed without difficulty. There is no packing material around the batteries, thanks to the provision of a battery frame mounted on top of the high-tension unit.

Another good point about the battery compartment is the simplicity of the connecting leads. There are only two high-tension leads and these, like the leads for the accumulator and grid-bias batteries, are plainly marked.

A large balanced-armature loud-speaker unit drives a cone of ample size. As in other Columbia sets, the loud-speaker in this portable provides very pleasing quality. Music is free from pronounced resonances and speech is notable for its clarity.

The Circuit

The circuit copes with modern conditions. Of the four valves, the first is a screen-grid high-frequency amplifier, the second is a leaky-grid detector; and then there are two stages of low-frequency amplification, the last valve being a P215 power valve.

I see that the high-frequency amplifier is coupled to the detector by the tuned-grid method. This makes for stability, and experience shows that it provides a good compromise between sensitivity and selectivity. There are two tuned circuits, the frame tuning and the coupling tuning. The two variable condensers are ganged together so that their moving plates are operated by a single knob.

This control is fitted on the left-hand escutcheon plate. Near by is the calibrated tuning scale, marked in medium wavelengths, from 250 to 500 metres in steps of 50 metres, and in long waves from 1,000 to 2,000 metres in steps of 200 metres. Just to the right of this scale is a tuning trimmer knob, which actuates the fixed plates of the aerial condenser.

There is another escutcheon plate on the

right carrying the remaining controls. These comprise a volume-control knob and a reaction control knob, mounted on each side of a three-position switch lever. The volume control is a variable resistance in the filament of the screen-grid valve, whose sensitivity can thus be reduced to avoid overloading of the other valves during the reception of strong signals. To bring up the strength of weak signals the reaction control was found invaluable.

The total anode-current consumption was found to be 12 milliamperes. This is rather excessive for the standard-capacity battery fitted, but is not greater than in other portables of the same type. The filament-current consumption was found to be .5 ampere, so the accumulator should work for nearly 40 hours per charge.

Simple Control

Control of this Columbia suitcase portable is pleasingly simple. I think the makers have greatly simplified control by separating the tuning devices from the subsidiary controls. The calibrations on the tuning dial are sufficiently accurate to enable one to locate foreign stations quite rapidly. There is no need to adjust the tuning trimmer for every station received. Most of the tuning operation is confined to the main tuning control.

Tested at my home in south-west London, this portable put up a very creditable performance. The London National station came in exactly at the 260-metre mark. Naturally, it was very strongly received. In fact, the volume control had to be turned down. London Regional came in quite close to the 350-metre mark.

Distant Reception

Trying for more distant stations, I logged the Midland Regional very strongly at 398 metres, with reaction at zero. The North Regional came in at 479 metres. This was a good loud-speaker signal with the application of some reaction.

Although still daylight, I was able to get Brussels No. 1 at full loud-speaker strength. And, long before dark, Rome, Hilversum and Fécamp were coming through at great strength. This set is certainly sensitive on the medium waves.

On the long wavelengths, even better reception was obtained during daylight. The set gallantly responded to my efforts to bring in Huizen, Radio Paris, Daventry, Eiffel Tower, Kalundborg and Oslo. All these stations were logged at full loud-speaker strength.

As regards selectivity, the Columbia portable had no difficulty in separating the

two London stations. Midland Regional was received entirely free from London Regional.

I recommend readers to ask to see this new portable. Its weight is approximately 29 pounds. The cabinet, which is 14¾ in. square and 8¾ in. deep, is covered in black leather cloth. The price of 17 guineas is absolutely inclusive.

SET TESTER.

A NEW S.G. VALVE

A NEW form of valve has made its appearance in America, known as the Variable Mu Tetrode. The arrangement has been designed in order to overcome the bug-bear of cross-modulation, which arises from the fact that if rectification is produced in a screen-grid valve by a strong signal, this signal modulates all the foreign stations operating on near by frequencies, and tends to wipe out the reception.

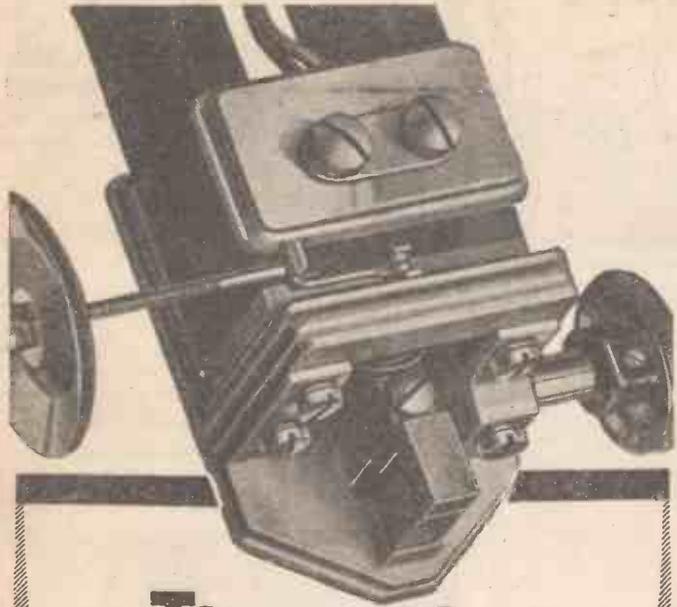
It is because of this that the method of volume control by variation of grid bias, which has much to commend it, has not come into more general favour. If it were possible to overcome this cross-modulation trouble, then many of the problems confronting the present-day designer would be overcome.

The Variable Mu tube is in reality two valves in one. Both valves are of the screen-grid type, but they have widely differing characteristics. The one has a low amplification factor while the other one is of the normal high amplification factor type. These two valves are paralleled so that the actual anode current is the sum of the anode current for each valve.

The current in the high-mu element falls to zero very quickly at only a small negative grid voltage; in the low-mu element, however, the anode current is smaller and falls away much more slowly, being able to withstand a grid voltage of negative 40 or 50 volts before it is reduced to zero. If we connect both valves together, therefore, the resultant characteristics partake of the low-mu valve at large negative grid voltages, while as the grid voltage approaches zero a sudden change over to the high-mu type takes place, the amplification rising rapidly and the valve begins to function as an ordinary screen-grid valve.

This transition is entirely automatic and simply depends upon the voltage applied to the grid. The signal itself may be made to control the operation, and it is plain that this new valve will tend to reduce the number of operating controls.

J. H. R.



There IS nothing better than BLUE SPOT

BLUE SPOT Units did not achieve their high reputation by chance, but by performance.

They are used by experienced amateur and professional constructors alike, not because their price is modest—although that is certainly an important point—but because they reproduce magnificently. Model 66P illustrated here for example, is scientifically constructed to give a fine degree of sensitivity and pleasing mellow tone. Reproduction by a BLUE SPOT Unit has quite rightly come to be regarded as the high water mark in Speaker performance.

The BLUE SPOT Chassis is equally worthy of praise. It is scientifically constructed and dimensioned to harmonise with the vibrations of the stylus of BLUE SPOT Units. The two together, housed in a suitable cabinet, make an ideal loud-speaker for all purposes.

UNITS : 66K 25/-, 66P 27/6, 66R 35/-.
CHASSIS : Major, 15/-, Special, 7/6.

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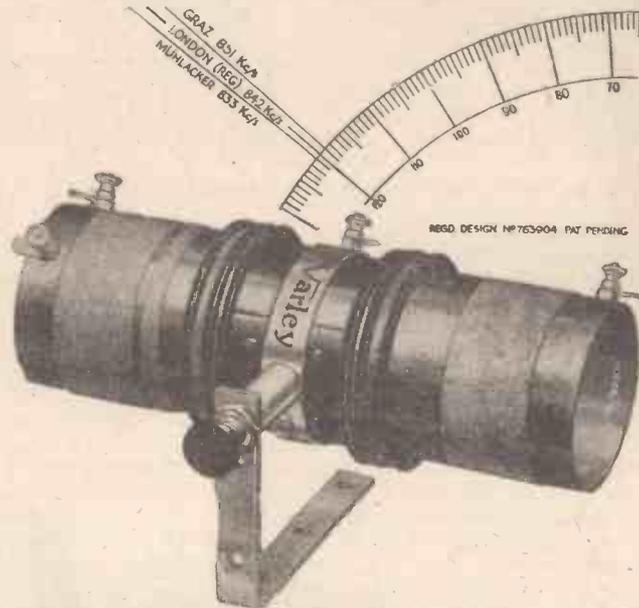
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" . . . the sharpness of tuning is uncanny . . ."

" May I congratulate you on the performance of your new Constant Square Peak Coil. I have fitted it in the aerial circuit of my receiver in the place of another dual range coil of well known make, and the results are amazing. No other word can express my feelings. The sharpness of tuning is uncanny.

"On the lower end of the medium band where previously the stations were an inseparable jumble, I can now get lots of stations absolutely clear of interference, and this performance holds good over the rest of the dial, long waves included."

This extract is from one of the many letters we are receiving from all parts of the country.



**CONSTANT
SQUARE
PEAK
COIL
15/-**

The Varley Constant Square Peak Band-Pass Coil—the ideal pre-selective device for any set; S.G., Reacting Detector or Super-het.

Confines local station to 3-4 degrees on the simplest set. Enables programmes—now swamped by powerful transmissions—to be heard and enjoyed. Actually improves quality of reproduction. Abolishes all interference by medium waves on long waves. Supersedes wave-traps. Easily replaces existing aerial coils. Needs no screening.

This new Coil Combines *negative* inductance and capacity coupling, so giving a constant square-topped peak and separation of substantially 9 kilocycles over the whole of both wavebands.

Supplied complete with extension rod for switch and universal mounting bracket.

Ask your dealer for the Free Colour Folder, or write direct.



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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.

Ellison Filament Transformer

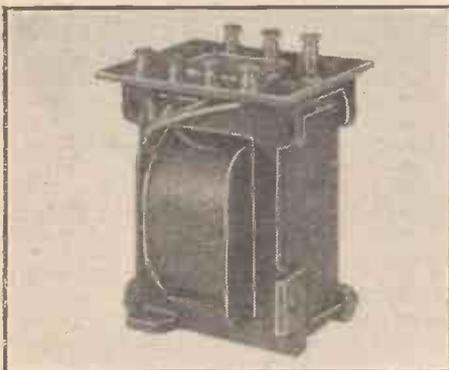
THERE are probably many readers who have A.C. mains, but whose sets use battery valves with an A.C. eliminator, who are wishing to change over to the more efficient A.C. valves. The necessary modification to the set can usually be carried out easily, but a filament transformer will be needed.

The Ellison transformer, manufactured by the Ellison Manufacturing Co., of Harrogate, has been produced to fill this need.

The transformer is well made and has a very substantial core and a neat terminal assembly on the top. Only two windings are provided, the primary tapped for voltages between 200 and 250, and a centre-tapped secondary winding giving 4 volts on load.

On test the transformer was quite satisfactory, the regulation being good, as can be seen from the accompanying figures. The no-load power was 1.7 watts, giving an efficiency at full load of 93 per cent. The overall dimensions of the transformer are 5 in. by 3 3/8 in. by 4 3/8 in.

Amps.	Volts
0	4.25
1	4.2
2	4.15
3	4.1
4	4.05
5	4.0
6	3.95



The Ellison filament transformer

Neat Bulgin Meter

A CHEAP moving-coil meter giving a full scale deflection with only 2 milliamperes is a useful accessory for the serious experimenter. It can be used to give reasonably accurate indications in current as small as 50 microamperes, and, of course, for larger currents it can quite easily be shunted in order to reduce the sensitivity.

Used in conjunction with a suitable series resistance it makes an excellent high-resistance voltmeter which will only take 2 milliamperes from the H.T. supply even on full scale deflection, and less than this under actual working conditions, where the pointer is usually somewhere in the centre of the scale.

The only essential is that the meter shall be sufficiently accurate for the purpose. The Bulgin meter which we have tested this week can certainly be considered satisfactory in this respect as is shown by the readings given herewith.

Meter reading (mA)	Actual current (mA)
0.2	0.195
0.4	0.395
0.6	0.60
0.8	0.80
1.0	1.00
1.6	1.61
2.0	2.01



One of the range of Bulgin meters

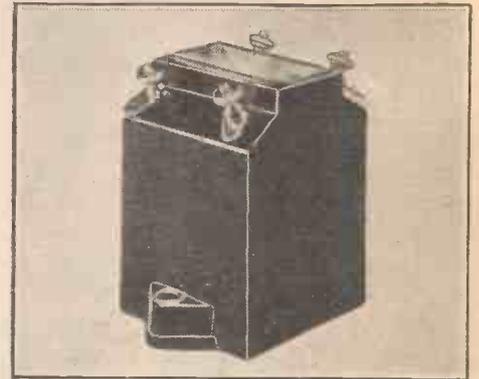
The meter is housed in a black bakelite case as a flush-mounting instrument, the diameter over the case being 1 3/8 inches, the diameter over the flange 2 3/8 inches, and the depth overall, including the terminals at the back, 1 1/2 inches. This instrument is nicely damped, and possesses a useful feature in that the scale is not uniform, but is slightly more extended towards the lower readings. This is a useful feature giving the effect of greater sensitivity on the smaller currents.

New Varley Transformer

THE new Varley Niclet inter-valve transformer belongs to the new class of L.F. transformer now appearing on the market, intended for use in parallel feed circuits only. These transformers are cored with nickel iron, which has a very high permeability. It thus is possible to obtain a high inductance with many fewer turns and smaller dimensions than was originally the case, while the question of saturation

does not arise as there will be no D.C. in the windings.

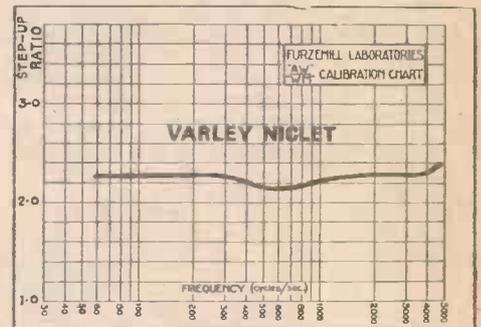
There are quite a number of advantages to be gained by the use of this type of trans-



The new Varley L.F. transformer

former; for example, the size and weight are small; as there is no D.C. in the winding, the breakdown due to corrosion cannot occur; a choice of ratios is possible by auto-connection, while finally, by varying the coupling condenser, the amplification of the lower frequencies can be controlled.

On test the Varley transformer was found to be quite satisfactory. The voltage step-up ratio when using an L210 type valve is,



Characteristic curve of the new Varley transformer

as can be seen from the accompanying curve, strikingly constant from 50 to 4,000 cycles, after which a rising characteristic is obtained. This latter feature is most useful tending to correct for the high-note loss which is so prevalent to-day, due in some degree to the use of super-selective tuning. The inductance of the primary was approximately 40 henries. The transformer is housed in the same case as the Nikon II, measuring 2 1/2 in. by 1 1/2 in. by 2 1/2 in. high.

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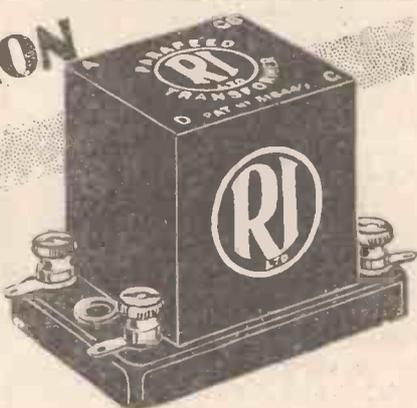
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ANOTHER TRIUMPH OF R.I. RADIO RESEARCH

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

NEW VALVES FOR MAINS USERS

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

AN entirely new situation is created by the announcement of a number of new valves intended for working off the mains. In the old days any set could be converted to A.C. working by a small rearrangement of the filament wiring and by the provision of a high-tension unit. This has, for some time, been more and more difficult, because the greater efficiency of the A.C. valve has usually brought trouble in its wake.

With the latest valves, one can say quite definitely that the design of an A.C. set is now an entirely different proposition to the design of a battery set. The circuit must be different and the technique so much altered that it is bad design to endeavour to make one set an A.C. version of an existing battery set. The two designs must be considered quite separately and independently.

The battery user has hardly been catered for at all in the new valve releases. There is a slight improvement in power valves and in general-purpose valves, but that is all. In the mains class, however, there are some really noteworthy improvements of a striking character.

New S.G. Valves

Let us look at the screen-grid series. In order to avoid cross modulation, there has been a tendency for some time to reduce the internal resistance of screen-grid valves, to enable them to handle a larger grid-swing input. Modern conditions, indeed, seem to call for an arrangement of the high-frequency stages similar to that in the low-frequency side. In the first stage we require a high amplification, with a comparatively small grid swing. Overloading is avoided by using a band-pass filter. The second valve must be able to handle a larger grid swing, owing to the amplification in the first stage and it may have a reduced amplification factor accordingly. Some designers prefer to use a general-purpose valve with average characteristics in both cases, while others prefer to use two different types, a high-resistance valve first, followed by a low-resistance one later.

With mains valves the internal resistance has usually been of the order of 500,000 ohms to 1 megohm, but it is now possible to get down to 200,000 ohms under which conditions a grid swing of several volts can be handled without any rectification, and consequent cross-modulation. For some time, however, designers have been hankering after something better than this and it now appears that a solution has been found in the H.F. pentode.

Hitherto, the pentode has been regarded as a low-frequency valve pure and simple, but there is no reason why this valve should not be utilised at radio frequencies. The construction of the valve requires to be altered, of course, the anode leads being brought out at the top of the valve, just as in the ordinary screen-grid valve, to minimise the internal capacity. Cossor's have introduced what they call the

MS-PEN-A, which is in effect a screen-grid valve with an A.C. resistance of only 80,000 ohms and an amplification factor of 320. This gives a mutual conductance of 4, a figure quite unheard of in H.F. practice previously. Samples of this valve have not yet come to hand, so that it is impossible to comment on them further, but it is clear that they offer the possibilities of radical changes in design.

Turning to the general-purpose and detector class of valve we find that amplification factors are soaring. The Cossor 41MH has an internal resistance of 18,000 ohms with an amplification factor of 72. This valve, of course, will only tolerate a limited grid swing of $1\frac{1}{2}$ volts, but it has a distinct application. Even more striking is the Mullard 904V, which has an amplification factor of 85 and an internal resistance of 17,000.

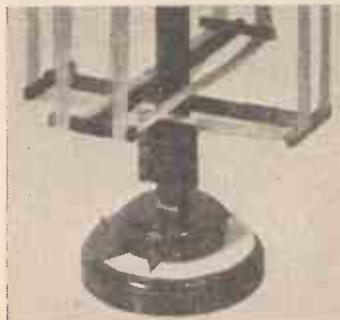
Output Valves

When we reach the output valve we find again that remarkable steps have been made. The Mazda PP5/400 is one of the most interesting valves here. It has an A.C. resistance of 1,500 ohms and an amplification factor of 9. With 400 volts on the anode and only 30-odd volts grid swing it will produce undistorted output of nearly 5 watts. This valve, is, of course, directly heated, and was reviewed in the test columns a short time ago. In the indirectly-heated class Cossor's are introducing two valves, the 41MP and the 41MXP; these valves are designed for undistorted output of $1\frac{1}{4}$ and $1\frac{3}{4}$ watts respectively, and have mutual conductances of 7.5!

This figure sounds incredible. Not so long ago we thought a mutual conductance of 3 was an amazing figure, and here we have a valve which is over twice as good (for mutual conductance is a direct measure of the "goodness" of a valve), while none of the new releases in the output valve class

A FRAME AERIAL HINT

"Century Super" users should try calibrating their frame aeriels, for this is a great help in getting foreign stations quickly and without preliminary ad-



justment of the frame's position. Once a number of stations has been logged the requisite frame positions can be shown on a semi-circular scale attached to the base of the frame as shown.

has a mutual conductance of as little as three.

Finally, everybody seems to be turning their attention to pentodes. Many readers do not like pentodes, and I must confess that I have not been particularly enamoured of them myself in the past, but the valves which are being marketed to-day make one think very carefully as to whether the pentode will not in time replace the ordinary triode for the output stage. The Mazda AC/Pen has, of course, been with us for some time. This is a valve giving an output of two watts (sufficient for twenty or thirty couples to dance to) with an input of only 10 volts peak grid swing. They followed this up with the DC/Pen, which has practically the same performance, but is designed to operate off D.C. mains. I have not referred to the other D.C. valves made by the Mazda people, because these have already been on the market for some time.

A new Marconi valve is available, an indirectly-heated pentode classed as the MPT4. It has a mutual conductance of 3, and gives an undistorted output of 2 watts. It is suitable for mains operation, taking one amp. at four volts.

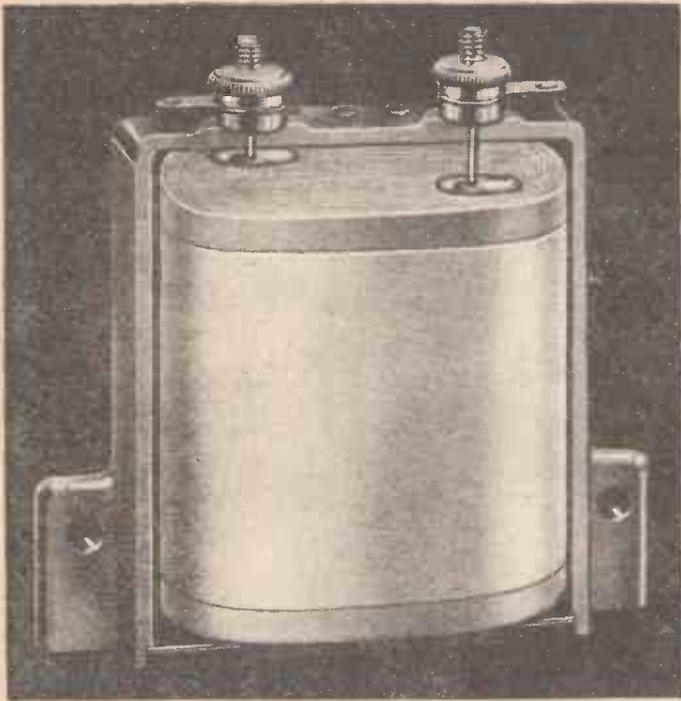
Mullards have for some time brought out a range of PM/24s with directly-heated 4-volt filaments suitable for mains working. To this range are now added the 24/C and the 24/D, having outputs of $3\frac{1}{2}$ watts and 8 respectively. They are both high-voltage valves, the 24/C taking 400 volts on the anode, and the 24/D taking 500. Naturally, the anode current is not low on a valve of this type, but it is no more than one is accustomed to use on a 400-volt triode, while the price is of the same order.

Let us think back a little to the days when we used to use LS5A's, valves giving an undistorted output of $2\frac{1}{2}$ watts, but requiring something over 110 volts grid swing to load them fully. We often used four of these valves in parallel or push pull, giving an output of the order of 10 watts at a cost of £5 for the valves. With the new PM24D we can obtain 8 watts output with 35 volts grid swing instead of 110 odd, at the cost of 35 shillings for the valve!

More Power

Some of the latest valves are several times as powerful as the old ones which they may be called on to replace. In many cases they will be quite unsuitable for the original circuit, particularly in the case of power valves, and the reader is recommended to go about matters rather carefully.

The valve with a mutual conductance of 6 or 7 will not require much feed-back in order to make it oscillate. The oscillations may not occur at low frequencies, but at some inaudible frequency. This will paralyse the valve and prevent it from working properly, but the more serious trouble is that the whole of the time that it is oscillating, the anode current will be abnormally high.



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BROADCAST NEWS FOR OVERSEAS

Some comments on the need for longer broadcasting hours for the B.B.C.'s short-wave transmitter

THE PRINCE OF WALES, when addressing a gathering of business men in the Midlands recently, said that he urged the establishment of a more efficient service of British news in distant parts, and

From personal experience, I know that he is right. Friends in India and Africa send me their reception logs and they often say how difficult it is to receive news or programmes of any kind from 5SW, because the transmission schedule is too short and is not properly arranged to cover the hours of dark and light.

Here, for instance, is what an AMATEUR WIRELESS reader outside Durban says:

"I have made up the 'World-wide Short-wave Three,' and get fine results from the Philips station PCJ, and from several American stations. I cannot claim to be very enthusiastic about reception, though, because here I am far removed from the usual news centres. It is difficult to get newspapers, and when they arrive they give British news which is at least three weeks late. I do occasionally get 5SW, but although it is supposed to relay the National programme it never gives anything I want to hear. All the latest gramophone records I hear through PCJ, and the dance music from America, but if I could get real news through 5SW then I should consider short-wave reception really worth while. There are nearly twenty other radio enthusiasts near me in these outposts who would welcome a decent news

idea that 5SW relays the National programme all the time, but, actually, it never works at times when most overseas listeners want to hear it. It does not work on Saturdays and Sundays,

It relays 5XX only from 12.30 to 1.30 p.m. and from 7 p.m. till midnight; that is, if 5XX does not shut down before 12 p.m. The morning period is far too short and, for reasons of copyright, the news service is practically non-existent.

Who Is to Pay?

I know that in pressing this question the old argument against it—of expense and of the difficulty in making the overseas listener pay for his news service—will be raised.

I cannot see that any appreciable expense will be involved in slightly increasing the transmitting hours of 5SW, or of changing them to times better suited to long-distance reception; and there should be no serious increase involved in leaving the microphone "open" when the news is being broadcast.

It seems hardly worth while running 5SW at all as an experimental station if it is not appreciated, and it seems a pity that foreign stations such as PCJ, which are smaller than 5SW, should be better received than the Britisher because of longer transmitting hours and aerials specially designed for directional effect.

Overseas listeners cannot get direct reception of medium-wave B.B.C. stations because of fading. It would not seem misplaced Empire advertising to work 5SW to greater advantage so that it could be known in the Dominions as the Empire station. As several daily newspapers are doing their best to develop an "Empire" policy, they might think it worth while helping to put 5SW on a proper financial basis. R.D.



Inside the "O.B." van. Duplicate amplifiers are carried in the travelling van which the B.B.C. uses for outside broadcasts, and an engineer is here checking up the tone quality on one of the lines linking up the van with the control room

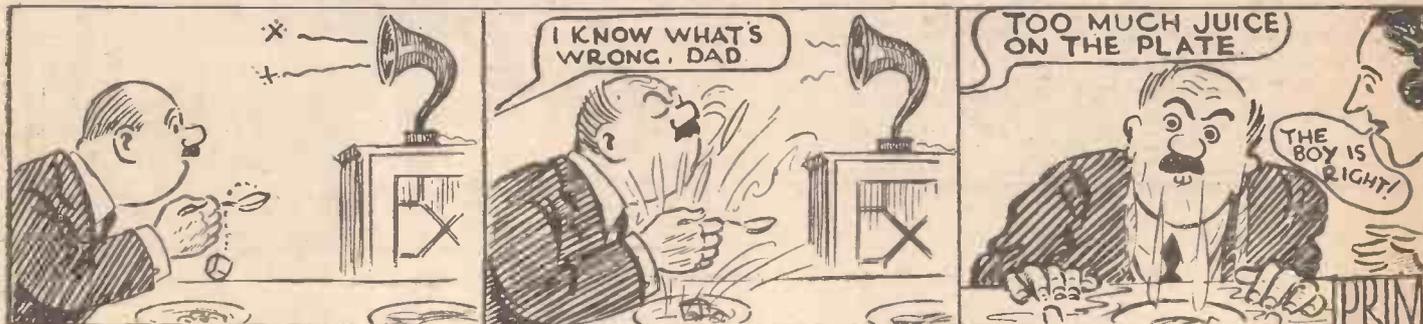
He made a point of the fact that not only would this be a benefit to overseas listeners but it would also provide a valuable trade link.

service." If you look at the transmitting schedule of Chelmsford you will see that there is cause for complaint. There is a popular

IT WAS JUST A COINCIDENCE—



--BUT IT PUT MR. FLEX IN A STATE OF HIGH-TENSION



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DESCRIBED IN THIS ISSUE

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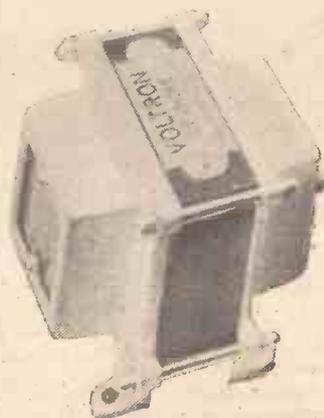


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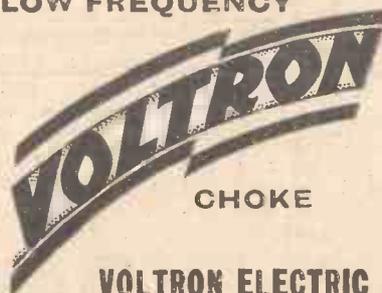
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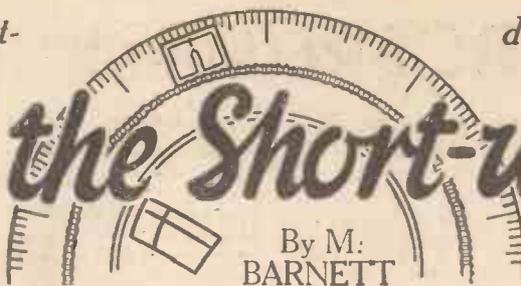
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Some Notes on Present-

day Short-wave Conditions

Around the Short-wave Dial



THE short-wave receiver is gradually being perfected, until there will be little difference in operating a short-wave receiver and a broadcast receiver. It is interesting to note that the latest type of American short-wave receiver uses five valves—a screen-grid high-frequency amplifier, a screen-grid detector, followed by two low-frequency stages, the last being a push-pull stage. The two tuning circuits are ganged and are controlled by one illuminated dial, the whole receiver being A.C. operated.

Until two years ago it was thought impossible to make an A.C. receiver operate efficiently on the short waves, owing to excessive humming, threshold howling, etc., and other troubles similar to these which always show themselves up on the short waves, but these have been overcome and receivers of the type referred to above are being extensively used in the States.

Just what is the exact value or use of a screen-grid amplifier in a short-wave receiver is a debateable point, but there is no doubt that an amplifier of this description is certainly very useful, because apart from its amplifying properties, it has several other very useful properties. There is no reason why two screen-grid amplifiers should not be connected in front of a detec-

tor circuit and some amateurs may care to experiment in this direction. This will mean three tuning circuits—one for the detector and one each for the H.F. stages and special care must be taken to see that all the battery circuits are decoupled. Ample by-passing condensers should be used and, in fact, a 1-microfarad condenser connected from each battery lead to earth will not be out of place. It is sometimes even an advantage to connect a condenser of this size from the "live" filament connection (i.e., the one which is not earthed) to earth. These refinements tend to keep down troublesome hand-capacity effects as well as reducing distortion by keeping H.F. currents out of L.F. amplifiers.

W3XAL is still receivable on both his 49.18 metre wavelength and just below 25 metres, although it would appear as though this last wavelength must be a harmonic, as this station frequently announces the fact that it is operating only on 49.18 metres and no mention is ever made of the 25-metre transmission.

Radio Maroc, at Rabat, Morocco, still continues to roar in on his Sunday evening transmission. They frequently reply to correspondents via the ether and may be heard reading out excerpts from short-wave fans' letters, reporting their transmissions.

The tonal quality of this station's programmes has greatly improved lately.

The Atlantic telephone stations, whilst not exactly providing any entertainment value, are very useful landmarks on the short-wave dial and will greatly assist the calibration of a set of coils. Through the courtesy of the International Short-Wave Radio News, I give the call signs and wavelengths of these stations. At the same time, short-wave fans are warned of the terms of the receiving licence and are reminded that these are commercial telephone stations:—

WND	operates with Rugby on 14.3 metres
WMI	" " " " 15.14 "
WNC	" " " " 15.51 "
WND	" " " " 15.36 "
WMI	" " " " 20.56 "
WNC	" " " " 20.73 "
WND	" " " " 22.40 "
WMI	" " " " 30.39 "
WNC	" " " " 30.77 "
WND	" " " " 32.71 "

It will be noticed that there are three distinct stations working on three sets of wavelengths. These are used to provide three separate communication channels at all times and the various wavelengths are brought into use according to conditions and time.

For the Newcomer to Wireless: FROM THE MAINS

RECENTLY we discussed running a set from batteries. I am thinking of having electric light put into my house and I would like to know something about mains working.

Actually there are quite a number of different ways in which you can use the mains.

Please tell me.

First of all, you can use special valves which have no filaments. Instead there is a cathode which is indirectly heated. These valves work directly off the mains through a suitable transformer. There are also valves with filaments designed to be heated by A.C. Or again, still sticking to filament heating, you can use ordinary valves and a special eliminator with a rectifier incorporated. And there is yet another method.

What's that?

You can fit a trickle charger to your existing accumulator. You run the valves from the accumulator and when you switch off the set you turn over the charger switch. During the night all that you have taken out of the battery

is put back again from the mains.

How about H.T.?

If you possess an accumulator for high-tension supply you can also get a trickle charger for this. On the whole, though, I would recommend an eliminator with a rectifier, which supplies high-tension current direct from the mains. These are cheap to buy and they very soon save their cost.

What would you recommend me to do if I put in electric light?

As you already have a L.T. accumulator and don't want to purchase a new outfit of valves, I would suggest that you stick to your accumulator and install a trickle charger for it. For H.T. I would put in an eliminator, making sure that it is big enough to supply plenty of current without a big drop in voltage. If, though, you don't mind buying new valves I would go in for the indirectly-heated ones and a suitable transformer.

Why, exactly?

Because it is possible to make these

valves so extraordinarily efficient. No screen-grid valve with a filament can touch those which are indirectly heated for magnification.

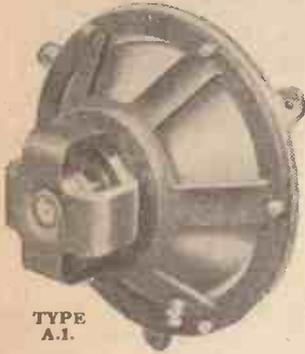
We have been talking all this time of A.C. mains. I have a friend whose supply is D.C. What would you recommend in his case?

The problem is simple here, he should obtain an eliminator that will supply plate current and run the filaments from an accumulator. There is one thing, though, that he should bear in mind.

And that is?

The regional electricity scheme is now under way and it is only a matter of time until everyone is on A.C. supply. He should therefore give notice to the local electricity people that he is installing a D.C. eliminator. The position is not quite clear at the moment, but it is, I think, more than probable that anyone who installs D.C. apparatus with the approval of the people who supply the current must receive compensation when a change over to A.C. is made.

CHOSEN by W. JAMES for the A.C. CENTURY SUPER



TYPE A.1.

MR. JAMES, the designer of the famous 'Century Super' has chosen the equally famous Epoch permanent magnet moving-coil speaker for use with the A.C. model of the 'Century Super,' described in this issue. The combination will give you radio at its very best. Refuse all substitutes—ask for the Epoch model type A.1., price £3 : 3 : 0; of all radio dealers.

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Mains Units and Grid Bias

SIR,—Some valve manufacturers include with their valve data a little table showing the correct grid bias to use with one or two different anode voltages.

This is very helpful when one is using dry or wet batteries, the approximate voltage of which is known or easily ascertained. But an increasing number of amateurs nowadays use high-tension mains units and separate grid bias dry batteries. With the mains units it is not easy to find out with any degree of accuracy the voltage applied to the different valves, particularly if the unit is home made.

But it is possible with a milliammeter costing only a few shillings to ascertain quite easily the current passing.

Now, as the valve makers know the correct grid bias for various voltages and the current the valve ought to pass under those conditions, surely it would be feasible for them to supply with each valve a curve showing correct grid bias plotted against anode current. Any amateur possessing a cheap milliammeter could then easily adjust grid bias until his milliamp-grid-bias combination agreed with an intersection point on the curve supplied, without needing to know the voltage applied by the mains unit.

Other things being equal, I for one should certainly choose valves by a maker who supplied this data with them.

W. M. H. (Chertsey).

Success with the "Super"

SIR,—I am sending you a line, long overdue, to thank you for the "Century Super." I have had the battery model going for just over a week, and it is all you claim for it. Later I shall probably change it into the A.C. model, but I am waiting till

JUST over a week ago I was deluged with inquiries from listeners regarding a late transmission with which a foreign station closed down. As usual, no mention of the broadcast was made in the published programmes. The station switched off without any announcement, a gramophone record replacing the conventional "good night" greetings. Apparently the studio playing it almost nightly was using it as a fitting end to the day's transmission. Searching for a solution, as luck would have it, I picked up the item personally, and discovered it to be an S.B. from both Brussels No. 1 and No. 2, who after their scheduled programmes transmit records until 11 p.m. B.S.T. Titles are not announced. The record chosen for the close-down is *Love's Dream after the Ball* (H.M.V. C1844), in which the last sentence, "Good-night, Princess; sleep on," has been provisionally adopted by Brussels as a substitute for the studio announcer's stereotyped formula.

A further mystery which appears to have puzzled many readers relates to a powerful transmission of both music and speech broadcast on a recent Sunday afternoon, on a wave-

length which tallied with no known station. As a matter of fact, this was purely an experimental broadcast carried out by a high-power transmitter at Kootwijk (Holland) on 1,053 metres, and the transmission was in the nature of a speech and music test. I have not yet been able to ascertain whether this is a preliminary step to the adoption of another long-wave transmitter in Holland or whether an attempt is being made to find a better position in the waveband for the Hilversum programmes.

During the past few months tests have been carried out on the various Polish wavelengths by the new Wilno 22-kilowatt transmitter, but it has now been finally decided to take over the Cracow channel of 244.1 metres (1,229 kilocycles); the latter will continue to share a seat in the crowded ether with Genoa, at least for the time being, although the arrangement is a very unsatisfactory one. Warsaw No. 2—the old Capital station—is to be used as stand-

by for the Raszyn high-power transmitter but

Another "Clarion"

SIR,—I trust you will not mind my mentioning it, but, as a regular reader of *AMATEUR WIRELESS*, I am using the "1930 Clarion Three," and I should like to ask if you contemplate bringing out a "1931 Clarion Four." I am sure there are many other readers who would like to improve this very fine set.

I should like to suggest two screen-grid stages, a detector, and a pentode. This should make a fine circuit.

E. F. (London, S.W.20).

A Novel Speaker

SIR,—So much controversy appears to have been aroused as to what is the best type of speaker that I think you might like to know the results I have had. I have recently made up a special type of horn speaker. I am using a metal horn of a specially made type; to this I have attached a Stirling unit. To my mind, the results are as good as those from a moving-coil speaker, and at far less cost.

S. G. (S.E.24).

Radio Trails

SIR,—Under the heading of "Radio-grams" in a recent issue there was a paragraph on the radio beacon trail between Kansas City and Wichita, which stated that the signal — A means that the aviator is on his course and — N that he

has wandered from the straight and narrow path.

The above is not quite right; the scheme of things is as follows. The beacons are arranged to transmit A's and N's (F's and L's and other similar combinations are also used). In certain zones the A only is heard and in others the N only; in between, the dot and dash combination of A and N merge and overlap, so that there is no spacing and a continuous note is the result, and this is used as a "homing" signal.

M. D. M. (London, N.W.).

101 Stations on the "Century Super"

SIR,—I have built the "Century Super" and for the few days since I have done so I have delayed writing you until atmospheric conditions permitted of my proving for myself the validity of its name. I have logged 101 stations: 32 short, 55 medium, 14 long.

The short-wave stations, with only a very few exceptions, came in exceptionally strong. Those identified were Rome 3RO (25.4 metres), Zeesen (31.38 metres), Bandoeng (Java) PLR (28.2 metres), Buenos Aires LSX (28.98 metres), Moscow (46.6 metres).

I find a four-turn short-wave coil covers practically the whole band, from 15 to 70 metres. W2ZAF, till Zeesen closed down, was more or less drowned, but after was wonderfully clear during the intermittent atmospherics. I wish I knew if there was a wavemeter sensitive enough to deal with the stations received on this SET (it justly deserves capitals).

The valves are two Lissen H210, two ditto S.G.215, Osram for oscillator, and super-power Lissen for last stage.

P. H. (Troone).

OUR LISTENING POST

By JAY COOTE

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by for the Raszyn high-power transmitter but

may shortly blossom out as a short-waver, as Poland is anxious that her transmissions should be heard throughout the Old and New Worlds. Trieste has been merrily testing during the past few days on 247.7 metres; the aerial energy of the transmitter is 15 kilowatts, with a maximum modulation of 100 per cent. Although in a crowded corner, a careful search may bring its signals to your ears.

Whilst the Paris Overseas Exhibition keeps open its doors to the public, short-wave fans will be given an opportunity of logging the transmissions of the new French colonial 13-kilowatt station working on 19.68 and 25.20 metres. It is on the latter wavelength that a search should be made, and the best times to capture its broadcasts are between 7 and 10 a.m., between 10.30 a.m. and 2 p.m.; again, between 5 and 9 p.m.; and, finally, from 9.30 p.m. until midnight B.S.T. The call is "*Ici Poste Colonial des PTT*," and a metronome is used as an interval signal.

Has anybody picked up tests by Vienna on 1,249 metres? Broadcasts are being carried out on this wavelength every Monday, Wednesday, and Saturday after 8 p.m.



RADIOGRAMS

A VAUDEVILLE programme to be broadcast on June 29 (National) and July 1 (Regional) includes the Hulbert Brothers, Mr. Flotsam and Mr. Jetsam, George Seversky, who took part in the Berlin night club broadcast, *The Jockey*, on Whit-Monday, and Donald Calthrop.

One of the chief music broadcasts of July will be *The Rebel Maid*, which is to be heard on the National on July 10 and on the Regional on the following day.

The street pavement artistes or "buskers" who are taking part in the National vaudeville programme on June 27, are George Gorman, cockney nigger minstrel; A. Final and P. Kent, piano-accordionists; George Lester and Partner, comedy vocalist and harmonium player; W. A. Arnold, dulcimer soloist; Josh Cairns, comedy banjoist and mouth-organ soloist; and Fred Walker's Street Band.

NEXT WEEK: A "CENTURY SUPER" FOR WORKING OUT OF DOORS

The name of Gordon Gildard is a familiar one in broadcast programmes as a member of the Radiotimists, and he is to adopt another role on July 4, when he will broadcast a talk on "What I saw at Scapa Flow."

A topical touch is given to vaudeville on July 3, when the Tennis Championship is in full swing at Wimbledon. From the National transmitter will be heard "A Masque of Wimbledon," by Herbert and Eleanor Farjeon, followed by "Rex Evans' Tennis Party," a cabaret show.

John Rorke, who has broadcast from Savoy Hill in more than a hundred revues and musical comedies, is going to Belfast for a vaudeville broadcast on July 4.

"The Roosters" will be heard in a series of Army reminiscences on July 1.

Bumpkin Pie, an Ernest Longstaffe production, was particularly agreeable to listeners when it was first given early in the year. A second helping of this "Widdicombe Fare" has been prepared by Mr. Longstaffe, with additional songs by various authors and composers and it will be broadcast on July 7 (Regional) and 8 (National).

Charles Brewer has arranged another "ragtime" hour for Midland listeners on July 8. "Any Rags—A Sixth Saga of Syncopation" will include some old favourites, beginning with one of the original ragtime songs, "Alexander's Ragtime Band."

Elsa Tookey, a Midland 'cellist, will be

heard during the Midland studio concert on July 5.

The National Orchestra of Wales, conducted by Warwick Braithwaite, will give a light orchestral concert for West Regional listeners on July 5.

On July 11 the National Orchestra of Wales Light Orchestra, conducted by Reginald Redman, will give a musical comedy programme. Earlier in the day the orchestra will be heard in a light orchestral programme on the London Regional wavelength.

On July 4 a relay from the Coliseum, Douglas, will be provided for the Northern Region. It will consist of excerpts from Julian Wylie's revue, *Happy Hikers*.

On July 1, a special Manx national programme will be broadcast for the Northern Region, consisting of a performance of *Ellan Vannin*.

So popular have the previous "Do You Remember" programmes given in the Northern Region been that another one has been arranged for July 2.

Spain is the first European state to broadcast parliamentary debates; since the Revolution, speeches from the Spanish senate have been regularly relayed by the Madrid transmitter.

The Austrian broadcasting authorities have entrusted the German Telefunken Company with the construction of a 150-kilowatt transmitter in the immediate neighbourhood of Vienna. Work on this new station is to proceed forthwith.

The Soviet authorities, for the purpose of disseminating propaganda in Roumania, have installed a four-kilowatt transmitter at Tiraspol on the borders of Bessarabia. As it is operating on 358 metres, it is to this station that interference on the Mühlacker and London Regional wavelengths is traced.

PTT Lille has opened a special studio at Paris in order to be independent, for its relays of concerts from the capital, of the Ecole Superieure broadcasts; another studio has been opened at Arras.

The French Ministry of Posts and Telegraphs has officially authorised Juan les Pins to increase the power of its transmissions, or, alternatively, to erect a new station in the Nice district.

The public programmes which are given occasionally in the Scottish Broadcasting House, Edinburgh, are proving very popular. On the occasion of a variety performance by the Radiotimists in the main studio, four hundred people were unable to gain admission. It is announced that an "overflow" performance will be given by the Radiotimists in September.

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STRANGE USES FOR WIRELESS

By
David Lystaner

WE are so familiar with wireless as represented by a receiving set and a distant transmitting station that the majority of us are quite unconcerned with the many other uses to which wireless is put in the service of man. Of course, the greatest use of wireless to man is as a means of communication, but some of the other uses of wireless deserve attention because of the mystery which surrounds them.

Several years ago a distinguished American scientist invented an electric furnace in which the most intense electric heat was applied to metals and other substances without connecting wires of any kind. The heating was done by wireless waves, and metals, such as gold, platinum, iridium, and molybdenum, yielded at once to the tremendous heat of the furnace and a steel bar was melted in a few minutes into liquid steel.

Another strange use for wireless, of American origin, was in magnifying the sound of the beating heart of a hospital patient so that the sound could be heard by a large number of medical students assembled in a lecture room. A wireless valve amplifier, as used by all of us on the low-frequency side of our wireless receivers, was employed in the experiment. Wireless apparatus has also been used in America to obtain permanent photographic records of human emotions and mental reactions as reflected in the mechanical action of the heart.

Perhaps the strangest of all uses to which wireless has been put is in the attempts made to establish communication with the world of the dead. The interests of prominent spiritualists was at one time concentrated in these attempts, and Sir Arthur Conan Doyle was reported to have expressed the hope that wireless, on the very long wavelength of thirty thousand metres, would ultimately give wonderful results.

Outside the laboratory, wireless has been put to some very strange uses. Scientists once proposed to study earthquakes by wireless. When an earthquake takes place, its effect is felt many miles away from the place of occurrence. How these earthquake shocks travel is very mysterious, and the study of the mode of travel of earthquake waves through the earth is difficult, because nobody knows when an earthquake will take place. Hence it was proposed to explore the inside of the earth by means of wireless waves. From the manner in which those wireless waves were bent and reflected inside the earth, it was hoped to learn a great deal as to what exists in the earth's crust.

A very novel use for wireless was once devised by a British mechanical engineer. When trouble starts in rotating machinery, there is a slight change in the humming noise given out by that machinery. This British engineer placed a microphone against his machinery and, by suitable amplifiers, increased the sound so that the

faintest chatter indicative of coming trouble could be immediately detected.

Where wireless has, perhaps, failed to come up to expectations in one of the strange uses to which it has been put is in connection with mining. Several attempts have been made to employ wireless in mines as an emergency method of communication to be employed when other means of communication have been put out of action by accidents. These attempts, however, have not met with great success.

The hope that wireless might prove invaluable in prospecting for mineral deposits in the earth has been frequently expressed, but so far this hope has been disappointingly slow of fruition.

It should be noted that in the announcement of the New Times Sales Co. on page 938 of the "A.W." No. 470, the price of the Ultra Major moving-coil chassis should be given as £4-12s. 6d. (monthly payments 8s. 6d.) and the Epoch moving-coil as £3 3s., monthly payments 5s. 9d. The Epoch speaker selling at £4 4s. is fitted with the type B5 unit, and not the type B4, as stated.

RADIO PATENTS

IT is interesting to note, according to the annual Report of the Comptroller-General of the Patent Office, that there has been marked activity during the last year in inventions relating to short-wave wireless, particularly in directional systems depending upon the use of aerials of the beam type. The problem of fading has also received noticeable attention, being a subject that is intimately associated with short-wave working. Considerable research has also been carried out on the use of ultra-short-wave transmission for special purposes, such as marine navigation and for assisting aviators to land at night or in foggy weather. Mention is also made of the projected transatlantic cable for telephony. Up to the present it has only been possible to transmit morse signals over long cable-wires, so that their use for telephony is a remarkable technical achievement.

M. B.

TRANSFORMER TROUBLE

IN many cases transformer break-down is caused by the mechanical strain put on the windings if the high-tension supply is switched on after the filaments circuit has been closed. The sudden surge of current which then takes place is liable to set up mechanical movements—on the principle of the electric motor—which may rupture the fine gauge wire. As an illustration of the pronounced mechanical vibrations which may occur in a transformer winding, it is often possible to hear speech and music coming direct from the transformer, the movements of the latter simulating the action of the diaphragm in a loud-speaker.

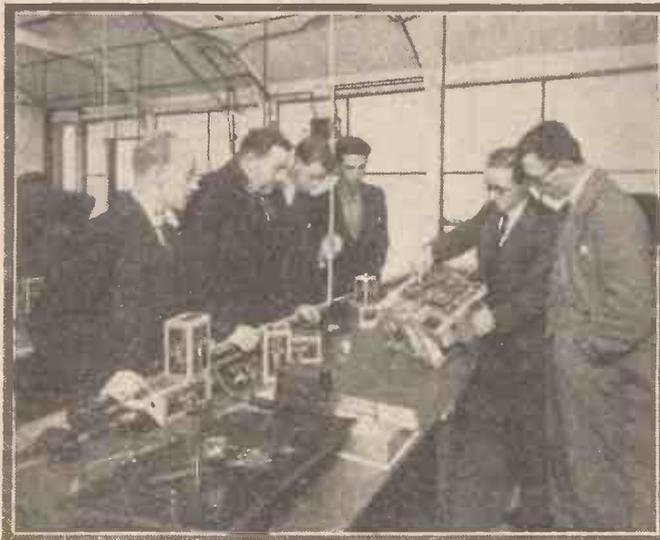
It is, in practice, advisable to switch on the high-tension supply first, and then the filament supply. As the filament take some little time to get hot, the relay takes the "punch" out of the first pulse of current and prevents it from doing damage.

M. A. L.

AFTER-SALES SERVICE

THE need for wireless dealers to have a practical technical knowledge of the goods they are selling becomes more evident every day. A good example of the interest

and making good the common faults likely to occur even in the best of modern receivers. In addition the elementary principles of radio are taught. Of the



Dealer students
receiving instructions
in the servicing
of Marconiphone sets

a large radio firm is taking in this matter was shown when an AMATEUR WIRELESS representative recently visited the service department of the Marconiphone Company, Ltd., at their Dagenham factory.

Here dealers from all over the country receive practical instruction in servicing radio receivers of this firm. A course, lasting a fortnight, is given in detecting

eleven working days approximately four are spent in lectures while the balance of the time is spent in practical bench work under the supervision of experts.

We learn that a similar course is being given by the Gramophone Co., Ltd., in the servicing of their radio-gramophones and other products.

T. F. HENN.

What are the Sound Waves Saying?

THE lives of the great musicians are somewhat sad in the telling; Wagner's was one of the saddest. His first operatic venture was a work called the *Love Veto*. He had then just been appointed conductor of opera at Magdeburg. The theatre was subsidised to a small extent from the treasury of the Saxon Court, but the sum allowed was not sufficient to meet the needs of the management.

He attempted the impossible in trying to rehearse both chorus and orchestra in the short space of twelve days; consequently scarcely a singer knew his or her parts and mistakes were made in the band.

Altogether it was a shocking performance. According to Wagner's own account, the procedure had a spice of humour about it. It appears that the prima donna's husband was jealous of the attentions paid her by the second tenor. He therefore hid himself in the wings, and just before the curtain was timed to rise, rushed on the stage to set about the tenor in fine style. The prima donna herself intervened and was treated much in the same manner, sustaining a blackened eye. At this the whole caste took sides, some being for the husband and some for her tenor-lover. The consequence was a general settling-up for all kinds of grievances, fancied or real, and the chief actors were so mauled that it soon became evident that they could not appear that evening. Thus Wagner did not make a fortune out of the *Love Veto*, which appears to have been a very suitable title for the occasion.

Later, Wagner set out for Paris en route for London. He and his wife, and an enormous Newfoundland dog, started in a sailing vessel from Riga, in Russia. They had an appalling voyage, being caught in no less than three severe storms. In Paris they merely existed. In order to obtain a livelihood Wagner was forced to undertake some very un congenial work, and he and his wife literally starved during the cold winters they spent there. Meyerbeer tried to help them a little, and until the production of *Rienzi*, Wagner kept body and soul together by doing hack work on a Parisian

journal. Later on, *Rienzi* was performed in Dresden with moderate success. *Tannhäuser* and the *Flying Dutchman* followed, but the critics were solidly against both works. Even Schumann, whose judgment was usually sound enough, misunderstood the former work and wrote to Mendelssohn telling him that Wagner's harmony was rubbish.

Wagner interested himself in politics; unfortunately his views nearly led to his arrest, but Liszt (who was devoted to him) managed to get him a passport to Paris from Dresden and so saved him from a term of imprisonment. A warrant for his arrest was actually issued.

In 1859 he was again in Paris, daring to hope for a production of *Tristan*, instead of which he succeeded in getting *Tannhäuser* on at the opera house. It seemed, at long last, that success was to be his, but unfortunately he had political enemies. After 164 rehearsals the work was produced, but the members of the Paris Jockey Club turned up in full force, each man armed with a shrill whistle which he blew with all his force at the first suggestion of applause. *Tannhäuser* had to be withdrawn.

At last, when he was sixty, after a life of appalling hardship, Wagner had the success he deserved. He was well received in London in 1877. He finished his days at Bayreuth, in peace and honour.

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GREAT BRITAIN											
25.53	11,751	Chelmsford (G5SW)	16.0	310	950	Marseilles (PTT)	1.5	410	722	Radio Maroc (Rabat)	10.0
242	1,238	Belfast	1.2	328.2	914	Grenoble (PTT)	3.0	1,250	240	Tunis Kasbah	0.0
261.3	1,148	London Nat.	08.0	329.3	911	Poste Parisien	1.2	NORWAY			
*288.5	1,040	Newcastle	1.2	368.8	813.4	Strasbourg (PTT)	15.0	236	1,277	Kristiansand	0.025
288.5	1,040	Swansea	0.16	385	779	Radio Toulouse	8.0	240.6	1,247	Stavanger	0.025
288.5	1,040	Plymouth	0.16	447	671	Paris (PTT)	2.0	384	824	Trondelag	1.35
288.5	1,040	Edinburgh	0.4	466	644	Lyons (PTT)	2.3	366.2	819.2	Frederiksstad	0.7
288.5	1,040	Dundee	0.16	1,445.7	207.5	Eiffel Tower	15.0	453.2	662	Porsgrund	0.8
288.5	1,040	Bournemouth	1.2	1,725	174	Radio Paris	17.0	493.4	668	Bergen	1.35
288.5	1,040	Aberdeen	1.2	1,725	174	"	85.0	587.1	511	Hamar	0.8
301.5	995	North National	70.0	(testing shortly)				1,071	280	Oslo	75.0
309.9	968	Cardiff	1.2	GERMANY							
356.3	842	London Reg.	70.0	31.38	9,560	Zeesen	15.0	POLAND			
376.4	797	Glasgow	1.2	217	1,382	Königsberg	1.7	214.2	1,400	Warsaw (2)	1.9
398.0	752	Midland Reg.	38.0	219	1,369.7	Flensburg	0.6	234	1,283	Lodz	2.2
479.2	626	North Regional	70.0	227	1,319	Cologne	1.7	244	1,229	Wilno (tests)	22.0
1,554.4	193	Davenry (Nat.)	35.0	227	1,319	Münster	0.6	314.2	958.8	Cracow	2.0
*testing on 479.2 m. (626k.)				227	1,319	Aachen	0.3	335	896	Poznan	1.9
AUSTRIA											
218	1,373	Salzburg	0.6	232.2	1,292	Kiel	0.31	381	788	Lvov	21.0
246	1,220	Linz	0.6	239	1,256	Nürnberg	2.3	408	734	Katowice	16.0
283	1,058	Innsbruck	0.6	240.4	1,217.2	Cassel	0.3	1,411.8	712.5	Warsaw	158.0
352	851	Graz	9.5	253.8	1,182	Gleiwitz	5.6	PORTUGAL			
453	666	Klagenfurt	0.6	259.3	1,157	Leipzig	2.3	290.5	1,033	Lisbon (CTIAA)	2.0
517	581	Vienna	20.0	269.8	1,112	Bremen	0.3	also on 42.9 m.			
also testing on 1,249 n. from 8.0 p.m. (Mon. Wed. Sat.)				270.5	1,085	Heilsberg	75.0	ROMANIA			
BELGIUM											
206	1,456	Antwerp	0.4	283.6	1,058	Magdeburg	0.6	394	761	Bucharest	16.0
215.0	1,394	Radio Conference Brussels	0.25	283.6	1,058	Berlin (E)	0.6	RUSSIA			
244.0	1,224.8	Schaerbeek	0.5	318.8	941	Stettin	0.6	427	702.5	Kharkov	25.0
338.2	887	Brussels (No. 2)	20.0	325	923	Dresden	0.3	720	416.6	Moscow (PTT)	20.0
508.5	590	Brussels (No. 1)	20.0	360	833	Breslau	1.7	800	375	Kiev	20.0
BULGARIA											
318.8	941	Sofia (Rodno Radio)	1.0	372	806	Mühlacker	75.0	937.5	320	Kharkov (RV20)	25.0
CZECHO-SLOVAKIA											
263	1,139	Moravska-Ostrava	11.0	390	770	Hamburg	1.7	1,000	300	Leningrad	100.0
279.5	1,073	Bratislava	14.0	418	776	Frankfurt	1.7	1,000	283	Tiflis	10.0
293	1,022	Kosice	2.5	452.1	662	Berlin	1.7	1,073	279.6	Rostov Don	4.0
341.7	878	Brno (Brno)	34.0	473	635	Danzig	0.2	1,103	272	Moscow Popoff	40.0
487	617	Prague (Prala)	5.5	533	563	Langenberg	17.0	1,304	230	Moscow (Trades Unions)	165.0
487	617	Cesky Brod	75.0	559.7	536	Munich	1.7	1,481	202.5	Moscow (Kom)	40.0
(testing shortly)				559.7	536	Kaiserslautern	1.0	SPAIN			
DENMARK											
281	1,067	Copenhagen	1.0	570	527	Augsburg	0.3	206.5	1,125.4	Valencia (EA J18)	8.0
1,153	260	Kalundborg	10.0	586	530	Hanover	0.3	349	860	Barcelona (EA J1)	8.0
ESTONIA											
296.1	1,013	Tallinn	0.7	570	527	Freiburg	0.35	368.1	815	Seville (EA J5)	1.5
465.8	644	Tartu	0.5	1,635	183.5	Norddeich	10.0	424	707	Madrid (EA J7)	2.0
FINLAND											
220.8	1,353.3	Helsinki	15.0	1,635	183.5	Norddeich	10.0	453	662.2	San Sebastian (EA J8)	0.6
291	1,031	Tampere	1.0	HOLLAND							
291	1,031	Viipturi	15.0	31.28	9,599	Eindhoven (PCJ)	30.0	SWEDEN			
1,796	167	Lahti	54.0	290	1,004	Hilversum	8.5	230.3	1,304	Malmö	0.75
FRANCE											
219.7	1,365.6	Béziers	0.6	299	1,004	Radio Idzerda (The Hague)	3.0	257	1,166	Hörby	15.0
237.2	1,265	Nimes	1.0	299	1,004	Scheveningen-Haven	5.0	306.9	977.2	Falun	0.65
238.5	1,258	Bordeaux-Sud-Ouest	2.0	1,000	283	Huizen	8.5	322	932	Göteborg	15.0
249.9	1,200.6	Juan-les-Pins	0.5	1,875	160	Budapest	23.0	436	689	Stockholm	75.0
250.4	1,198	Fécamp	5.0	550	545	Budapest	23.0	542	554	Sundsvall	15.0
255	1,175	Toulouse (PTT)	1.0	HUNGARY							
264.6	1,134	Lille (PTT)	15.0	550	545	Budapest	23.0	570	389	Ostersund	0.75
272	1,103	Rennes	1.2	ICELAND							
282.2	1,063	Montpellier	2.0	1,200	250	Reykjavik	21.0	770	389	Ostersund	0.75
287.1	1,045.1	Radio Lyons	0.5	IRISH FREE STATE							
294.7	1,017.8	Limoges (PTT)	0.5	224.4	1,337	Cork (GCK)	1.5	1,229.5	244	Boden	0.75
304	936	Bordeaux (PTT)	20.0	413	725	Dublin (2RN)	1.5	1,352	221.9	Motala	40.0
314.3	954.5	Natan-Vitus (Paris)	0.5	ITALY							
GERMANY											
310	950	Marseilles (PTT)	1.5	25.4 and 80	Rome (3RO)	9.0	SWITZERLAND				
328.2	914	Grenoble (PTT)	3.0	247.7	1,211	Trieste	15.0	244.7	1,226	Basle	0.65
329.3	911	Poste Parisien	1.2	296.1	1,013	Turin (Torino)	8.5	246.7	1,215.7	Berne	0.5
368.8	813.4	Strasbourg (PTT)	15.0	312.8	959	Genoa (Genova)*	1.5	403.5	743	Sittens	32.0
385	779	Radio Toulouse	8.0	332	905	Naples (Napoli)	1.7	456.6	657	Beromuenster	75.0
447	671	Paris (PTT)	2.0	426.1	704	Palermo	8.5	780	395	Geneva	1.5
466	644	Lyons (PTT)	2.3	441	680	Rome (Roma)	75.0	TURKEY			
1,445.7	207.5	Eiffel Tower	15.0	456.6	657	Bolzano (IBZ)	0.2	1,216.2	246.6	Istanbul	5.0
1,725	174	Radio Paris	17.0	501	599	Milan (Milano)	8.5	1,538	195	Ankara	7.0
1,725	174	"	85.0	LATVIA							
(testing shortly)				525	572	Riga	13.0	YUGOSLAVIA			
GERMANY											
31.38	9,560	Zeesen	15.0	LITHUANIA							
217	1,382	Königsberg	1.7	1,935	155	Kaunas	7.0	307	977	Zagreb (Agram)	0.7
219	1,369.7	Flensburg	0.6	NORTH AFRICA							
227	1,319	Cologne	1.7	363.4	825.3	Algiers (PTT)	13.0	430.4	697	Belgrade	3.0
227	1,319	Münster	0.6	WHEN SUBMITTING QUERIES . . .							
227	1,319	Aachen	0.3	Please write concisely, giving essential particulars. A Fee of One Shilling (postal order), a stamped addressed envelope, and the coupon on the last page must accompany all letters. The following points should be noted.				to proprietary receivers and designs published by contemporary journals cannot be undertaken.			
232.2	1,292	Kiel	0.31	Not more than two questions should be sent with any one letter.				Readers' sets and components cannot be tested at this office. Readers desiring specific information upon any problem should not ask for it to be published in a forthcoming issue, as only queries of general interest are published and these only at our discretion. Queries cannot be answered by telephone or personally.			
239	1,256	Nürnberg	2.3	The designing of apparatus or receivers cannot be undertaken.				Readers ordering blueprints and requiring technical information in addition, should address a separate letter to the Query Department and conform with the rules.			
240.4	1,217.2	Cassel	0.3	Modifications of a straightforward nature can be made to blueprints, but we reserve to ourselves the right to determine the extent of an alteration to come within the scope of a query. Modifications				sixteenth of an inch wide sticking to one edge of the roll. To prevent this it is a useful plan to make a slight "nick" at two or three points around the periphery of the roll by means of a sharp knife. If this is done along both the top and bottom edges of the roll, it will be found that the tape will come away neatly and in one piece. B.A.R.			
253.8	1,182	Gleiwitz	5.6	A TIP FOR INSULATING TAPE							
259.3	1,157	Leipzig	2.3	A roll of insulating tape is part of the stock-in-trade of most amateur constructors. In nine cases out of ten when attempting to unroll it, one edge of the tape sticks along the side of the roll, so that instead of coming cleanly off, it splits along its length, leaving a thin strip about a							

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A BELLING-LEE TERMINAL MOUNT fixed anywhere, vertically or horizontally—on baseboard, window ledge, wall or skirting. Price 8d. each

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WIRE 27/40 9/40

James Super 60 and Century Super. Frame aerial wire as specified, 27/40 and 9/40 per two reels 6/-. Weedon Centre tapped frame aerial complete kit of parts, with 6 drawings and complete instructions. Kit includes ebonite pieces, all wood drilled and finished in Black, switch for wave changing, screws, turntable and two reels above wire. Price complete 13/9. Lists and details free.

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A.C. from D.C.

THERE must be a large number of listeners still on D.C. mains supplies who would like to know of an easy and fairly cheap way of working standard A.C. apparatus from D.C. mains. I recommend to their attention the Crypto converter, full details of which are given in a leaflet to be obtained. 285

The Radiocorder

Ekco have gone in for a very high-grade gramophone home recording system known as the Radiocorder outfit. This differs in many ways from existing systems and you should write, through my free catalogue service, for an illustrated folder which gives a full description of this novel method of making your own records at home. 286

For Set Users

Here is a lengthy list of parts described in the new Igranich folder. Condensers, coils, transformers, chokes, potentiometers, switches, and so on are included, and set builders should have a copy of this. 287

A Good Portable

Electrical and Radio Products, Ltd., makers of the well-known E.R.P. high-tension battery, also make a fine screen-grid four-valve portable, a good feature of which is the amazing low H.T. consumption of only 6 milliamps. This is housed in a real hide suitcase, and the appearance and workmanship are really commendable. A folder can be had describing this. 288

Polar Price Reductions

I see that the prices of the whole range of Polar pre-set condensers have just been reduced and that condensers are now made in the additional values of .0002 and .0005. There are very many uses for pre-set condensers in most sets and you should have on hand the literature describing these handy Polar pre-sets. 289

Good Fixed Condensers

You probably know that certain alterations have been made in the prices of Ferranti fixed condensers, the prices of popular models such as the 2-microfarad, 1,050-volt D.C. test condenser being considerably reduced. These condensers use pure linen tissue as a dielectric which is specially treated to remove all traces of moisture. OBSERVER. 290



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SIZES AND PRICES Standard.	
25, 35, 50, 75	each 1/6
30, 40, 60, 100	each 1/8
125, 150	each 2/3
275 for 5XX ea.	2/6
200, 225	each 2/9
250	each 3/3
300	each 3/9
100	each 4/3

Centre tapped 9d. each extra.
X type 1/- extra.

Sound design, thorough finish and accurate assembly are very real advantages of Tunewell Coils. Their self capacity is low, their insulation high, their materials the finest—that is why they have won such a reputation for sharp tuning and long-range reception: why set designers choose Tunewell Coils in preference.

TUNEWELL ALL-BRITISH SPAGHETTI RESISTANCES
10,000 and 15,000 ohms, 1½, 20,000, 25,000 and 30,000 ohms, 1½, 40,000, 50,000 ohms, 1 8, 60,000, 70,000 and 80,000 ohms, 1½, 90,000 and 100,000 ohms, 2½.

Write for lists.
TURNER & CO.,
54 Station Road, London, N.11.

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REVIEWED IN THIS ISSUE

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Let us have your enquiries! (All transformers value £1 or over may be obtained on easy payment terms.) We can quickly and economically carry out repairs to any make of mains transformer.

What others say

"Eliminator has been running 4 to 5 hours daily and has not given the slightest trouble." S.W.N.

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MANUFACTURER with works slack during trade slump offers to design and supply apparatus to suit individual requirements, at cost price plus 20 per cent. Represents almost half shop prices. T. R. White, 10 Andover Yard, 219 Hornsey Road, N.7.

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Builders of the "Century Super" will be interested to know that two models of the type A.1. moving-coil Epoch speaker specially recommended for this set are now available. This popular moving-coil in-



The Epoch permanent-magnet moving-coil speaker

strument can be obtained, at no extra charge, either with the normal or sub-normal type of diaphragm, the sub-normal giving a slightly lower tone and a lower cut-off—a big advantage for gramophone working. The price of both models is £3 3s.

With reference to the new Wright and Weaire Frame Aerial reported on in last week's "A.W.," the price should have been 32/- and not 35/- as stated.

We are informed that supplies of this aerial will be available to the public about June 27th.

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A. TAYLOR, 57, Studley Road, Stockwell, LONDON.

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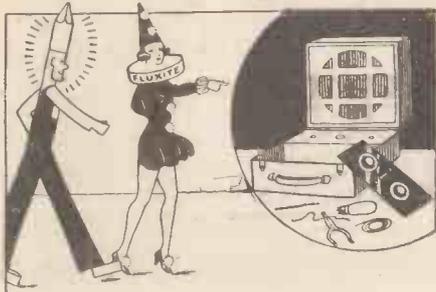
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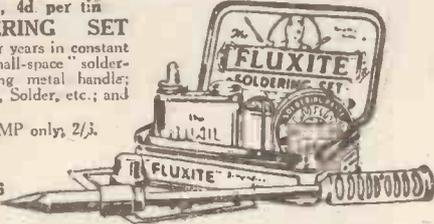
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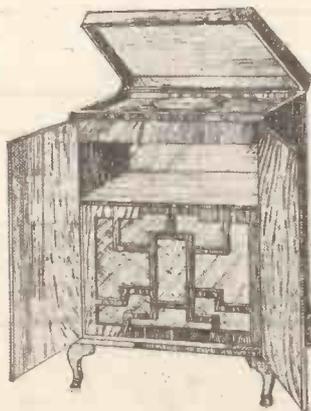
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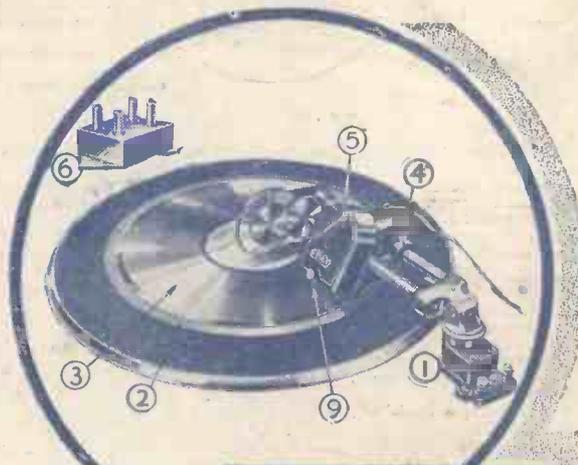
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