SUMMER-TIME DISTANCE GETTING

BUILDING THE A.C. "CENTURY SUPER"

Amateur Wireless

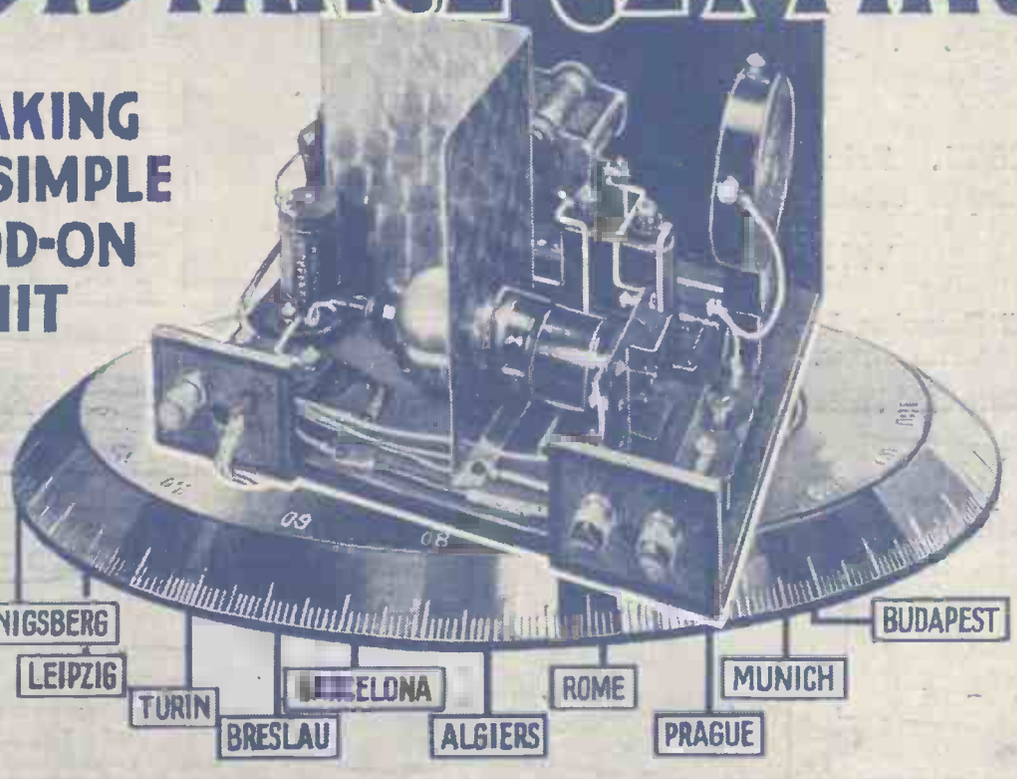
and Radiovision

Every Thursday 3d

Vol. XVIII. No. 471 Saturday, June 20, 1931

SUMMER-TIME DISTANCE GETTING

MAKING A SIMPLE ADD-ON UNIT



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ONLY **15/-** EACH

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TELSEN
RADIO COMPONENTS

Telsen 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/-

Telsen Grid Leaks

Absolutely silent and non-microphonic, practically unbreakable, cannot be burnt out and are unaffected by atmospheric changes. Telsen Grid Leaks are not wire wound, therefore there are no capacity effects. Made in capacities of ¼, ½, 1, 2, 3, 4, and 5 megohms.

Price 9d. each.

9D

Telsen 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.

Price 6d. each.

6D

Telsen 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.

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The World-Famous Telsen 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 Telsen 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 ,,
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ACE 5/6

RADIOGRAND 8/6

COLOSSAL PRODUCTION
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TELSEN'S LEAD TO

Mass production enters the radio industry, and the home constructor benefits immediately . . . First, all the established and world famous Telsen components are reduced to amazingly low figures. Second, a further range of Telsen components is added at correspondingly low prices. Behind these new price levels are the brains of skilled engineers and costing experts, for the high standard of quality and performance, which has made Telsen famous throughout the world, is rigidly maintained.

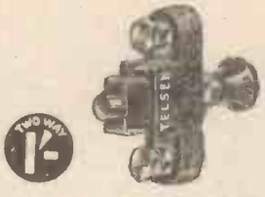
Specify Telsen when buying components.

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.

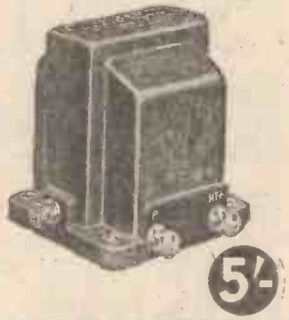
Bakelite Dielectric Reaction Condenser
Made in capacities of .0001, .00015, and .0003.
Price 2/- each.
Capacities of .0005 and .00075.
Price 2/6 each.

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.



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.

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.



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/-.

Telsen Pentode Output Transformer
Price 12/6 each.

Telsen Multi Ratio Output Transformer
Ratios 9-1, 15-1, 22.5-1.
Price 12/6 each.

Telsen Radiogrand Transformer
Ratio 1.75-1 for super quality reproduction. Price 12/6 each.

THE LARGEST RADIO COMPONENT MANUFACTURERS IN THE WORLD

THE RADIO WORLD

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, adjustments being extremely sensitive. 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.

From 1/6

Telsen Mansbridge Type Paper Condensers

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

Made in capacities from .01 upwards.

		500-volt test Price	1,000-volt test Price
W83	.01 mfd.	1/6	2/6 each
W80	.25 ,, ...	2/-	3/- ,,
W79	.50 ,, ...	2/3	3/3 ,,
W78	1.0 ,, ...	2/3	3/6 ,,
W77	2.0 ,, ...	3/-	6/- ,,

1/6

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.

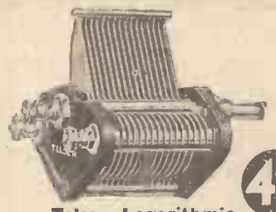
Price 1/6 each.

From 6d

Telsen Spaghetti Flexible Resistances

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, 750-1,000	42 m/A	6d. each
1,500-2,000, 3,000-4,000, 5,000	23 m/A	9d. ,,
10,000-15,000, 20,000-25,000, 30,000	6 m/A	1/- ,,
50,000-60,000, 80,000-100,000	3 m/A	1/6 ,,
150,000-200,000	1½ m/A	2/- ,,



4/6

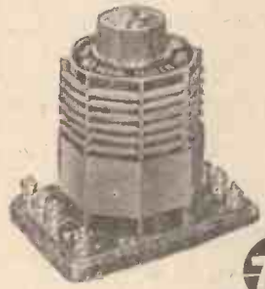
Telsen Logarithmic Variable Condensers

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.



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, No. 154. Price 5/6

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 T2-pole switch. Price 5/6 each.

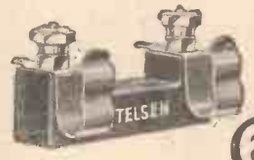
2/6

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.



6d

Telsen Grid Leak Holder

Will hold firmly any standard size of type of Grid Leak, ample clearance being provided between the terminal screws and the baseboard. The terminals and fixing holes are accessible without removing the Grid Leak.

Price 6d. each.

6d

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. ea.

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

TELSEN

RADIO COMPONENTS ARE ALL BRITISH

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

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

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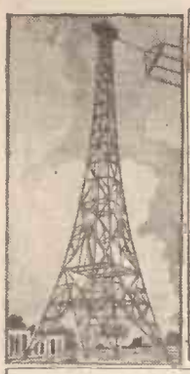
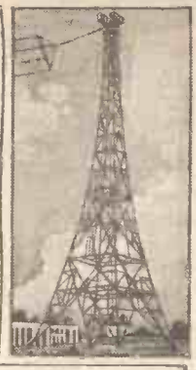
Don't Forget to Say That You Saw it in "A.W."

No. 471. Vol. XVIII. JUNE 20, 1931



Amateur Wireless and Radiovision



EDITOR: BERNARD E. JONES.
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THE LEADING RADIO WEEKLY FOR THE CONSTRUCTOR, LISTENER & EXPERIMENTER.
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ASSISTANT EDITOR: H. CORBISHLEY.

NEWS · & · GOSSIP · OF THE · WEEK

SUMMER-TIME DISTANCE-GETTING

WITH a big set you shouldn't have any trouble in getting the usual number of foreign stations in spite of the long evenings (ask any "Super Century" owner), but if you don't want to go to the trouble of rebuilding your old set, then you will most likely be finding summer-time distance-getting a bit of a problem. On page 947 you will find a novel idea for increasing range. Try it!

THE A.C. "CENTURY SUPER"

IN this issue there is more about the new edition of the amazing "Century Super." This is the A.C. mains-driven model. In convenience of operation and results it is even better than the 100-station battery model.

THE RIDGEWAY PARADES

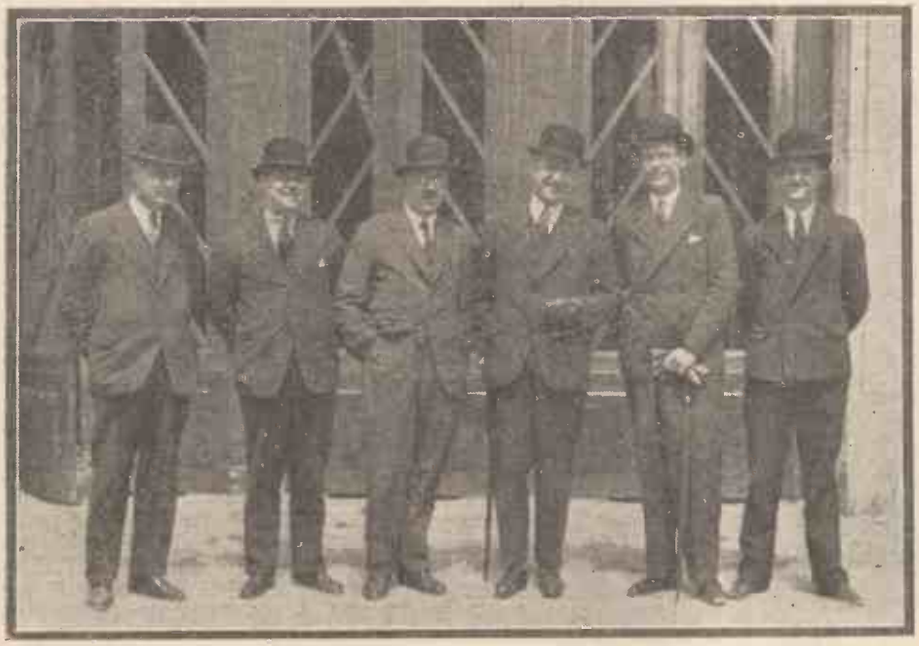
PHILIP RIDGEWAY is to do six more Parades in the autumn. It is probable that these will not be run on quite the same lines as the series which has just finished but will more closely resemble the 1930 Parades. These, you will remember, were of the "reminiscence" type, and the general concensus of opinion is that these are more popular than the variety song-and-dance type of show which was given this year. Ridgeway is now on the look-out for some new form of presentation.

THESE CONTRASTS

THE programme arrangers are sometimes up against it in getting alternative programmes. Here is an instance. On June 12 arrangements were made for broadcasting from the annual dinner of the National Allotments Society, and just after these arrangements had been made definitely a request was received from the National Savings Society for a similar broadcast. They were holding their annual dinner on the same day. No, "Programmes" did not toss for it! Both broadcasts could not be made because this would not provide an alternative and, as the Allotments people had asked first, they were "given the mike." As a matter of fact, an organ recital was broadcast as the alternative to the after-dinner speech relay!

PRINCIPAL CONTENTS

THE PIONEERS OF BROADCASTING HOUSE



Here, standing outside the main entrance of the now nearly completed Broadcasting House in Portland Place, are some of the officials responsible for its design. Second from the right is Mr. M. T. Tudsbery, the B.B.C. civil engineer, and third from the right is Col. Val Myer, the architect

TESTING THE STUDIOS

WHEN the Broadcasting House studios more nearly reach completion in a few weeks' time, then the sound engineers will be busy testing the acoustics. The small organ-pipe device which was designed by West for studio reverberation period testing is now rather out of date and the engineers have made up a new gadget, electrically operated, which gives very precise results.

ACCURACY

WITH the new studio "echo tester" the B.B.C. engineers can work out the exact amount of felt, wood, cloth and so on needed in the furnishing and decoration of the room to produce a studio having acoustics suitable for any special purpose—talks, plays, small orchestral combinations

NEXT WEEK: PRACTICAL SUPER-HET IDEAS FOR YOU

NEWS & GOSSIP OF THE WEEK—*Continued*

or whatever it may be. The engineers will go round Broadcasting House with this new instrument and, after taking measurements, will tell each Department exactly how much material it must instal in the decoration scheme to produce the best results.

AN Ex-B.B.C. ENGINEER

IT is common knowledge that a number of former B.B.C. engineers left the Corporation to go into the talking film world. Many of them have achieved success, and a man who is in the news at the moment—Mr. Rudolph, of British International—was formerly in the Control Room at Savoy Hill. He is doing the sound part of the film of *The Flying Fool*.

THE WESTERN REGIONAL STATION

RUMOURS have been going about that a site has been chosen at Watchet for the Western Regional station. It has also been known that up till now there has been a delay in arriving at a definite decision because the Air Ministry has held objections to the site on account of the obstruction to aircraft that might be caused by the masts of a super station. Now we learn that these objections have been removed, and one must watch for developments at Watchet.

THE WESTERN REGIONAL "H.Q."

IT is definite that the Western Regional offices will remain at Cardiff. Additional office equipment will probably be provided in Bristol when the new Regional transmitter is ready, but the main "H.Q." will be at Cardiff. Most people are unaware of the fact that already there is a small talks studio in Bristol which is used, on the average, about once a week.

THE NEW "PROMS"

THERE has been a minor controversy over the British Composer nights at the new series of Promenade Concerts which starts on August 8. The B.B.C. investigated the box office figures and found that concert goers appear to be in favour of special British composer nights. These have been adequately provided in the new series.

HATS OFF TO THE NORTH

WE have reason to believe that the B.B.C. is secretly pleased with Northern listeners! A comparatively small number of difficulties have been raised, despite the extensive power and wavelength changes with which Northern listeners have had to deal in connection with the introduction of Slaithwaite, and the re-shuffling of wavelengths.

A BIRD'S-EYE VIEW

Visitors to Broadcasting House will be able to enjoy a wonderful view over London. This glimpse, from the top of the building, down Regent Street, gives some idea of the enormous height of the new B.B.C. "H.Q."

OUR BRITISH NIGHTS

FOR the next "Proms" there will be special Composer nights — two Elgar nights, one Delius and one Vaughan Williams. There will be four special British nights and, in addition, twenty or thirty British items will be included in other programmes.

NORTH REGIONAL BREAKDOWN

THE North Regional station has had its first breakdown. It was only a minor event, and the B.B.C. is not worried. It lasted only seven minutes and was caused by a failure in one of the bias panels.

B.B.C.'s PROVIDENT FUND

APPARENTLY there is some delay in forming a permanent provident fund at Savoy Hill. It seems difficult to find a scheme that will be fair to everyone. An accountant in the B.B.C. may be secure for life, while the job of a programme compiler may depend upon his inspiration. Many are hoping that Sir Gordon Nairne will find a good scheme.

SUBSIDISED OPERA

THOSE who foretold disaster to the Government's scheme for subsidised opera through the B.B.C. must have smiled when Mr. Lionel Powell announced his opposition season of opera at the Lyceum. On several evenings recently the Lyceum has drawn a good house, at the expense of Covent Garden. We may expect a discussion on the opera subsidy in the House of Commons.

TALKING TAPE FOR O.B.'s

B.B.C. ENGINEERS are suggesting that the talking-tape machine installed in a van will be a great help in certain outside broadcast events. This instrument could record events beyond the reach of the telephone service or those taking place at times unsuitable for broadcasting. Later the tape could be run through the machine at Savoy Hill. Is this the radio reporter of the future?

B.B.C.'s CAR PARK

MOST artistes and a few officials at Savoy Hill run motor cars. These are parked around the B.B.C. building and for those using No. 10 studio there is a yard near the warehouse. Car parking will present a problem at Broadcasting House. The B.B.C. is trying to secure the mews near by.

NORTH PROGRAMME CHANGES

WHEN the full alternative programme is introduced at Moorside Edge, important programme changes will be made. All regional transmitters will then broadcast the local Children's Hours, while dance music is given on the national wavelengths. Thus London Regional and London National will change programmes between 5.15 p.m. and 6.15 p.m. from the end of July. Daventry National will continue to relay the London Children's Hour.

TALKING-TAPE WORRIES!

NOW that the Blattnerphone has been taken over by the programme people, it is being used by harassed announcers, who are recorded reading tongue-twisting passages. They will have to read the same thing three months hence and if there is no improvement, something will be said by Mr. Lloyd James, the Secretary of the Committee on Spoken English. By the way, he coaches all announcers in fortnightly lessons.

B.B.C. AND AMERICA

MR. PAYLING, a high official of the Columbia Broadcasting System, has arrived in England to put his system on a par with the National Broadcasting Company in the matter of programme interchanges as arranged by Mr. Ellwood of the N.B.C. It would be easier to the B.B.C. to deal with only one broadcasting authority in the U.S.A. No doubt it will have to exercise its usual tact in arranging programme interchanges that will convince the Columbia official that the N.B.C. is getting no advantage.

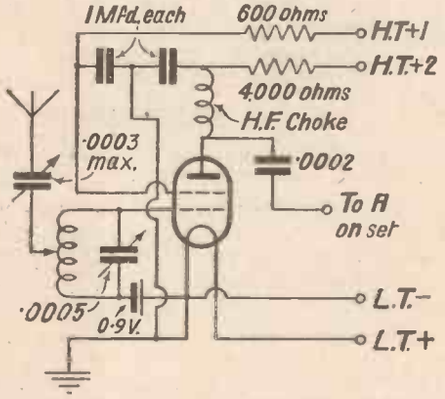
SUMMERTIME DISTANCE GETTING

CONSTRUCTIONAL DETAILS OF A SIMPLE SCREEN-GRID H.F. ADD-ON UNIT WHICH WILL INCREASE THE RANGE OF YOUR PRESENT RECEIVER

OWNERS of big sets are lucky because, although the long, light summer evenings are now here, they can still get almost as many stations on the dials as they can in winter time.

Sets such as the "Century Super" and the "1931 Ether Searcher" are going a long way towards ensuring good all-the-year-round reception. Owners of old-type sets are finding in comparison that there is a certain amount of difficulty in keeping up the same reception log during June, July, and August, as they can for the rest of the year.

The trouble is caused by the fact that daylight covers the long distances of most stations, unless one is prepared to sit up



The circuit of the Add-on H.F. Unit

very late at the set, and everybody knows that fading and a diminution of signal strength are noticeable owing to the strange workings of the Heaviside layer during the hours of sunlight.

An old set can be rebuilt according to one of the modern circuits; but there is another plan. You can make up a simple adaptor which can be added to the front of your present set and which will increase its range. In many cases this is the cheaper way, because it means the use of only one new valve, whereas an entirely new set may demand a number of new valves.

The little unit shown by the photographs is essentially a simple H.F. stage using a screen-grid valve, and it is so arranged that the output of the unit links up with the aerial terminal of the set and no wiring modification of the existing receiver is necessary.

Nothing could be easier to work than this unit, for it has one-knob control. This knob is adjusted step by step with the main tuning control of the set and not only is the range greatly increased, but the selectivity is vastly improved because of the addition of the high-frequency valve preceding the detector.

From the accompanying list of components you will see that no expensive parts are needed.

A centre-tapped or plug-in coil is used for tuning in conjunction with an ordinary panel-mounted condenser. There is a pre-set condenser in the tuning circuit to take the greatest advantage of the unit's selectivity.

The connections are very simply arranged. There are two small terminal strips on the unit, one carrying only one terminal and a group of flex leads, and the other carrying aerial and earth terminals. The aerial and earth leads are shifted from the receiver to these terminals on the unit and the other aerial terminal on the unit is connected to the aerial terminal of the set.

The set's earth terminal is left disconnected, for connection is automatically made through the wiring of the adaptor.

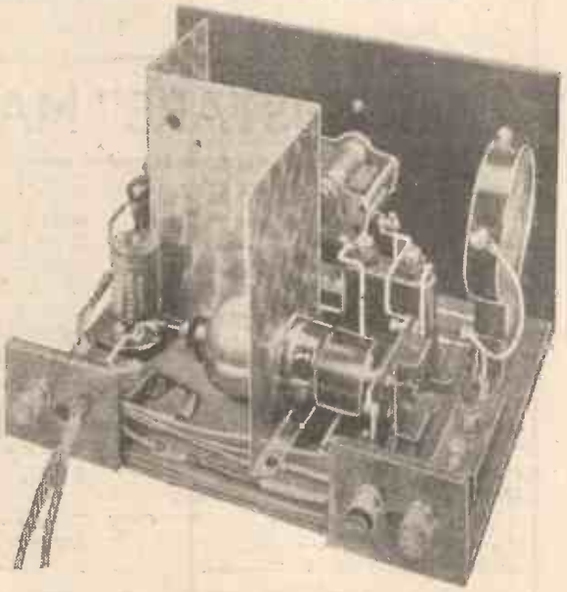
The flex leads from the unit are connected up to the batteries, there being two spade tags to connect with the accumulator (in addition to the existing connections for the set, of course) and three high-tension wander plugs.

These three wander plugs must not be confused with the existing high-tension battery connections for the set. The negative lead for the unit, for example, must be connected up to the negative socket of the battery, in connection with the negative lead which already goes to the set. The H.T. plus 1 tapping should be taken to approximately 90 volts and the H.T. plus 2 tapping to 120 volts. There is a simple double-stepped screen in the unit and this can be bought ready made.

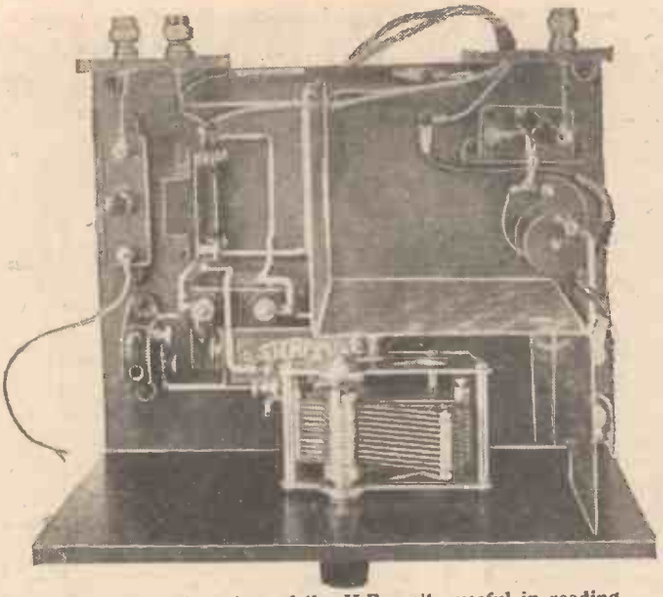
Amateurs who want to carry out all the constructional work themselves would be well advised to get the full-size blueprint from the Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4. It costs only one shilling.

COMPONENTS REQUIRED

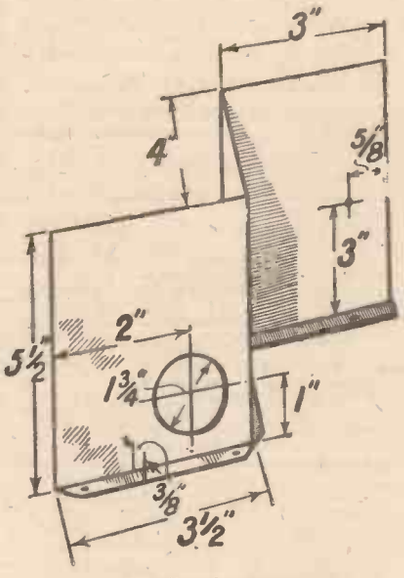
Ebonite panel, 9 in. by 6 in. (Becol, Peto-Scott, Trelleborg).
Baseboard, 9 in. by 7 in. (Camco, Pickett, Peto-Scott).
.0005 variable condenser (Lotus, J.B., Cyldon, Formo, Ormond, Polar).
Slow-motion dial (Astra, J.B., Ormond, Brownie, Formo).
Aluminium screen, with hole for S.G. valve (Ready-Rad, Peto-Scott).
Horizontal-mounting valve holder (Junit, W.B., Parex).
Single coil holder (Lissen, Lotus, Wearite).
Two 1-mfd. fixed condensers (Dubilier, T.C.C., Lissen, Formo).
.0002-mfd. fixed condenser (Telsen, T.C.C., Dubilier, Formo, Lissen, Ormond).
.0003 to .00025 pre-set series aerial condenser (Formo, Sovereign).
High-frequency choke (Wearite, Varley, Lissen, Telsen, Formo).
600 and 4,000-ohm spaghetti resistances (Lewcos, Lissen, Bulgin, Tunewell, Sovereign).
Two terminal blocks (Sovereign, Junit, Belling-Lee, Lissen).
Three terminals marked: Aerial 1, Aerial 2, Earth, (Belling-Lee, Clix, Eelex).
.9-volt grid bias battery (Siemens).
Three yards of thin flex (Lewcoflex).
Three wander plugs, marked: H.T.–, H.T.+1, H.T.+2 (Belling-Lee, Clix, Eelex).
Two spade terminals, marked: L.T.+, L.T.– (Belling-Lee, Clix, Eelex).
Screen-grid valve anode-connector (Belling-Lee).



The unit is of very simple construction and few components are required



Here is a plan view of the H.F. unit—useful in reading the wiring diagram

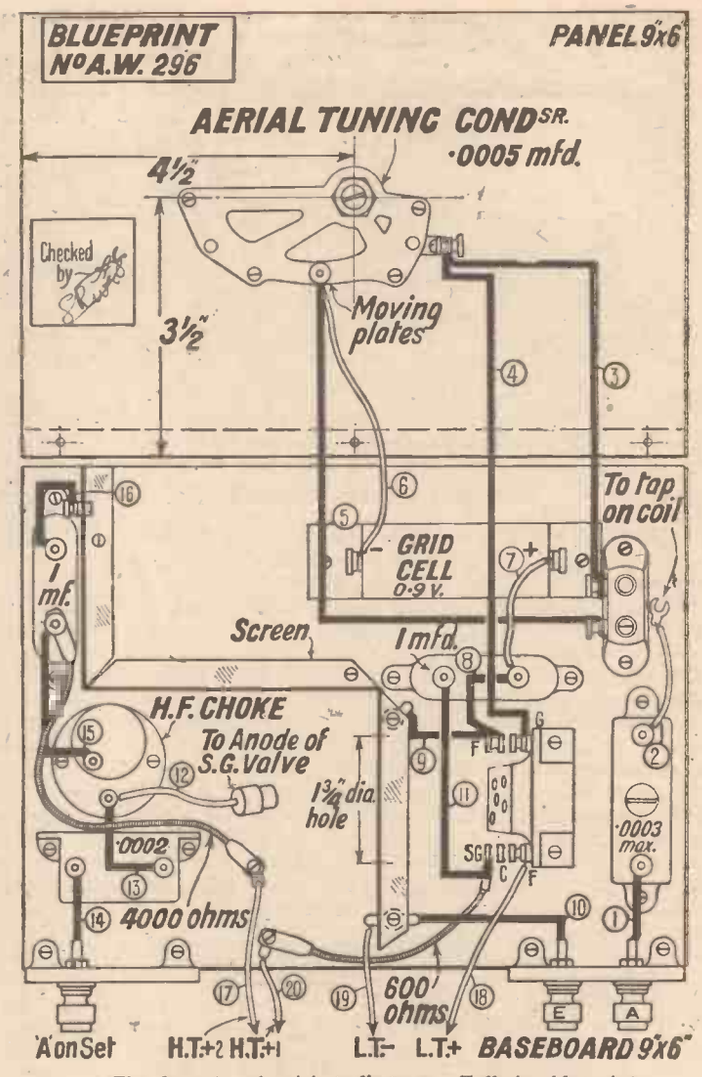


Details of screen

The wiring is carried out with rigid insulated wire, with spaghetti resistances and with flex leads at various points. There are two spaghetti resistances, one of 600 ohms and one of 4,000 ohms.

There are flex leads for the batteries, for the tapping to the coil, for the connections to the small grid-bias battery screwed to the baseboard and for the lead to the anode terminal of the screen-grid valve.

Any good screen-grid valve is suitable, the following two-volters being recommended. Marconi S215, Osram S215, Mullard PM12, Mazda 215SG, Eta BY6, Cossor 215SG, Lissen SG215. Equivalent four- or six-volt valves may be used if four- or six-volt valves are used in the existing set. A number 50 or 60 X-tapped coil should be used in the coil holder for the medium waves and a No. 200 X-tapped coil for the long waves.



The layout and wiring diagram. Full-size blueprint available, price 1/-

FAMOUS "STARS" MADE BY RADIO

Why not a programme supplied entirely by artistes who have made their names by broadcasting? asks our contributor

FAME and fortune may not go hand in hand to meet the artiste who scores a broadcasting success, for there is not the money in broadcasting to bring such fortune to radio stars as can be found in Hollywood or on the West End stage. But fame is certainly won by wireless; there are many artistes who are famous throughout Great Britain to-day who were unknown before they first faced the microphone.

There is Mabel Constanduros for instance, probably the most popular woman broadcaster. She recently appeared for the 250th time at the microphone, and she owes her fame entirely to broadcasting, for her gift of impersonation was previously only used for the private entertainment of friends.

Some stage artistes have been able to adapt themselves to radio work; others have been lamentable failures. It is notable that most of the leading wireless humorists are people who had little or no stage experience before they started broadcasting.

There is Arthur Clifford ("Stainless Stephen"), for instance, who started broadcasting in a very modest way in his native Sheffield, and is now a stage comedian as well as a wireless star. In his case, the microphone has led to the footlights.

So, too, with Flotsam and Jetsam, and with Tommy Handley, and Clapham and Dwyer, all of whom owe their national reputations to radio.

The Programme Department of the B.B.C. is always searching for fresh ideas—why not a programme provided entirely by radio's own stars? I make the B.B.C. a present of the idea.

As well as those mentioned above, several names of artistes who were comparatively unknown before they commenced broadcasting come to my mind as I write.

There are at least three sopranos who are now very well known indeed—Olive Groves, Mavis Bennett, and Wynne Ajello. There is Dale Smith (baritone), Leonard Gowings (tenor), and Maurice Cole, the pianist. Doris and Elsie Waters are also essentially radio artistes, and, of course, there is the Gershom Parkington Quintet.

Already we have plenty of variety in the talent for our Radio Stars Programme, but what about adding A. J. Alan and John Henry to the list?

There is also Doris Arnold, the well-known syncopated pianist. She started with the B.B.C. as—a shorthand-typist!

There's romance for you! From shorthand to syncopation!

LESLIE W. BAILEY.

STUDIO CHATS WITH BROADCAST STARS

The VERSATILITY of GRACIE FIELDS

By KENNETH ULLYETT

WHEN Miss Gracie Fields broadcasts, it is generally from the stage and not from the studio. Her latest broadcast was at the Royal Command Performance, relayed from the London Palladium, and, of course, she came over well.

She is quite frank about her admission that although she doesn't suffer from microphone fright, she does not really like the microphone either for broadcasting or gramophone-record making. She is essentially a stage artiste and it is owing only to her extraordinary versatility that she has made such a success of B.B.C. vaudeville broadcasting.

She is a radio enthusiast at home, too, and always has at least two sets, one of them a radio-gramophone which is used for dancing at the gay parties that are given at her new Hampstead home.

I hope she will forgive me for discussing her private life, but it is interesting from a radio point of view.

She is really Mrs. Archie Pitt, wife of the well-known theatre manager and producer. "A. P." takes a great interest in her broadcasts and many of her radio turns are personally rehearsed at home for his judgment and approval.

Miss Gracie Fields—in real life Mrs. Archie Pitt

In order to get the right "angle" for her radio turns she makes good use of the gramophone. If, for example, she wants to broadcast some song or sketch which she has previously recorded, then she puts the record on the radio-gram in what she dubs the "Fatty Goo" (fatigue) room and listens to it over and over again, criticising and mentally rearranging the material so that it will sound even better over the microphone.

Apart from her interest in dancing and music she leads quite a simple life. She is devoted to her dogs—there are, I think, six of them in the house—and at the moment Airedales are her hobby.

It is rather difficult to say just what is her microphone secret. Frankly, she has a voice which, in the case of an inferior artiste, would not broadcast well, because it covers such a wide scale, and because in her singing she covers the whole gamut of emotions. Perhaps it is just because she is "Gracie," and because we know her, that she is good.

Yet it cannot be all reputation for, when she went to America recently she made a hit there, too, on the stage and in the studio. She admitted that it took some doing to get American radio listeners to appreciate Lancashire dialect.

And yet she did it. She has the knack of getting things over, whether it is over the footlights or over the wireless.

She has the producer's knowledge as well as that of the artiste's and when she broadcasts she does much of what in an ordinary vaudeville broadcast, is left to the producer, *compere* or conductor. Directly she comes into the studio she seems to galvanise the orchestra and the other vaudeville artistes with her personality.

Some artistes who are far more familiar with the stage than they are with broadcast studio conditions are rather apt to feel the loss of an audience and the need for something to galvanise them into action, in the same way that they are inspired by footlights and by the applause. Whether Gracie Fields feels this or not, she alone can tell, but certainly she does not make it evident.

She has no recourse to popular claptraps, or to a studio *claque*. Comediennes are generally supposed to be more susceptible to this coldness of the microphone than any other broadcast artistes, but then Gracie Fields is not primarily a comedienne.

She is at heart an actress, and quite half of her stage and radio performances are the result of sheer artistry, which makes them all the more remarkable.

Off-hand, I cannot think of any woman who makes a better broadcaster, and as so many nowadays are trying to broadcast and to make gramophone records, that is really worth while telling.

Perhaps the secret of her radio success is her stage versatility.

OUR LISTENING POST

BY JAY COOTE

ON looking through a batch of French newspapers, I was amused to see that the Paris fans have been trying to solve a very serious problem, namely, what to call the lady who takes on the duties of a studio announcer. There is no actual French term for this new profession and everybody is trying to coin one. The stations in some instances have borrowed the English word "speaker," but this in France applies to a man only. *Speakerinne* was suggested and discarded; *annonciatrice, parleuse, diseuse*, and other equally clumsy terms were put aside, and finally listeners have favoured *microphoniste* as the word best suited to the case.

Whilst the French Colonial Exhibition keeps its doors open at Paris, short-wave fans are given the opportunity of logging a new transmitter. It is that of the new Pontoise Government station operating on 19.68 and 25.20 metres with a power of 13 kilowatts in the aerial. It works usually from 7 a.m. until midday and again between 6 and 8 p.m. The call is "*Ici Poste Colonial des P.T.T.*," and a metronome is used as an interval signal. When engineers are testing you may hear "*Poste d'essai* G (zhay) *douze mille* (12.000)." During the period of the exhibition, for the benefit of French listeners in Indo-China, Africa and other French colonies, it will relay some entertainments from a special studio in the grounds.

Has anybody picked up tests by Vienna on 1,249 metres? Broadcasts are being carried out on that wavelength every Monday, Wednesday, and Saturday after 8 p.m., B.S.T., as the Austrians, with a view to building a super-power station, are anxious to find a comfortable corner in the upper waveband. Moreover, plans have been put forward for the erection of a further relay station at Villach.

By the exchange in wavelengths between Bergen and Trondheim, the former will be picked up more easily in the British Isles, although its power is relatively small. It broadcasts its own programmes and on rare occasions only relays entertainments from Oslo.

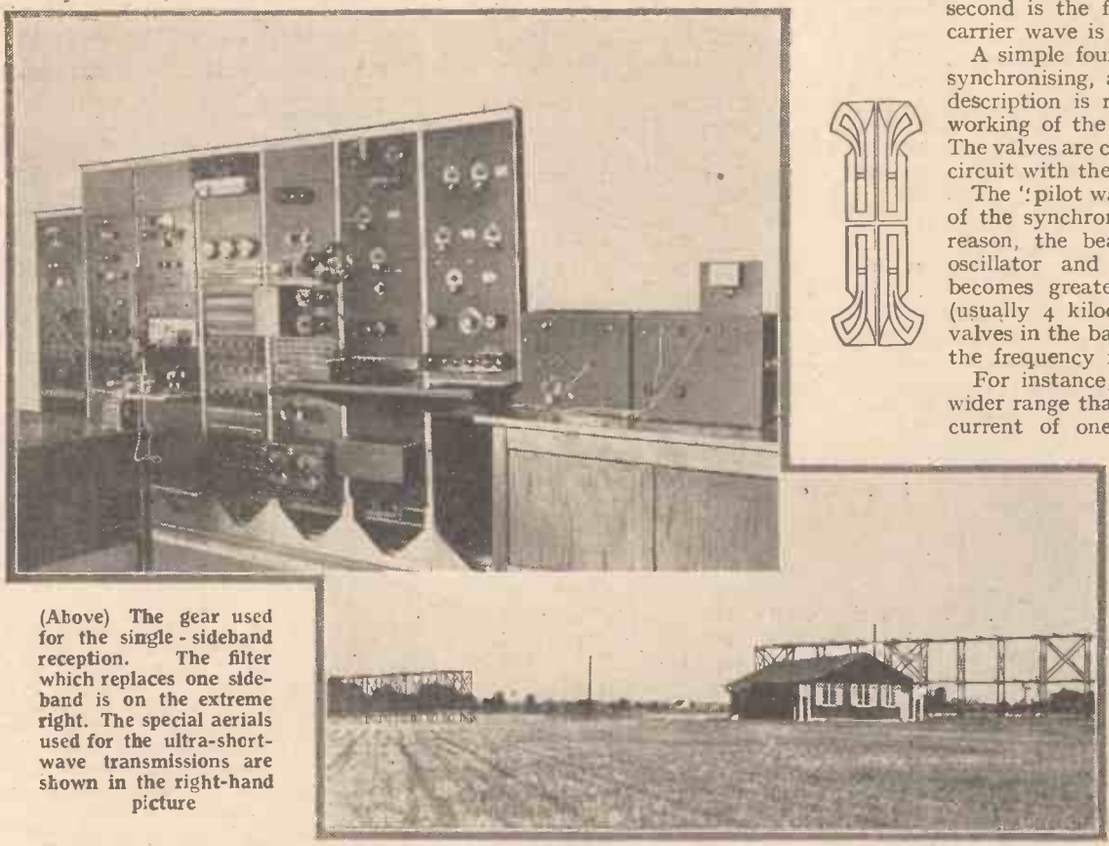
Warsaw, of late, proud in its possession of Europe's most powerful transmitter, on some evenings extends its programmes until past midnight. As a rule, on Sundays and Wednesdays you will find this station on the air until 12.30 or 1 a.m., and the programme is often taken by Lodz and Wilno; occasionally also by Katowice, Cracow and Poznan. On other days the high-power station closes down at midnight, but when conditions are favourable you may turn to Warsaw on Friday nights for a relay of foreign transmissions. Several tours of Europe have been made during the past weeks and attempts have been carried out in the re-broadcasting of U.S.A. programmes.

USING ONLY ONE SIDEBAND

A novel system of telephony is now being developed which uses only one sideband of the speech transmission on the short waves. This could be used for "secret broadcasting," and here is a description of the apparatus. By a Special Correspondent

AFTER carrying out the interesting experiments with broadcasting on a 1-in. aerial, which I described recently in AMATEUR WIRELESS, the Materiel Téléphonique organisation at Trappes, near Paris, have turned attention to yet another novelty.

They have succeeded in broadcasting speech on the ultra-short waves, using only one sideband of the speech transmission.



(Above) The gear used for the single-sideband reception. The filter which replaces one sideband is on the extreme right. The special aerials used for the ultra-short-wave transmissions are shown in the right-hand picture

The Single-Sideband System

This is known in commercial circles as the "single-sideband" system of telephony and was used some years ago with carrier communication on ordinary telephone lines ("wired wireless," in other words), the big advantage being that by using only one sideband, twice as many speech channels can be put into the total waveband space as when using direct modulation and both sidebands.

Since then it has, of course, been used on our ordinary commercial radio-telephone working from London to New York. It is, in fact, difficult to see how this long-wave telephone business could be carried out without the single-sideband method, because on the very long wavelengths used for this it would be difficult to design an aerial passing both sidebands.

There are all kinds of troubles which crop up when the engineers try to use the single-sideband method on the short waves. The reason is that there is a big technical difficulty in building a local oscillator which, while "faking in" the carrier wave at the receiving end, is sufficiently well synchronised with the suppressed carrier wave at the transmitter.

In these so-called secret single-sideband transmissions, you see, one sideband is suppressed at the transmitter and is replaced by a small local oscillator, synchronised with the transmitter, at the transmitting end. On long wavelengths this synchronising is fairly easy but on a wavelength of, say, 15 metres, the precision required for the synchronising gear *amounts to one part in a million*!

It is this synchronising problem which is, in fact, the chief technical difficulty to be overcome in applying single sideband to the short waves.

The "Pilot" Wave

The Materiel Téléphonique people have got over this trouble in a novel way by transmitting a continuous "pilot wave" in addition to the speech sideband. This pilot is received and automatically synchronises the frequency of the local oscillator. There is thus no mechanical gear involved, the synchronising using purely electrical methods. The power of the pilot wave transmission is much less than the sideband and its frequency lies about 400 cycles outside the speech band.

The engineers have gone very thoroughly into the matter of "drift," and the amount by which the "pilot wave" and the speech wave are apt to fade using very short wavelengths and they have worked out that a maximum rate of change of 10 cycles per second is the fastest that the suppressed carrier wave is likely to drift.

A simple four-valve receiver is used for synchronising, and although the technical description is rather involved, the actual working of the apparatus is quite simple. The valves are coupled up in a simple bridge circuit with the local oscillator.

The "pilot wave" is received at one side of the synchronising gear and if, for any reason, the beat note between the local oscillator and the received pilot wave becomes greater than a certain amount (usually 4 kilocycles) the voltages of the valves in the balance circuits are upset and the frequency is restored to standard.

For instance, if the beat note covers a wider range than it should, then the plate current of one of the rectifying valves increases. This is coupled to another valve so that it increases the grid bias of the second valve, putting more negative grid bias on it and so raising its internal resistance. This middle valve is again coupled to the oscillator, so that as its resistance is raised the frequency is lowered.

The whole secret of this single-sideband transmission on the short waves lies in synchronisation of the oscillator. The missing sideband is suppressed at the transmitting end by a filter and is put in again at the receiving end, of course, by the oscillator.

While it will probably be some time before this sytem is used for broadcasting, it is quite on the cards that the method of synchronising will be found useful for television.

On June 28, Lille PTT will broadcast the official ceremony in connection with the unveiling of a monument dedicated to Lord Haig at Montreuil-sur-Mer (France).

Recently on two separate occasions in one week the aerial of the Beromuenster (Switzerland) station was struck by lightning.

The Finnish Government has decreed that the power of the Helsingfors station is not to be increased, but that an alternative project calling for the installation of twelve small relay stations is to be accepted.

On Your Wavelength!

NEW RECORDS

THE broadcasting of this year's Derby will go down to history as containing no less than two records. To begin with, this is the first occasion on which the B.B.C.'s programme "bottling" apparatus has been used for the running commentary, and, secondly, there was the remarkable and very praiseworthy attempt to televise the race itself. I believe, too, that there is another record in that this occasion marks the first time that G5SW has relayed the running commentary to all the world. This was done a good long while after the race, the bottled record being used. It must have come as a very pleasant surprise to English folk living in the far corners of the world, particularly to those whose abiding places are at the back of beyond. The running commentary was also shot across the Atlantic for the benefit of American stations. Over there, it was picked up and relayed by the great broadcasting chains which extend from side to side of the American Continent. I believe, too, that several European stations relayed it.

BOTTLING

THE bottling of the commentary by means of the impressed wire system was a very great success, as any of you who heard it from G5SW will admit. It seemed to me to come through really quite as well as the original. I hope that we shall see more and more use made of records, not only to enable relays to be made at a later hour the same day for the benefit of those in countries whose time is widely different from our own, but also in order that records of very important events may be preserved. In ten, fifty, or a hundred years' time, think what interesting programmes it will be possible to send out on occasion in this way when they have a "wireless in the old days" evening. Great singers and instrumentalists should, I think, be bottled—wirelessly, I mean, of course—and I would like to see permanent records made in this way of some of the best concerts.

SEE HOW THEY RUN

HAVING an engagement elsewhere, I was not able actually to witness the televising of the Derby (my engagement was *not* at Epsom), but I heard all about it afterwards from a friend who has a televisor. It wasn't, of course, a large clear picture. That could not possibly be expected at this stage of the development of television. But the television scene did give quite an impression of scenes on the course and of the parade, and it was more than interesting actually to see the horse as the commentator named it. The race itself would be difficult in any case to televise, no matter how perfect the apparatus was. When you watch a race, all that you get, as a rule, is a momentary glimpse of a mass of horses and of a confusion of jockeys' colours as they flash past your eyes. I am very glad that both the attempt was made and that it had such a measure of success.

SITTING NOW

A VERY important conference of wireless experts from all over Europe is at present taking place at Copenhagen. The main subject of their debates is the congestion of the ether at present and as it is likely to be very soon when more and more stations using higher and higher power come into operation. They are not armed with powers actually to make any changes, but they are reviewing the whole position and will put forward suggestions for the International Radio Telegraphic Convention which is to be held next year at Madrid. This preliminary conference will save an enormous amount of time next year, for it will be able to get to the bottom of many of the most pressing problems, and the cut-and-dried suggestions presented will avoid the necessity of the early days of the Madrid Convention.

At the Copenhagen Conference there are six chosen representatives of the International Broadcasting Union, and it is interesting to notice that two of these are members of the B.B.C. engineering staff, Mr. Noel Ashbridge and Mr. L. Hayes. Another important figure at the conference is Professor Braillard, of whom listeners in this country have not yet heard much, though he is recognised now as one of the foremost authorities on wireless in the world. We are likely to hear a great deal more about him before so very long.

WHY NOT TIT FOR TAT?

I THOUGHT some time ago of referring to the talks by prominent countrymen of ours which are so frequently sent over the transatlantic telephone and relayed by either the National Broadcasting Companies or the Columbia chains of stations in the United States. It occurred to me, though, that to do so might bring one of those rebukes that the B.B.C. are so fond of publishing in the form of a request to "study the terms of my wireless licence." Since, however, some of the lay papers have now brought the subject up, I don't see why I shouldn't too. Many short-wavers will have found when getting down below 25 metres that they pick up, from time to time, and particularly on Sunday evenings, talks by notabilities in this country which are being sent to the other side via the transatlantic telephone service. I have listened entranced to a great many of them, for they are infinitely superior to the kind of thing that we get so much of from the B.B.C.

MORE RELAYS WANTED

AMERICANS rather like talking, but they do insist that their talkers shall be absolutely first-rate. Since the big organisations over there have plenty of money, they can afford to take their pick; and they jolly well do so. It seems to me rather a pity that when there is such good stuff on the air the B.B.C. should not pay its share and give its listeners the benefit. Why, again, should America relay so much more of our programme matter than we do of theirs? Transatlantic relaying has now been brought to such a pitch of perfection that good reception can be assured over here of practically anything that is broadcast in the States. The time, I think, is ripe for a wider and fuller exchange of programmes between the Old World and the New.

THIS WIRELESS AGAIN!

I BET myself twopence that it would not be long after our little home-made earthquake before I met someone who would shake his head and say: "That kind of thing was, of course, to be expected with all this wireless about." And, believe me, before the day was out I duly won the twopence from myself; for, sure enough, I came across one of these queer people. He was holding forth in a railway carriage to several others who appeared to be quite impressed with what he said. The ether, he explained, was everywhere, penetrating right down to the middle of the earth. For many years now the usually calm ether had been thrown into a state of violent agitation by all these wireless transmissions. This agitation was communicated by it deep down into the bowels of the earth. The world, therefore, got the shivers and earthquakes were to be expected. Looking up from my paper, I asked him whether he realised that broadcasting on a far larger scale than man has ever accomplished had been going on ever since the beginning of the world. He inquired what I meant, and I suggested that if he cared to use his wireless set (or somebody else's, if he hadn't got one) a little before or a little after a thunderstorm, he would hear the kind of wireless signals that Nature is incessantly sending out and would realise that they were a good deal more powerful than anything due to man's handiwork.

MICROSCOPIC

THEN I pointed out that the energy developed by the biggest of the B.B.C. stations was just about equal to that of ten baby Austins. As is the case with most cranks, though, the bee in his bonnet or the bat in his belfry, whichever it may have been, was very firmly established, and I don't think that anyone will ever convince him of the error of his views. It is curious to find how many quite enlightened people still feel that wireless does have adverse effects upon all kinds of things. They might think differently if only they could bring themselves to realise the utter insignificance in the scheme of Nature of the power radiated by all the broadcasting and commercial stations in the world put together.

QUAKING THE SET

I HAPPENED to be sitting up trying for America in the early hours of the Sunday morning when the earthquake took place.

On Your Wavelength! (continued)

The first symptom that I noticed was a sudden outburst of pongs from my short-wave set and I saw that the detector valve (and the others as well, of course) was fairly dithering in its holder. I thought, first of all, that it must be a very heavy lorry passing along the main road, which is not far away, but my ears assured me that there was no lorry. Then the doors and windows began to rattle, and I realised, having had previous experience, that we were having a slight earthquake. One very curious effect I noticed during the period of vibration—there were two of these, so far as I could make out—was that something very like the familiar quick fading of the short waves was distinctly noticeable. This was, no doubt, due to the vibrations of the condenser vanes, of the wiring connections within the set, and of the indoor aerial with its down lead. There would thus be small and rapid changes in the capacities in circuit with the result that incoming signals would seem to wobble, keeping time more or less with the vibrations.

RATHER QUEER

I NOTICED in one of the lay papers a report, from which it appeared that at least one other wireless enthusiast was also at work with his short-wave set during the 'quake. He appears to have said that he noticed quite a big increase in signal strength whilst the tremors were in progress. I cannot say that I did. The only phenomenon I observed was the quick fading just referred to. Nor can I see any reason why there should be an increase in signal strength, for an earthquake is caused simply by a slipping of part of the earth's crust and has nothing to do with electrical or magnetic effects. If this happens to catch the eye of the short-waver who made the report to the newspaper in question, I should be most grateful if he would communicate with me, giving a short account of his experiences. I keep a record of queer wireless happenings and I am always glad to have authenticated accounts of out-of-the-way events to add to it.

D.C. VALVES

I HAD a talk the other day with a well-known valve designer, and the subject veered round to D.C. valves. We had a long conversation on the subject, and I said that I could not see why such a high figure as half an amp. was considered necessary for the heater. As a matter of fact, I told him that I had heard rumours of D.C. valves using very much less than this, although the voltage was naturally increased, so that the wattage could remain much the same. From what I could gather, the current has quite a distinct effect upon the hum produced, and if it is made too low the valve will not behave satisfactorily on certain classes of very raucous mains.

MAINS DIFFERENCES

THIS led us on to the subject of D.C. mains generally and the enormous difference between them. If one designs a set for one A.C. mains there is a reasonable certainty that the results will be satisfactory on the great majority of other supplies. The same does not apply to D.C., for some D.C. supplies are very mild and well-behaved, while others will not give satisfactory results unless special precautions are taken. This makes things very awkward for the designer both of valves and sets, and the customary practice at the present moment is to find from among one's circle of acquaintances someone who has a positively filthy D.C. supply, and carry out all one's tests on this. Such a procedure means trespassing on the hospitality of one's friends and carrying out a good deal of the work in the evening.

HOW THEY DO IT ABROAD

LISTENERS in this country—and their name is legion—who suffer from interference caused by "sparking" motors must envy the way in which some foreign countries are tackling this nuisance. In Germany, for instance, the local authorities in over twenty different districts have prohibited the use of any high-frequency apparatus liable to interfere with broadcast reception. Again at Dinant in Belgium every electrical appliance must be so "conditioned" that it cannot radiate any disturbance capable of interfering with wireless listeners. In several districts in Czechoslovakia it is forbidden to operate any electrical apparatus that is likely to radiate "static" between the hours of noon and 2 p.m., or after 8.30 at night. To enforce this regulation the owners must register at the municipal offices so that the apparatus can be inspected by the local surveyor. Judging from the complaints which reach me, I should say that action along these lines would be heartily welcome over here.

RADIO ON THE "BRAIN"

THIS is what the wireless "widow" says about her husband and his pet hobby. It also applies to the folk who used to write to the newspapers to complain that wireless waves were upsetting the climate. But it does describe quite literally the latest application of high-frequency electricity. By using a radio-frequency "knife"—that is an electrode fed with very high-frequency oscillations—it is hoped to carry out surgical operations on the brain in a manner never before possible. The radio knife cauterises as it cuts, so that the operation is not only bloodless, but also practically painless. It is the former property which is so valuable in brain surgery, since it prevents any dangerous haemorrhage.

If only the inventor will adapt this discovery to the art of dentistry, I shall be all for it. Some of the so-called "painless" operations I've undergone in my dentist's chair make me think that a radio-frequency tooth-extractor might easily prove a "howling" success.

MYSTERY AND ROMANCE

MIND you, there is certainly something a little mysterious in the action of very high-frequency waves. They have undoubtedly been used with great success to treat certain ailments—more or less because they are able to penetrate through the skin and reach any deep-seated source of trouble; and it has also been shown experimentally that plants subjected to H.F. treatment grow faster and larger than others. On the other hand, one hears a good deal of rubbish talked about the subject. Claims have, for instance, been made to cure diseases by applying waves of such frequency as to "disrupt" the bacillus or other organism causing the trouble. Then there is a school which says that every human being radiates waves of a frequency which depends upon one's state of health. This may or may not be so, but when they go on to recommend the application of waves of the proper frequency as a "tonic" dose, it strikes me as being so much moonshine.

"STARVING" THE SET

IT is curious how many people will go to the expense of installing a first-class receiver, and then go all out to save a few shillings on upkeep. One sees it most frequently in the case of the high-tension supply. They will buy the cheapest make of dry-cell battery they can find—usually of inferior quality and small capacity—and then run it down to the bitter end—and beyond. This is like putting dubious petrol and lubricating oil in a new Rolls-Royce car. Honestly, the game isn't worth the candle. Another instance of false economy is in over-running the valves. After a valve has been going steadily for well over a year, it may still function after a fashion, but, believe me, it is beginning to suffer from senile decay. Filament emission is no longer what it was, so that it is only due to the set to give it a new valve and a fresh lease of life from time to time.

THERMION.

A DIAL HINT

Do not be troubled with dial slip. Make quite sure that the grub screws holding the condenser dials to the

shafts are quite tight, otherwise movement of the dial may not make corresponding movement of the condenser.

So successful was the recent revival of *The Gipsy Princess* that the Productions Department of the B.B.C. is considering further revivals of musical comedy. An English version of Johann Strauss's *The Gipsy Baron* is being prepared for the microphone and a play based on the life of Strauss, with music consisting entirely of his waltzes, is being considered.

THE THRILL of a TELEVISED DERBY

An account of the first experimental television transmission of the Derby

By H. J. BARTON CHAPPLE, Wh. Sch., B.Sc.

THE first attempt to televise the Derby was essentially a technical undertaking and was not intended to provide entertainment. The whole scheme was sponsored by the Baird Company in association with the B.B.C. As a privileged participant in the preliminary tests and a witness of the final results, I am sure readers will be interested in a description of what actually took place.

The television van was transported to the famous racecourse on Epsom Downs and occupied a position against the rails almost opposite to the grand stand and finishing post. Post Office engineers laid telephone lines from this van under the course to the stands and from there they were linked up direct with the Baird television control room in Long Acre. From here the signals passed through the B.B.C. channels to Brookmans Park and were finally broadcast by the National transmitter (261 metres).

How the Scanning was Done

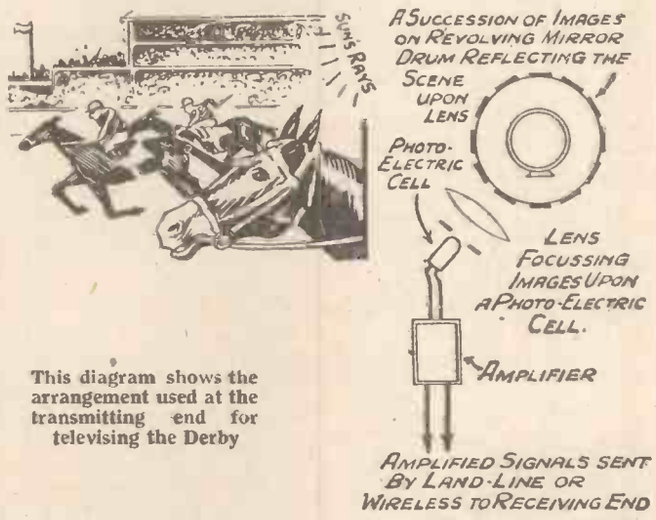
For the dress rehearsal on the day prior to the race, seven commercial "Televisors" were arranged at the Baird Company's offices and a number of press representatives first of all visited the course at Epsom and made a formal inspection of the caravan and had its intricacies explained to them. Then, on returning to Long Acre, a line picture was sent through and the reporters renewed their acquaintance with those sections of the course within range of the transmitting apparatus by watching the images on the small television screen. Horses being led in parade, the finish of a race, people walking about and a car park were all plainly visible and satisfaction was expressed at what was shown, especially as the babel of sound peculiar to Epsom was reproduced with the images.

To overcome the difficulty of moving the daylight caravan about a horizontal axis so as to sweep the surroundings into view, a large mirror was brought into play. The mirror was hinged on the caravan side remote from the course and by setting it at various angles it reflected different portions of the course and surroundings and it was this looking-glass image that was scanned by the revolving mirror drum carrying thirty mirrors around its periphery. As the drum revolved the mirrors in turn caused a strip of the scene to pass through a lens on to a photo-electric cell, the individual mirror inclinations relative to each other being such that the picture was dissected into thirty adjacent strips. The whole process was repeated twelve and a half times per second, the electrical interpretations of the image being sent along the line in the usual manner after amplification, as shown by the sketch.

No alteration to the existing vision apparatus was necessary at the receiving end and with the "stage" thus set, all was in readiness for Derby Day. Punctually at 2.45 p.m. on Derby Day the scenes came filtering through on the "screen," built up by the neon lamp and its associated spirally perforated disc. They were somewhat indistinct at times, but quite clarified at others. The interference that occurred and took the form of streaky light splashes was due to induction from the telegraph and telephone lines, but in spite of this the parade of the horses and jockeys was witnessed by all present, while now and again a man or a woman would walk across the foreground and present a transient close-up.

A short wait then occurred until we heard the B.B.C. announcer say the horses were rounding Tattenham Corner. Very soon after this the first three horses, not individually recognisable, of course, to be able to say which was which, flashed by the winning post, with the rest of the field following quite close on the leader's heels.

Horses and riders were there quite definitely, although the event portrayed before our critical eyes took place about fifteen miles away. The results proved conclusively that even within the present limitations of the apparatus, television can be taken out of the studio and applied to outdoor topical events and also that the need for artificial light and the restrictions of the studio can be dispensed with. The event can justifiably be termed an historic achievement and furthermore the Baird Company had, in effect, fulfilled a promise made years ago that it would some day be possible to see the Derby by television.



This diagram shows the arrangement used at the transmitting end for televising the Derby

Estaçao Radio CT1AA, Lisboa, is the call of a 2-kilowatt broadcasting station privately owned at Lisbon, Portugal. Transmissions of orchestral concerts and relays of dramatic performances are made every Monday, Wednesday and Saturday on 290.5 metres between 10 p.m. and midnight B.S.T. All announcements are given in Portuguese, French and English. On Thursdays broadcasts are carried out on 42.9 metres.

THE HOW AND WHY OF RADIO—XLI

HOW SIGNALS AFFECT THE VALVE

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

TRULY called the Aladdin's Lamp of radio, the valve is a never-ending source of perplexity for the beginner. Although I have now written several articles on the valve, I must confess that only the barest fringe of the subject has been touched. Still, we must not lose heart, for only by the piece-meal assimilation of knowledge can we avoid mental indigestion!

This week we might do worse than think of the valve in its relation to wireless signals. Briefly, the valve works in three ways. Firstly, an incoming signal can be increased in amplitude, but not otherwise altered, by the process of high-frequency amplification. Secondly, the incoming wireless wave, with or without high-frequency amplification, can be altered by the process of valve detection. Thirdly, the wireless waves, after high-frequency amplification and detection, can be made to operate the loud-speaker by the process of low-frequency amplification.

Carrier Waves

No study of the valve as it is made to work by the application of wireless waves can be begun unless the three distinct valve processes are understood—namely high-frequency amplification, detection and low-frequency amplification. Incidentally, I am leaving the function of the valve as a power output stage for a separate article.

Before the effect of a wireless wave on a valve in any one of its functions can be realised, something of the nature of a wireless wave must be grasped. Every broadcast signal is borne on what is termed a carrier wave. The easiest way to picture a carrier wave is seen by Fig. 1. It is a series of alternating voltages, the frequency of the alternations depending upon the wavelength of the station.

Note that with respect to zero voltage the peaks of each alternation are constant, either positive or negative. The amplitude is the distance from A to B or from C to D, and the wavelength is the distance from A to E.

Fig. 1 fails to illustrate one extremely important fact about a carrier wave—its very high frequency. The number of waves passing a given point in a second defeats imagination. For example, a signal with a wavelength of 300 metres has a frequency of one million! Because carrier waves have such high frequencies we do not hear them. For the human ear, even the most sensitive, cannot detect sounds of a frequency above 20,000 cycles.

Obviously, the carrier wave carries something—the audible and much lower frequencies of speech and music. These frequencies affect the microphone and produce a rise and fall of current corresponding to the rise and fall of the sounds in speech and music. Just as we can illustrate the very high frequency of transmission by Fig. 1, so we can show the much lower frequency of the broadcast artiste's vocal chords or musical instrument by Fig. 2, which gives an indication of a broadcast sound.

Note that the variations of Fig 2 all occur above the zero line and not equally above and below as at Fig. 1. By the process of modulation, that is to say the application of the microphone current to the carrier-wave current, a modulated signal is created as shown by Fig. 3. Note that this produces a double variation—the very quick variation of the high-frequency

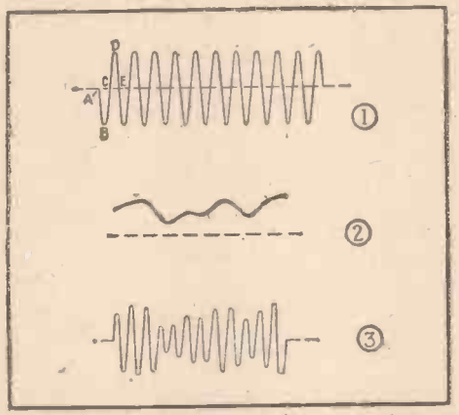


Fig. 1. Diagrammatic representation of a carrier wave. Fig. 2. Representation of broadcast sound. Fig. 3. Modulated carrier wave

carrier wave and the much slower variation of the sound wave.

Fig. 3 shows the complicated sort of varying energy that works the modern valve. Fairly clearly, whatever we do about amplifying, the process of demodulation is of the greatest importance. That is to say, we must separate the sound-wave current from the carrier-wave current.

We call the valve that does the demodulation the detector. Very briefly, this valve converts the Fig. 3 state of affairs into that of Fig. 2. In other words the detector gets rid of the carrier wave—high frequencies—and leaves the sound waves—low frequencies.

Unfortunately, detectors cannot do this job efficiently with less than a certain minimum amount of signal amplitude. So we often have to use valves to amplify before detection. Taking Fig. 3 to represent the incoming signal, what does high-frequency amplification do to it? It simply increases its amplitude but does not alter its "shape."

After detection the signal has the shape of Fig. 2, and here again amplification is often needed. For while it is true that the low-frequency current variation represented by Fig. 2 can operate the loud-speaker mechanism, it is a sad fact that loud-speakers are very inefficient and need a good deal of current to produce undistorted sounds. So low-frequency amplification is used to increase the amplitude of the signal after detection.

HOTSPOT.

AROUND THE SHORT-WAVE DIAL

CONDITIONS still seem to be extraordinarily good on the short-wave bands and there seems to be little change from day to day. W2XAD and W2XAF are enormously powerful and they are certainly providing a real entertainment value. Incidentally, it is worth noting that on Sunday evenings there is a continuous transmission via these two stations of the WGY programme. W2XAD is on the air from six to nine o'clock, when a change over is made to the W2XAF transmitter for the rest of the evening and early morning. W3XAU, a very low-powered station at Philadelphia, has been coming in fairly well lately. He is worth trying for and will be found right at the bottom of the cluster of stations made up of Lyngby, W2XAF, PCJ, Zeesen, W1XAZ, etc. A few nights ago, I picked up the voice of PCJ, broadcasting happiness, as the announcer said. It seemed quite like having an old friend back, but he has never returned to his original power.

M. B.

FRAME AERIALS

WHEN changing-over from an elevated wire to a frame aerial, it is wise not to overdo things by making the frame too small. Remember that signal pick-up is proportional to the total area enclosed by the loop, and if possible do not make it less than a square of 2 ft. side, or a rectangle or circle of equal periphery. To cover a tuning range of from 250-500 metres on an aerial of this size, ten complete turns of wire are necessary. To receive the long-wave stations another twenty turns should be added, making thirty in all. For a square aerial of 18-in. side the number of turns should be increased to twelve and forty respectively.

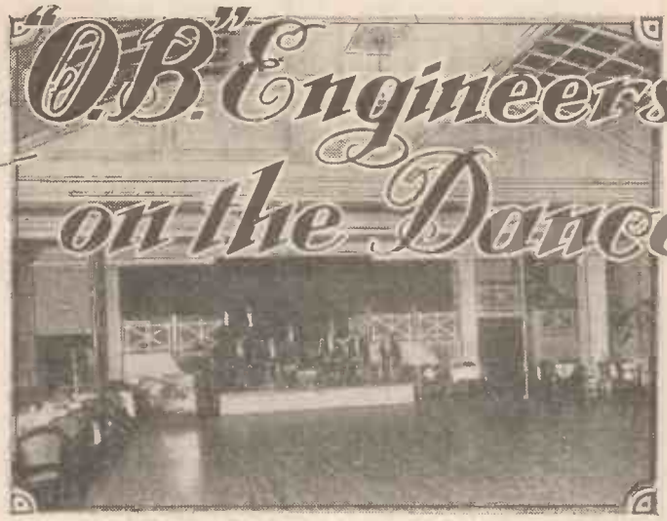
B. A. R.

The Principal of the Catholic Workers College, Oxford, Rev. L. O'Hea, will conduct the service to be relayed from St. Chad's Cathedral, Birmingham, on June 21.

A recital of songs by Landon Ronald will be a feature of the Midland Regional programmes on June 22. Mary Pollock will be the singer.

With the "O.B." Engineers on the Dance Floors

The B.B.C. Outside Broadcasts engineers have tackled many difficult problems in relaying programmes from places outside the studios and here an "Amateur Wireless" Special Commissioner describes the arrangements at popular "O.B." centres



Inside the Amateur Dancers' Club, where the Outside Broadcast engineers installed apparatus

WHEN an hour's dance music comes in the programme, unless it be by Jack Payne, we are too apt to imagine that the studio staff is having a rest and that the engineers have only to turn a switch in order to connect up with the Outside Broadcast source of syncopation.

Well, they do turn a switch, but that is not the end of the story! Dance bands very often give the Outside Broadcast engineers sleepless nights, not because of the high standard of quality required, but because very many dance halls have poor broadcasting acoustics.

Take the Savoy, for instance. Listeners to the recent broadcasts of Howard Jacobs' dance band may have been puzzled as to the real reason why this popular band was not broadcasting in the Savoy ballroom, and the reason represents a great deal of hair-greying worry for the engineers.

These broadcasts were not made from the ballroom, but from the Lincoln room at the Savoy, because there is so much background noise when the "mikes" are in the ballroom itself. Broadcasting from an empty room, as in the case of the Lincoln room is tricky, too, for one sometimes gets too much echo.

An Outside Broadcast engineer adjusting the short-wave apparatus sometimes used to link up with the control room

At the Savoy

On one occasion of a Savoy Hotel broadcast a large number of tables and chairs had to be crowded into the room to cut down the reverberation period. In fact the engineers would have welcomed a crowd of free diners, the "mass" of whom would have given the empty room ordinary ballroom acoustics! The microphone had to be shielded with large screens placed at the back of it to cut down the echo and heavy baize was hung over the screens.

So, you see, even the Savoy, which is reckoned to be a good broadcast centre, is not always ideal for the engineers. There is another point, too, in that Jack Payne's broadcasts from the Number Seven studio at Savoy Hill (a double-decker room with fine sound properties) have set for Outside Broadcast relays of dance music a high standard of comparison.

An engineer who has made a special point of these dance band broadcasts has been telling me of some experiences he has had.

A Tricky O.B.

"One of the most difficult dance band O.B.'s we have ever had to tackle," he told me, "was that of the band at the Amateur Dancers' Club, the popular dancing centre in Queen's Road. I think if we had had the time to spare and there was promise of a sufficient number of broadcasts, we could have made this into a really fine broadcasting centre for dance bands. But as it was, the acoustics of the place were unsuitable for broadcasting.

"We had to hang heavy draping all round the back of the stage, and thick sound-absorbing carpets had to be placed all along the front of the stage to cut down the echo.

"It took us goodness knows how long to find the best position for the microphone and eventually we located it right in front of the trombones and trumpets, only a foot and a half from the front of the stage. You would think that in this way we should not have heard a whisper of the saxophones, which were at the other side of the stage, or of the piano which was right at the back. And yet, when our balanced test was made, you could not have wished for a better balanced broadcast.

"The trouble with the hall was that there were so many places where uncontrolled echoes were created, and echoes which are uncontrollable are our bugbear when placing the 'mikes.' If I remember rightly, special sound insulating material had been used to cover the walls of the hall, but, unfortunately, an air space had been left behind it and the last stage was worse than the first so far as broadcasting went although the sound insulation of the hall itself was well-nigh perfect."

Technical Snags

I asked if any technical snags ever crop up in dance band relays, and what kind of apparatus is used.

"We seldom have breakdowns now," the engineer told me, "for we always carry a spare amplifier with us wired up to a change-over switch. In one position the main amplifier is working, while when the switch is moved over to the other side, the reserve comes into action.

"On any occasion where an important dance relay is made, we increase our safety factor by having two available microphone lines and by having only one microphone in action at a time. On rare occasions we have to use more than one 'mike' in order to do a band justice, but then, of course, the possibility of microphone breakdown is doubled."

Inverness Town Council has passed a resolution drawing the attention of the British Broadcasting Corporation and the Secretary of State for Scotland to the difficulty experienced in Inverness and in many parts of the North of Scotland in obtaining adequate wireless reception from Scottish broadcasting stations.

WHEN RADIO PARIS CALLS ENGLAND

Being an account of an interview in Paris with the English announcer of the popular French Station, Radio Paris, by ALAN HUNTER

Mr. T. St. A. Ronald, the English announcer at Radio Paris

"*BONJOUR, Mesdames; bonjour, Messieurs! La Decca Record Company Limited de Londres et de Paris tachera, comme chaque dimanche à la même heure, de vous faire passer quelques moments agréables et vous prie d'écouter son soixante-quatrième concert de musique enregistrée.*"

Well, those who know a little French can probably guess the meaning of the above opening announcement from Radio Paris on a recent Sunday afternoon. But for every one English listener who understands French probably ten do not. That is why the English announcements that follow the French during the Decca hour from Radio Paris are so much appreciated.

On the Sunday in question the English announcement was this: "We are going to broadcast the sixty-fourth of the weekly gramophone recitals, which come to you each Sunday at this hour as the contribution to your Sunday radio entertainment of the Decca Record Company Limited of London and Paris." In other words, a sponsored programme with English and French announcements was once more being radiated by Radio Paris, as much for the benefit of English listeners as for those in France.

An English Announcer

In common with most foreign-station listeners in this country, I have often wondered about the announcer who so clearly and smoothly co-relates English with French during the Decca and other sponsored hours from Radio Paris. So, during a recent stay in Paris, I called upon Universal Radio Publicity Limited, and found our friend the English announcer ready to tell me all about his job. He is Mr. T. St. A. Ronald.

"I have been on the job as long as eighteen months," he told me, "and so far I have not missed a single sponsored concert." Mr. Ronald agreed that the Decca hour on Sunday created an enormous interest in England. "You see, the B.B.C. is shut down at the time of this broadcast, which takes place just when thousands of listeners are wanting a little light music."

Radio Paris is thought to be the most-heard and the most-popular station in all France. Mr. Ronald hazarded a guess that taking listeners in France, Germany, England, Belgium, Holland, Spain, and Ireland, there must be at least six million listeners to Radio Paris programmes.

I told Mr. Ronald how most of us liked the Black Cat broadcasts. "Yes, they went down very well," said Mr. Ronald. "Did you know that Marius B. Winter's Band used to fly out to Paris every Sunday for these broadcasts?"

We talked of sponsored programmes in general and of those from Radio Paris in particular. Mr. Ronald said he regarded the sponsored programme as a sugar-coated pill—the sugar being the advertiser's musical offering and the pill the advertiser's goods! Very few complaints are said to be received from French listeners regarding the interpolation of the English announcements.

"In England it is probably not realised that the average Frenchman does not like jazz," explained Mr. Ronald. "French people are brought up on opera and that probably explains why they have a fairly refined taste in music. The Odol broadcasts from 10 to 10.30 p.m. were much appreciated by the French as the subject matter was above the usual jazz standard."

The Publicity Scheme

Universal Radio Publicity Limited is an extremely interesting *liason* organisation. It links those who wish to advertise their goods through the medium of sponsored broadcast programmes and the broadcasting organisations willing to lend themselves to this essentially American scheme.

The *liason* people do everything except pay for the programmes. They try to arrange an opening tune appropriate either to the name of the sponsored hour or to the brand of goods advertised. For example, in the Revelation Suit-case Hour we have often heard the refrain "Pack up Your Troubles in your Old Kit Bag" and for the Odol Slumber Hour we have had the tune "Sleepy Valley" reiterated.

I was amused to hear from Mr. Ronald that many listeners think it is one and the same announcer broadcasting in English and French. Actually, Mr. Ronald never announces in French, although during his eighteen-months stay in Paris he has acquired quite a Parisian accent. Two men called round at his office not long ago with a large bet on the probability of there being only one announcer!

But Mr. Ronald is rather more than an announcer. Here is a good example of a day's activities. Decca Hour from 2 to 3 p.m., rehearsal from 3 to 4 p.m., Black Cat rehearsal 4 to 5 p.m., announcing from 6 to 6.30 p.m., doing the Black Cat Hour from 6.30 to 7.15 p.m., rehearsal of Grosvenor House Hour from 8 to 9 p.m., first half of Lyons concert from 9.30 to 10 p.m., 10 to 11 p.m. Grosvenor House Hour—with a Russian Orchestra that had never broadcast before—and, finally, from 11 to 11.30 p.m. the second half of the Lyons programme. Some day!

Mr. Ronald can remember only one more hectic day than that. It was the day he hurriedly took a taxi from his flat to the Radio Paris studio in order to be present at the Grosvenor House Hour. After the manner of Paris taxis, this particular one tried conclusions with a large car in the Place de la Concorde. The taxi got the worst of it and turned turtle. Shaken, slightly bruised, but otherwise unhurt, Mr. Ronald crawled out from underneath and popped into another taxi. Hours afterwards the perplexed taxi-driver was still looking for the little bits into which he assumed Mr. Ronald had been disintegrated!

DO YOU KNOW—

— that where metal screening is used in a set, care should be taken to see that wires which pass through holes in the screens are not liable to have their insulation chafed? It is a good plan to bush holes in metal screens through which the wires pass.

— that often the mistake is made of using too thin paper for the cone of a speaker? When the paper is too thin the quality is certain to be poor. On the other hand a very heavy diaphragm will cause a loss of volume.

— that if you want to use your portable set in the car while the engine is running, and are troubled with "engine-made" static, then small wire-wound resistances of about 20,000 ohms should be put in series with the high-tension cables?

The ultra-short-wave experimental transmitter operated by the Telefunken Company at Berlin with which broadcasts have been made on 7.05 metres is being dismantled. It will shortly be reconstructed and its power increased to 8 kilowatts (aerial).

The Radio Maroc (Rabat) programmes may be heard every Wednesday evening on 90 metres; they are relayed to the Maroc-France commercial telephone transmitter.

A Weekly Programme Criticism—By SYDNEY A. MOSELEY.

Without Fear or Favour

SOME GOOD VOCALISTS

RADIO PLAYS

A BARITONE whom I don't remember having heard before is Campbell McInnes. He has a fine voice, and his programme of Scottish and Irish folk songs was delightful in every way.

◆ ◆ ◆

A singer who is "coming on" is Gabrielle Lavelle, about whom one of the most poignant stories I ever heard may be told. When Sir James Melville, who was Solicitor-General in the present Government, lay dying, Lavelle happened to be in the house consoling the relatives. As Sir James loved a good song and was a singer himself, Lady Melville asked Lavelle to sing one of the songs they both loved. So he sang softly the opening verse of "Water Boy," and, much to the surprise of the onlookers, the dying man took up the second verse! When he had finished Sir James had passed on.

Lavelle sang this the other night over the wireless, and beautifully moving it was.

◆ ◆ ◆

I listened to two plays, one entitled *Fame* and described as "an ironic comedy in one scene, by Gideon Clark." The other was *Robinson*, "a fantasy in one act, by L. E. Bunnett, adapted by Peter Cresswell."

Now, the first play was quite amusing, although, as the author is a journalist, I wondered why he made his photographer an illiterate fellow. The play, however, was at least as good as many. The second play was rather more ambitious and was also of decided merit.

Incidentally, I must ask people not to send me plays to submit to the B.B.C., because I have made it a rule never to use my influence in regard to that august body. It is impossible to remain independent if one asks for favours. At any rate, the last three plays I have received were written for the ordinary stage, and as such were handicapped from the very start from the broadcasting point of view.

◆ ◆ ◆

Richard Tauber's song, "You are my Heart's Delight," written by the composer of "The Merry Widow," sounded rather thin as played by Sandler on the violin. This song, by the by, which has become the rage of the Drury Lane season, I heard in Berlin two years ago. It was sung in a café by an unknown man so effectively that I have never been able to forget it. It is certainly a melodious composition.

I had the choice the other night of more oratorios or—Sandler's band! I thought, "Well, one must give the oratorios a chance," and switched on. But after a heavy day's programme from the National transmitter it was too much; so over to London I went. Alas, the first thing I heard was "The Londonderry Air"! Will Mr. Sandler inform me exactly the number of different pieces in his repertoire? It would be interesting.

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Sandler was once at the seaside, and I remember the applause by one individual in particular who always managed to get in a beat or two ahead of the others. This gentleman has apparently come to town. Nothing is more irritating than this form of noise. It may be all to the credit of this popular orchestra, but so irritating and unnecessary was the applause that I switched back to the oratorios, with the result that I soon switched off altogether!

◆ ◆ ◆

Leonard Gowings sang songs of a more robust character than usual; to his advantage and ours, I may add, although personally I prefer the lighter ballads, such as "Good-night, Love." I thought he was in excellent form.

Gillie Potter, an impression in caricature

ANNOYING APPLAUSE

COVENT GARDEN

"Harold," who has been on holiday, writes: "Only Len Tillis' clever guitar playing saves Paul England's Speciality Octet from falling thoroughly flat."

◆ ◆ ◆

In regard to the S.O.S. broadcasts, it has always struck me as strange that people should be asked to take down a long telephone number. Surely in the case of urgency, such as a dying person or a missing person, it would be better to simply say: "Please inform your local police," who, of course, could then hand on the message. One knows how difficult it is to write down a telephone number when dictated over the wireless.

◆ ◆ ◆

Mr. Snowden is paying out a tidy sum to the Covent Garden Opera Syndicate, but I doubt whether we are getting our money's worth.

While I applaud the idealism of Mrs. Snowden, who is trying desperately to inculcate a spirit of true art in this country, I do not think the present system is the best. Nor am I certain that the broadcasts we have heard are likely to make converts to grand opera.

◆ ◆ ◆

I don't know whether you lika balalaika; but Mr. Nikolas Sinkowsky is the best of the bunch of balalaikaists we have heard for a long time. (Read this quickly!)

◆ ◆ ◆

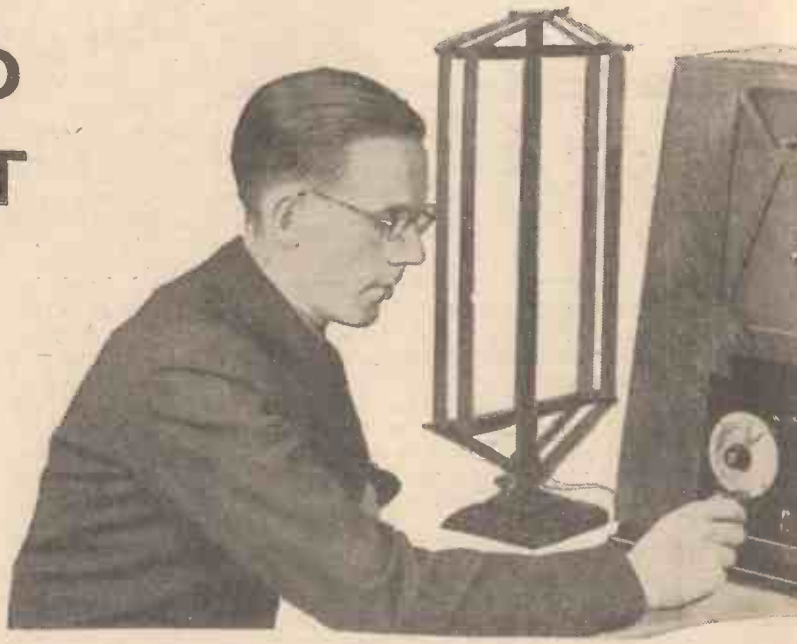
I didn't hear the Derby commentary because, if you please, I was at the Derby myself putting over a special commentary by landline to the Baird studios, where the Press were looking-in. The idea of *my* commentary was to describe what was happening in front of the television transmitter mirror. The whole experiment was a pronounced success and justifies the optimism of AMATEUR WIRELESS from the very start of this new science.

◆ ◆ ◆

I went to the opera the other night to hear *Turandot* and later on went on to the Lyceum to hear the Russian opera. I venture to say that it is utterly impossible to appreciate such productions *without seeing what is going on*. In both cases the spectacle helped greatly to put the thing over.

More about the A.C. "CENTU

HOW TO BUILD THE MAINS UNIT



THE mains part of the A.C. "Century Super" is arranged upon a separate baseboard and is fitted upon a shelf in the cabinet above the receiver itself.

The flexible leads from the mains are taken to fuses which, in turn, are connected to the primary coil of a power transformer. It is necessary to connect these leads to the correct terminals, marked with the voltage nearest to that of your supply.

If you should connect, say, a 240-volt supply to the 200-volt input terminals, the output will be too great and no doubt the unit will be overloaded and it may heat up to a dangerous point. Therefore, be sure and connect the input circuit properly in order to avoid this.

There are three low-tension terminals on the transformer. Two of them are joined to the heaters of the A.C. mains valves in the set and the third is the centre tap, which is connected to the cathode circuit, grid-bias positive, and high-tension negative.

The other two output terminals for the high tension go to the metal rectifier and condensers. There are four 4-microfarad condensers of the 800-volt test type, and a smoothing choke coil.

If you look at the circuit you will see that two of the condensers are used with the rectifier. The alternating current flows through the condensers and rectifier, one side of the transformer being taken to two condensers and the other side to the rectifying unit.

This is a voltage-doubler circuit and full-wave rectification is obtained.

In the positive side of the circuit a choke is included, and across the output are two 4-microfarad condensers. The smoothing is ample, with the result that the receiver is particularly silent in operation, there being no noticeable hum or noise.

This picture of the interior shows how the receiver and mains unit are housed in the cabinet

The Layout

No voltage-dropping resistances or other apparatus is included in the mains unit, these being wired into the set, which is the right place for them.

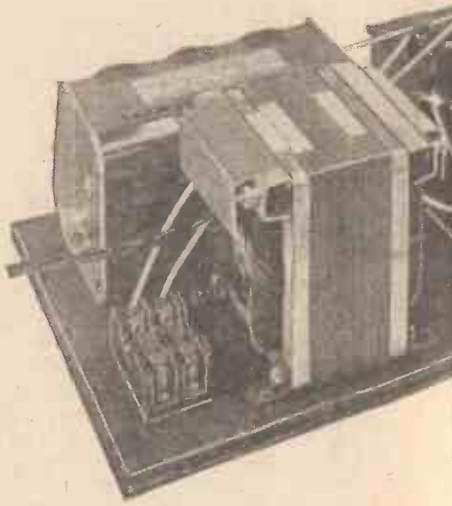
In the set itself are the various by-pass condensers, resistances and potentiometers and all that is needed is a high-tension supply of smooth direct current.

The diagram and photographs show the arrangement of the mains parts upon the baseboard.

Screw the parts to the baseboard in the positions shown and wire them, using tinned copper wire and good insulating sleeving. You can hardly go wrong in building this unit, it is so simple and the whole unit will not take long to finish. When it is completed, it is fitted into the top part of the cabinet.

Receiver Connections

First, the loud-speaker is fitted, and wires left for connection to the set below. Then the mains part is screwed down.



RY SUPER"

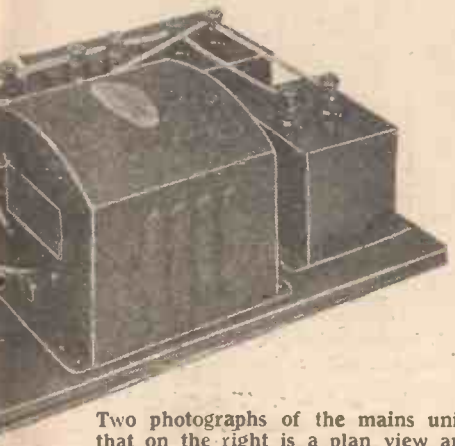
THE MAINS MODEL OF THE AMAZING RECEIVER OF 100-STATION FAME

Designed by W. JAMES

Grid battery clips may be fitted in convenient positions and the grid batteries mounted. There are heater and high-tension wires to go between the mains unit and receiver, but these are easily arranged.

Wiring

Not much was said about the wiring of the set last week, but it is quite straightforward and needs little description. You will find that one long wire may be used to connect the cathodes, another for one side of the heaters and so on. The essential wires are short in length, as you will see from the illustrations.



Two photographs of the mains unit: that on the right is a plan view and will be useful for comparison with the wiring diagram on the next page. The photograph in the heading shows the set in use with a Lewcos frame aerial

Do not forget that the loud-speaker must be a high-resistance one, as a choke-condenser filter is provided in the set. If you want to use a low-resistance type a suitable loud-speaker transformer should be fitted in the set in place of the filter circuit. If this is not carried out, the volume will, of course, be poor and the quality very bad.

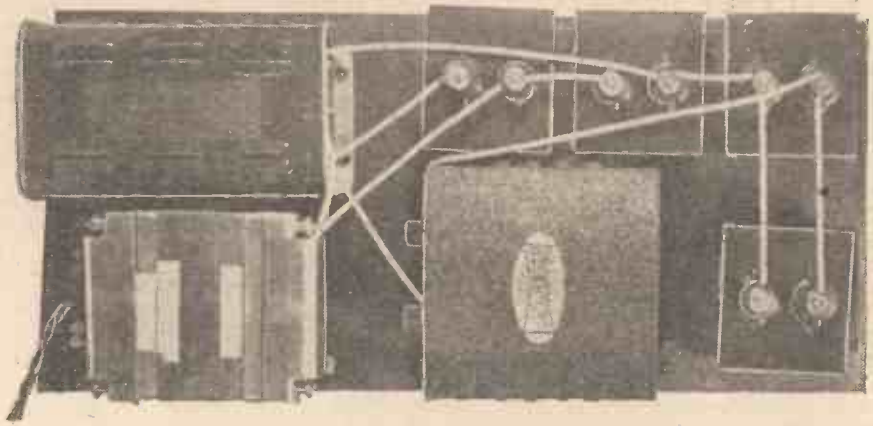
Arrangements must be made for connecting the frame aerial wires to the set. Mark the centre wire, as if this wire is joined to one of the outer terminals no results will be obtained. The oscillator is joined to the centre tap of the frame aerial and the tuning condenser is across the ends of the frame, one side going to the grid of the first detector.

Therefore, two sets of oscillations are applied to this valve, those from the local oscillator and the signal itself tuned in by the frame aerial. It is best to bring the frame aerial wires out of the set through a hole cut in the side of the cabinet in order that the leads shall be as short as possible.

As the frame connections are at the front of the set, the wires should first be fitted to the terminals and be passed through the hole in the side of the cabinet before the set is placed in position.

The wires passing from the mains unit to the set may also be run through holes instead of being allowed to wander over the back.

I have been asked whether a reader, having an ordinary mains unit, could possibly use this in the set, fitting as well a transformer for heating the mains valves. There is no reason at all why an ordinary mains unit should not be used, provided its output is sufficient. Many of the popular



COMPONENTS FOR THE A.C. "CENTURY SUPER"

Special cabinet (Peto-Scott "Dorchester," Readi-Rad, Cameo).
Frame aerial (Lewcos, Readi-Rad, Peto-Scott, Wearite, Ward and Goldstone, H. & B.).
Ebonite Panel, 12 in. by 8 in. (Becol, Peto-Scott, Potter, Trelleborg).
Baseboard, 17 in. by 10 in. (Clarion, Camco, Peto-Scott, Pickett).
Permanent-magnet moving-coil loud-speaker (Epoch A1, type D96).
Two .0005-mfd. variable condensers (Cyldon, "Junilog," J.B., Readi-Rad, Ormond, Polar, Voltron, Lotus, Lissen).
50,000-ohm variable resistance (Sovereign, Colvern, Lissen, Rotorohm, Regentstat).
Complete set of super-het. coils (Wearite or Lewcos).
Triple coil base (Peto-Scott, Wearite, Readi-Rad, Lewcos).
Six 5-pin valve holders (Telsen, Lotus, W.B., Junit, Benjamin, Wearite, Lissen).
Five 2-mfd. fixed condensers (Ferranti, type C2, T.C.C., Dubilier, Formo).
Two 2-mfd. fixed condensers, tapped at 1-mfd., (Ferranti, type C2C).
Two grid-leak holders (Readi-Rad, Lissen, Dubilier, Wearite).
Three fixed condensers, following capacities; .0002, .002, .001 mfd. (Telsen, T.C.C., Lissen, Dubilier, Readi-Rad, Sovereign, Watmel).
Low-frequency transformer (Ferranti type AF3, Telsen, R.I., Lissen, Varley, Voltron).
Low-frequency choke (Varley, 20-henries 140 m/a, Regentone, R.I.).
Six spaghetti resistances, following values: 50,000 (2), 30,000 (2), 20,000 and 5,000 ohms. (Readi-Rad, Lewcos, Tunewell, Lissen, Bulgin, Sovereign, Magnum).
1-meg. grid leak (Lissen, Dubilier, Telsen, Sovereign).
100,000-ohm grid leak (Lissen, Telsen, Dubilier).
Connecting wire and sleeving (Lewcos).
Two slow-motion dials (Astra type 2, Ormond, Lotus, Brownie, J.B., Lissen, Formo).
Terminal strip for frame aerial connection (Peto-Scott, Readi-Rad, H. & B.).

A.C. MAINS PORTION

Baseboard, 16 in. by 7½ in. (Clarion, Camco, Peto-Scott, Pickett).
Mains transformer with 135-volt 30 m/a, and 4-volt 6-amp. windings (Junit, Wearite, Regentone, R.I., Atlas).
Smoothing choke (Regentone type GR, Varley, Lewcos, Bulgin, R.I., Parmeko, Lissen).
Metal rectifier (Westinghouse HT7).
Four 4-mfd. fixed condensers (800 volt test) (Dubilier type LSB, T.C.C., Formo, Ferranti).
Baseboard-mounting twin fuseholder and fuses (Bulgin).
Connecting wire and sleeving (Lewcos).

OR—

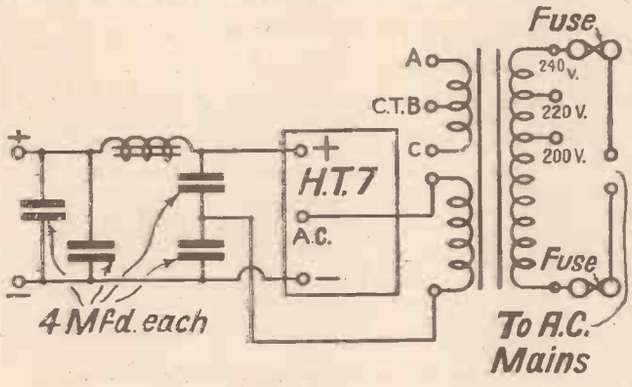
SPECIAL MAINS UNIT (REGENTONE TYPE S60 OR MARCONIPHONE TYPE AM7).

"THE A.C. 'CENTURY SUPER'" (Continued from preceding page)

models do not give anything like 200 volts at about 30 milliamperes and although a smaller power valve than the one recommended could be used, I would rather that the set was not spoiled by a reduction in its volume.

If you have a mains unit giving a large enough output it may be connected, the "power output" tapping only being used. The other output tappings are not needed.

For the heaters of the valves a good transformer giving 6 amperes at 4 volts



The circuit of the mains unit

with the correct input voltage should be used. A transformer rated at 4 volts 3 or 4 amperes may not be at all suitable and possibly the windings will overheat as well.

It is of no use trying to use a small choke in the mains unit or smoothing condensers of a low test or working voltage. Good smoothing is an essential and with 200 volts of direct current output, with over 300 volts if the load is removed, the condensers must clearly be of a good make and of a type which will safely withstand the working pressures. I mention this, because there may be a temptation to use low-voltage condensers costing less than those recommended.

Special units or transformers will be needed for 25-cycle supplies.

There are several makes of valves that may be used with satisfaction, but the results will not be equal with different sets of valves owing chiefly to the two screen-grid stages.

In the first detector stage a valve of the medium impedance type should be used and the table shows suitable types and makes. A good steep-slope valve is recommended, having a high amplification factor. A usual value is 35.

In the next two stages screen-grid valves are used. There are several suitable types.

If the various valves were plugged in one after the other, with a fixed grid bias of negative 1.5 volts you would find it necessary to adjust the volume control in order to obtain equal signal strength. The set will oscillate at different positions of the potentiometer, round about the maximum, according to the characteristics of the valves used.

With no valves is the set unstable, the difference between the results obtained with the various types being in the amount of the screen-grid voltage applied by the volume control potentiometer needed to obtain the maximum signals.

A bias of —1.5 or —3 volts may be used for these valves. Both values should be tried and you will note that the setting of the volume control must be increased if the bias is increased.

These two valves have practically the full 200 volts from the mains unit applied to their anodes.

In the next position, which is the second detector, the right valve to use is one of moderate impedance, such as the Mazda AC/HL, the Cossor M41HF, the Mullard 354L or any other make having about these characteristics.

The valve is used as a leaky-grid detector and will handle signals of ample strength fully to load the power stage. In this stage I much prefer a directly-heated type valve, such as the Mullard AC064.

It takes a grid bias of a little over 20 volts with a high tension of 200. Being of the directly-heated type its filament heats quickly and the condensers and other parts of the mains unit are not subjected to such high voltages for several seconds as when an indirectly-heated power valve is used.

There is no hum from such a valve and having used this type for a period I feel it is best for the set. The other indirectly-heated type valves, such as the Mazda AC/P or AC/P1 may be used and will work nicely.

VALVES FOR THE A.C. "CENTURY SUPER"

1ST DETECTOR
Cossor M41HF; Mullard 354V; Mazda AC/HL; ETA, DW4230.

2 SCREEN-GRID STAGES
2 Mullard S4V; 2 Marconi MS4; 2 Osram MS4; 2 Mazda AC/SG; 2 Cossor 41MSG; 2 ETA, DW2.

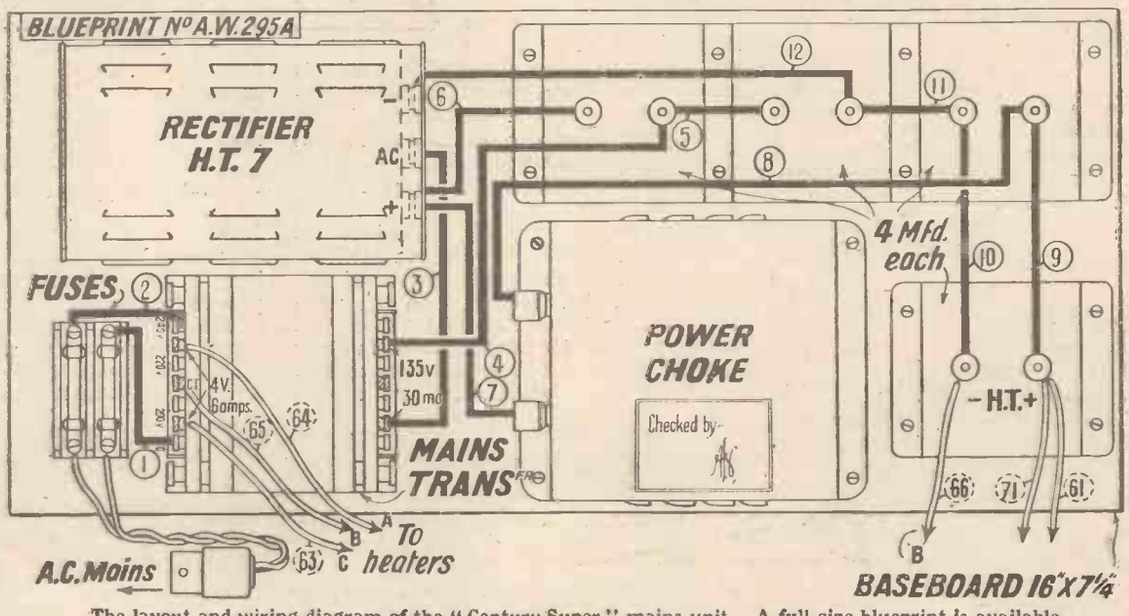
2ND DETECTOR
Mazda AC/HL; Cossor M41HF; Mullard 354V; ETA, DW4230.

OSCILLATOR
Mullard 354V; Mazda AC/HL; Cossor M41HF; ETA, DW4230; Marconi MHL/4.

POWER
Mullard AC064.

There is now the oscillator stage and for this a valve such as the Mullard 354V, Mazda AC/HL, and so on may be used. The valve for this position may have about the same characteristics as the valves for the first and second detector stages and in fact, these three valves may be of the same type and make, with advantage, and be changed about in order to find the best anode-bend detector.

A bias of —3 volts or perhaps —4.5 is needed for the anode-bend detector and oscillator at plug G.B.—1. The grid bias for the two screen-grid valves is applied to the plug G.B.—2 and for the last valve the bias of —21 or 22.5 volts for an AC064 is applied at G.B.—3. With a different power valve the bias will be lower; in the case of a Mazda AC/P1 about —12 will be suitable, or a little more.



The layout and wiring diagram of the "Century Super" mains unit. A full-size blueprint is available, price 1/-. The layout of the actual receiver was published in last week's issue

HERE IS THE CENTURY SUPER —FOR A.C. MAINS!

THE BATTERY OPERATED "CENTURY SUPER"

KIT A £6:18:6
(Less Valves and Cabinet but including Wound Frame aerial.)
or 12 equal monthly instalments of **12/8**

KIT B £10:14:6
(Including Valves, Wound Frame Aerial, but less Cabinet)
or 12 equal monthly instalments of **19/8**

KIT C £11:9:6
(Including Valves, Cabinet and Wound Frame Aerial
or 12 equal monthly instalments of **21/0**

CENTURY SUPER

Completely assembled with valves, cabinet and wound frame aerial, **£14.10.0**

ready for use and aerial tested. Or 12 monthly payments of **26/6**

THE A.C. CENTURY SUPER

	£	s.	d.
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		9	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 "Jiflinx" for wiring		2	6
6 Valves as specified: 2, S4V, 2 AC/HL, 1 4IM/RC, 1 AC064	5	11	0
Screws, flex, etc.			6
TOTAL (including valves and cabinet)	**£16.2.0**		

KIT "A" Less valves and cabinet but including Wound Frame Aerial. **£8.16.0**
Or twelve equal monthly instalments of 16/-

KIT "B" With valves, less cabinet but including Wound Frame Aerial. **£14.7.0**
Or twelve equal monthly instalments of £1.6.

KIT "C" With valves and cabinet but including Wound Frame Aerial. **£16.2.0**
Or twelve equal monthly instalments of £1.9.4

A.C. MAINS UNIT

	£	s.	d.
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	6
4 Dubilier 4-mfd. fixed condensers, type LSB	1	14	0
1 Bulgin F11 fuse holder with fuse		2	6
Wire, flex, plug adaptor, etc.		2	6

£5:12:6

Or twelve equal monthly instalments of **10/4**

or

1 Regentone model S60 unit **£4:10:0**

Or twelve equal monthly instalments of **8/3**

Loud Speaker to Specification.

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

TO INLAND CUSTOMERS
Your goods are despatched Post Free or Carriage Paid.

ORDER NOW
IT COSTS NO MORE
PAY ON DELIVERY

Recommended Accessories for the Battery Operated "Century Super"

	£	s.	d
2 Fuller 60-volt "Super" capacity H.T. batteries	1	7	0
1 Fuller 9-volt grid bias battery		1	6
1 Fuller (S.W.X.9) 2-v. 40/80 amp. L.T. accum.		12	9
1 Celestion D.10 loudspeaker	3	0	0
or 1 Amplion cone loudspeaker A.C. 21	1	19	6

Any Component can be supplied separately.

ORDER NOW
STRICTLY PRIVATE
EASY PAYMENTS

H.F. UNIT

	£	s.	d.
1 Polished Ebonite Panel, 9 in. by 6 in. by 3/16 in., drilled to specification		2	3
1 Baseboard, 9 in. by 7 in.			9
1 ReadiRad .0005-microfarad Variable Condenser		4	6
1 Brownie Slow-motion Dial		2	6
1 Readi-Rad Aluminium Screen, 9 in. by 7 in., with hole		2	6
1 Junit H.V. Valve Holder		1	9
1 ReadiRad Single Coil Holder			10
2 T.C.C. 1-microfarad Fixed Condensers		5	8
1 Telsen .0002-microfarad Fixed Condenser			6
1 Sovereigndenser, type "J"		1	6
1 ReadiRad "Hilo" H.F. Choke		4	6
1 Lewcos 600-ohm Flexible Resistance			9
1 Lewcos 4,000-ohm Flexible Resistance		1	0
2 Junit Terminal Blocks		1	4
3 Belling-Lee Terminals: A.L., A.L., and E.			9
1 Siemens "S.G." Cell		1	0
3 Belling-Lee Wander Plugs: H.T.—, +1, +2			6
2 Spade Terminals			3
1 Belling-Lee Anode Connector			6
1 Mullard S.G. Valve	1	0	0
Wire, Screws, Flex, etc.		1	2
TOTAL (Including S.G. Valve)	**£2**	**14**	**6**

Or 12 equal monthly instalments of 5/-.

IMMEDIATE DESPATCH ORDER FORM

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

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

C.O.D ORDER. Please despatch to me at once the goods specified for which I will pay in full the sum of £.....

EASY PAYMENT ORDER. Please despatch my Easy Payment order for the goods specified for which I enclose first deposit of £.....

Cross out whichever does not apply

Name..... *Kit required*.....

Address.....

IN MY WIRELESS DEN

WEEKLY TIPS— CONSTRUCTIONAL AND THEORETICAL

By W. JAMES.

Valve Facts

THERE still appears to be an idea in the minds of some amateurs that the actual magnification obtained depends upon the amplification factor of the valve without regard to other factors.

They, therefore, wonder what is wrong when stronger signals are not obtained by fitting a valve of higher magnification factor. The truth is that the impedance of a valve is as important as its amplification factor and that you should consider both.

If you had two valves of the same impedance, but one having a greater amplification factor than the other, and you tried them as detectors, no doubt a difference in the strength of weak signals would be noticed. But it is possible that worse results would be obtained in a screen-grid stage by fitting a valve of greater magnification.

The set might become unstable, for example, when the tuning would be difficult, and if you lowered the screen voltage in order to stabilise the stage, the amplification might then be no more than with the first valve. At the same time the grid bias would be reduced and so overloading might be experienced.

You see, there are many possible effects that may be produced by changing a valve and care is needed in order to obtain the best results and sometimes a change to a more efficient valve is not worth while.

These Anode-bend Detectors

When choosing a valve for anode-bend detection it is necessary to take full account of the coupling which will be connected to the anode of the valve. If this is a transformer, for example, the probability is that a different type of valve is needed than when a resistance-capacity coupling is to be used.

The impedance of a valve as normally used in anode-bend detection is much greater than the value given by the makers, which is often at 100 volts high tension and zero grid bias.

In anode-bend detection the valve is given a negative bias of such a value that the normal working point is towards the foot of the curved part of the characteristic. When a signal is brought in, the applied voltages sweep over the lower part of the curved portion and if the valve is being properly used, the signal covers a fair amount of the straight portion as well.

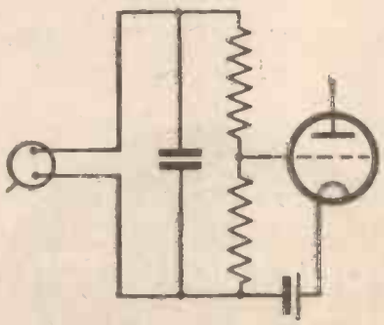
But still, the impedance is greater than the value stated by the makers and a good transformer ought to be used or a resistance coupling. With a valve having normally a low impedance, a transformer is usually perfectly satisfactory, but with a valve of the moderate or high-impedance class a resistance coupling is better and should be used when possible.

Regulating Pick-up Voltages

It is not always convenient to fit an adjustable potentiometer to a pick-up circuit for the purpose of regulation of the volume.

The voltages obtained from the pick-up may be too high, however, when a method of avoiding overloading must be used. A simple and effective arrangement consists in connecting two grid leaks in series across the pick-up, as shown in the accompanying diagram and in connecting the first valve across one of the resistances.

We have here a fixed potentiometer, the



Here is a simple and cheap way of controlling pick-up voltages by means of two grid leaks in place of a potentiometer

voltages being divided according to the values of the resistances. If the total value of the resistances is too low, the quality will be different from when normal values are used. As a rule the total value should be 100,000 ohms or rather more. As the resistance is reduced, so the higher notes are cut down relative to the lower notes, so that the average tone may be adjusted by choosing suitable resistances.

If grid leaks are not available, wire wound types of resistances may be used or it may be possible to screw an ordinary potentiometer to the baseboard and to set it after a few tests have been made. A condenser may be connected across the resistances to cut down the higher notes if this is desirable.

Stabilising the Power Valve

There are many sets which would be improved by the addition of a fixed condenser across the power valve. The condenser, of .001- or .002-microfarad capacity, should be joined between the anode of the power valve and the filament.

It often helps to stabilise a set by minimising the amount of the high-frequency which passes through the loudspeaker connecting wires. At the same time it affects the tone a little, tending to reduce the strength of the higher frequencies. This may also be an advantage.

The condenser used should be one well able to withstand the voltages to which it is subjected. A poor condenser might break down. This point is, perhaps, not so important in battery sets, but when a mains unit is employed the voltages may at times be in excess of the normal working value.

A breakdown would be serious, tending to short-circuit the supply, but before a complete breakdown occurred noises would, no doubt, be heard. Some of the cheaper fixed condensers issued should be regarded with suspicion, as they have no great factor of safety and are likely to be broken down by voltages of the order of 150 volts. Use a good condenser, therefore, as a cheap one may lead to trouble.

Don't forget the H.T.

If you should ever be troubled with a high-pitched whistle, do not overlook the high-tension supply or the grid battery.

Old batteries are likely to cause many troubles, and the production of a high-pitched whistle as the result of interaction of the circuits is one of them.

An old valve may also be the reason for the trouble. This is particularly likely to be true when the coupling between the detector and the power valves is a transformer having not too good characteristics.

With some of these a high-impedance detector valve cannot be used, because a whistle is heard, and if a valve of moderate impedance is fitted and after a time through use its impedance has increased, the whistle will come on. There are other faults which will cause a whistle to be heard, so do not assume it is received by the set. To test for this, short circuit the aerial and earth terminals of the set. You may find reversing the connections to the secondary of the transformer a help.

A Television Service

There has just been commenced in New York, I see, a television service. The Jenkins television studio is working four hours daily and while the received pictures are not perfect, they are said to be of interest.

No doubt the time has now arrived when big developments may be expected. Personally, I always feel so disappointed with our own television transmissions. I wonder what the great snag is.

Now turn to page 963

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.

Weedon Adaptadisk

ALMOST every amateur constructor must have, at one time or another, been inconvenienced by the fact that he had no cone washers to hand, to fit the particular angle of the cone diaphragm which he wished to use. The Adaptadisk, marketed by J. H. Weedon & Co., of Lisle Street, W.C.2, which has been designed to overcome this trouble is a universal cone washer and consists essentially of three parts, the central disc, a coupling ring, and the usual collar and grub screw, for gripping the extension from the loud-speaker armature.

The central disc, which is of aluminium, has a cut along a diameter and for nearly the whole length of it. By means of a screw at the edge, the two parts of the disc can be forced apart, thus causing the diameter to increase slightly.

In order to fit the Adaptadisk the centre of the cone paper is cut away so that when the cone is formed, a hole of about half-inch diameter will be left at the apex. Having formed the cone, the edge of the hole is serrated to form some fifteen or twenty points, so that the aluminium disc can be just fitted into the hole. The coupling ring is now put on over the top edges of the cone paper, and the central disc is then expanded by the screw already mentioned, thus causing the cone to be gripped tightly.

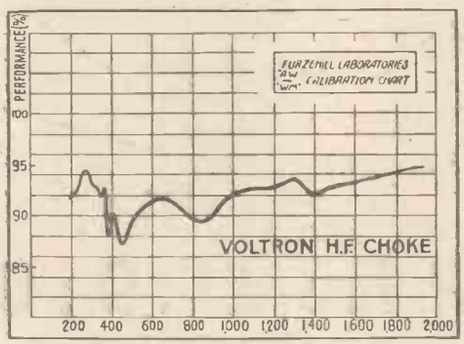
Neat in appearance—the Voltron H.F. choke

This gives a simple and rigid assembly and one which can be used on any cone irrespective of the cone angle. The dead weight of the moving system is, of course, increased by the device, but in most cases this is of little importance, while the advantages of a universal fitting will be obvious.

Voltron H.F. Choke

THE Voltron H.F. choke tested this week is in some respects different from the usual run. The former is of bakelised paper sheet, the choke being built up in sections, six in number, each section being one-sixteenth of an inch thick, and one and a quarter inches outside diameter. The choke is thus compact, a property which it still retains when, in its finished condition, it is housed in a moulding 1 by 2 by 1¾ inches.

The inductance of the choke was found to be 240,000 microhenries, the effective self capacity being in the neighbourhood of 7½ micro-microfarads. The choke was tested according to our custom, by measuring the impedance at various frequencies and comparing this with the impedance of .0001-microfarad by-pass condenser. A performance factor is derived showing the proportion of current shunted through the by-pass condenser, and clearly for a perfect



Characteristic curve of the Voltron choke

choke this figure would be 100 per cent.

It will be seen that the Voltron choke has a performance factor between 90 and 95 per cent. over the greater part of the scale.

The New R.I. Parafeed Transformer

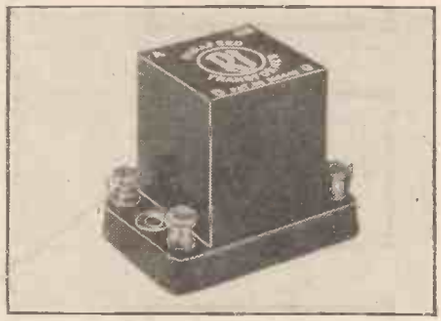
IN these days of selective circuits which tend to cut off upper frequencies, it is quite refreshing to find a transformer which has a really rising characteristic, instead of one which steadily falls off above 2,000 or 3,000 cycles.

The R.I. Parafeed transformer is a small component measuring only 2 in. in length, 1¼ in. wide, and 1⅞ in. high.

Nickel-steel alloy is used for the core, so that the instrument is not intended to pass any anode current through the winding. The use of a parallel feed arrangement of some sort is essential, but under these conditions the performance is good.

The primary inductance is of the order of 80 henries depending somewhat on the current used to measnre it. This gives a good step up even at the lower frequencies.

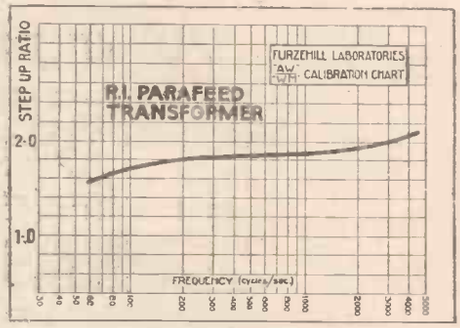
The most interesting fact about the



An interesting new R.I. component—the Parafeed L.F. transformer

transformer is that the amplification steadily rises throughout the whole frequency range, and does not show any falling off even at 10,000 cycles.

The curve reproduced herewith was taken on this transformer following an L210 valve, from which the appreciable rise can be seen the whole way. Of course, the



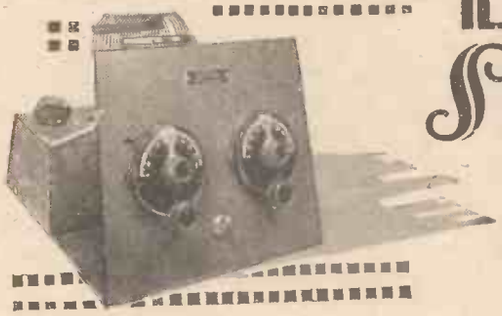
Response curve of R.I. Parafeed transformer

response at 10,000 cycles is very easily lost if any stray capacities are allowed across the secondary, while the performance in the bass becomes much worse if the connections to the secondary are reversed. Therefore be sure to use it as marked.

The step-up of the instrument may be increased if desired by using it as an auto transformer, in which case a ratio approaching 3 : 1 will be obtained. In view of the compactness of this instrument it will fit into a portable set very well, and altogether it appears to have several promising applications.

NEXT WEEK:
SUPER-HET IDEAS FOR YOU

SETS OF DISTINCTION



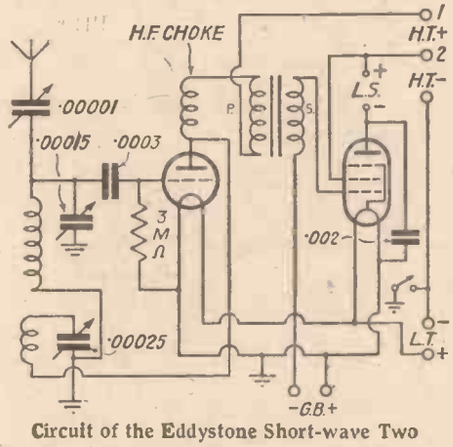
EDDYSTONE SHORT-WAVE TWO

Makers: STRATTON & CO., LTD.

Price: 18s. 6d. for the Chassis

AS a pleasant change from sets designed for normal broadcast reception, I have been testing the Eddystone two-valve short-wave assembly—with very gratifying results. Indeed, I cannot remember when I tested such a sensitive short-waver. The circuit is not remarkable, but right values of the components and a really scientific layout account for exceptional results.

The first valve is a leaky-grid detector, with a .0003-microfarad grid condenser and a 3-megohm grid leak. The leak is taken to the negative side of the filament. The usual modified Reinartz circuit is employed for reaction. The reaction condenser has its moving plates earthed and is connected in series with the reaction coil across the anode filament circuit of the detector.



Circuit of the Eddystone Short-wave Two

A high-ratio low-frequency transformer couples the detector valve to the pentode amplifying valve. Between the primary of the transformer and the anode of the detector is a special short-wave choke to divert the high-frequency current through the reaction circuit.

The aerial is coupled to the grid tuning circuit through a .00001-microfarad midget type of variable condenser. This form of aerial coupling is specially suitable for ultra short-wave reception. It eliminates "blind spots," that is, points on the dial where reaction is difficult to obtain, and so provides a fairly constant degree of sensitivity over the available tuning range.

In the practical interpretation of this circuit the makers' special metal chassis is the nucleus. On it are mounted the two variable condensers, one for tuning and the other for reaction, actuated by slow-motion dials. At the back of the chassis is mounted the short-wave coil holder, into which can be plugged one of three short-wave coil units for tuning and reaction.

Quite close to the coil unit, on the left, is the aerial coupling condenser. The chassis is remarkable for the shortness of the connecting wires between the different components. In fact, the Eddystone short-wave chassis is an object lesson in short-wave technique that will well repay the study of all amateurs.

I should make it clear that this short-wave two-valver has been produced for the benefit of amateurs interested in short-wave reception who do not wish to go to the expense of buying a complete set. The assembly is therefore supplied in kit form, and from an examination of the very clear blueprint and circuit diagram supplied with the kit I am sure every reader could assemble it with ease.

Loud-speaker Results

Although primarily designed for head-phone reception, the complete Eddystone short-wave two-valver, by virtue of its pentode output valve and highly sensitive detector, works a loud-speaker at good strength in the reception of the many strong signals within range.

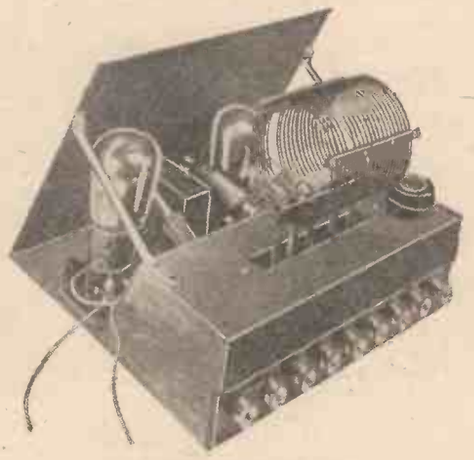
The three short-wave coils supplied with the kit cover all the short wavelengths of interest. The smallest coil tunes from 16 to 30 metres, the middle size from 27 to 55 metres and the largest coil from 46 to 93 metres.

As the makers point out, the aerial and earth system is important in short-wave reception. An aerial of the inverted "L" type, say 30 feet high, can be regarded as satisfactory for consistently good short-wave reception. The total length of the aerial should not exceed 60 feet, otherwise difficulty may be experienced in obtaining smooth reaction over the whole wavelength range. To avoid hand-capacity effects when operating the set, a short, low-resistance earth is strongly recommended for this set.

The makers have chosen suitable types of valves from the Mullard, Mazda, Osram and Cossor makes. The set supplied to me included a Mullard PM1HL for the detector, and a Mullard PM22 pentode valve. With the recommended 100-volt high-tension battery I found the total anode-current consumption was 10 milliamperes, with the pentode slightly overbiased. Using the alternative PM2A power valve, one can economise a little in the high-tension current.

Operating a short-wave set is quite different from operating an ordinary broadcast receiver. One has to take care to move the tuning and reaction dials very slowly and to keep the detector valve in a state of gentle oscillation.

But the surest test of ease of operation is how soon one can get a distant station. Well, while admitting that I have quite an extensive experience of short-wave tuning,



Another view of the set

I do not think this entirely offsets the fact that within five minutes of switching on I was listening to station 2XAD, the Schenectady relay of WGY.

This 20-kilowatt American short-wave relay transmits on 19.56 metres and can be heard every evening from about 9 p.m. onwards. I obtained such strong head-phone reception that I was subsequently able to work a loud-speaker at fair volume.

This excellent example of the set's capabilities was more than justified by subsequent operation. For the reception of 2XAD I used the smallest coil and the tuning point was 77 degrees. Using the middle coil I obtained very strong signals from Zeesen, the 31.38 metre German short-waver. This was logged at 52 degrees. Just above it I found 2XAF Schenectady at moderate strength. At 53 degrees the Danish short-waver OXY was surprisingly strong.

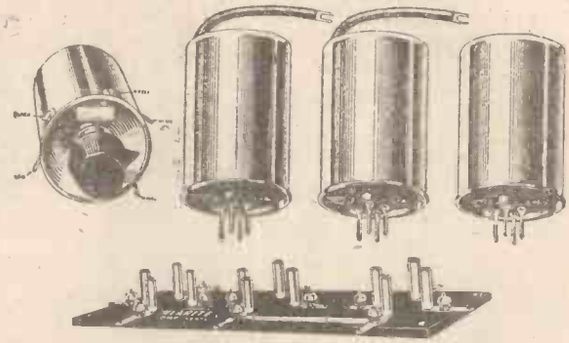
SET TESTER.

CENTURY SUPER A.C.

CENTURY SUPER

Chosen by Mr. W. James

SUPER SIXTY



CENTURY SUPER
Wright & Weaire Ltd. sole concessionaires in the British Empire for these coils.
(British Patent No. 349403)

SUPER SIXTY
Price of complete set of coils .. **50/-**
Illustrated descriptive leaflets explaining the unique constructions of the coils will be sent on request.

TRIPLE COIL BASE
Base for above coils, complete with terminals and tags. Coil sockets are sprung similar to valve holders. PRICE, **2/9**

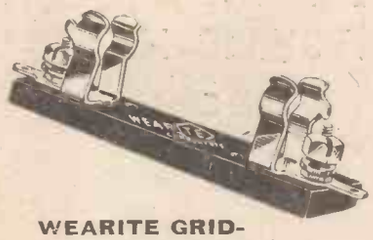
Combined 3-coil strip and 5-valve strip with all essential wiring complete as one chassis, for 'Century Super' and 'Super Sixty.'
7/-

MAINS TRANSFORMER
Standard input at 50 cycles; output 4 volts at 6 amp. Centre tapped. 135 volts at 60 m/a.
Price **32/6** (made for 25 cycles if specially ordered).

5-PIN A.C. VALVE SOCKET
Price **1/3** each

ULTRA SHORT-WAVE MINIATURE FRAME AERIAL

We have just designed a short-wave coil (or frame) suitable for receiving short-wave stations. It will replace existing frame aerial, and is centre-tapped for receiving the ultra-short-wave stations. The winding is Litzendraht wire. Price **5/9** supplied complete with base. The above short-wave coil (or frame) is standard for either "Super 60," "Century Super" or the "All-Mains" sets.



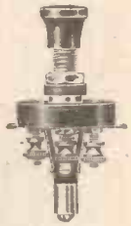
WEARITE GRID-LEAK HOLDER
Has new type contact spring clips. Fits any size grid leak. PRICE **6d.**

DUAL-RANGE FRAME AERIAL

Entirely new in design and embodying exclusive features which give extremely high efficiency. The windings are of Litzendraht wire, carefully wound at even tension throughout, in order to maintain the accuracy of spacing. The winding is centre-tapped and provided with the necessary three terminals for connection to set. The change from short to long waves is effected by means of a switch at the base: no other alterations to connections are necessary. The frame aerial swings through 180 degrees and is mounted on a polished mahogany base. It is of particularly handsome appearance.

Price **42/-**

Price per complete set of parts, less wire, **30/-**



WEARITE THREE-POINT SHORTING SWITCH
Push-pull action. Sound self-cleaning contact. With insulated spindle. PRICE **1/6**

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MAHOGANY PANELS
Black or natural finish. 12 in. by 8 in. by $\frac{3}{16}$ in. **5/9**
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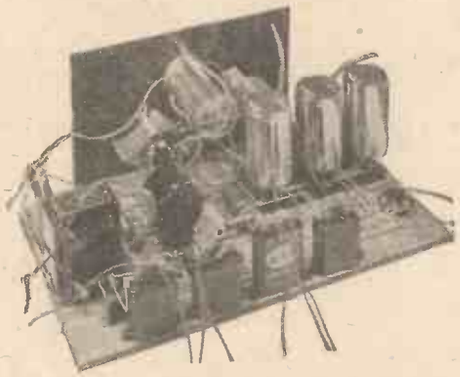
READY-BUILT A.C. "CENTURY SUPERS"

THE "A.W." Technical Staff has now had an opportunity of thoroughly trying out commercially-produced A.C. type "Century Supers" made up from approved kits of parts.

One very well-made assembly was supplied by Peto-Scott, made up from a "Pilot" kit of parts, and was tried out with the Peto-Scott frame aerial and the standard "A.W." mains unit as described this week for the "Century."

Good results were obtained without any preliminary adjustment. General control was remarkably stable, and owing to the high-grade parts incorporated in the "Pilot" kit, the tone was distinctly commendable.



The set assembled from a kit of H. & B. parts

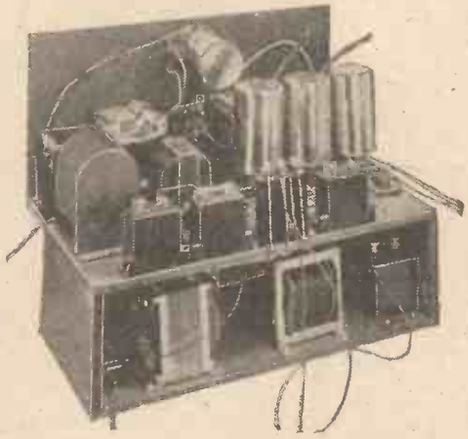
It should be noted that these sets can be supplied either in the kit form, or ready built. The workmanship of the set submitted was of a good order, and readers who are anxious to own a hundred-station set, but who do not want to be troubled with the constructional work, will find this a most satisfactory method of purchasing a "Century."

A "Century" made up from a Peto-Scott "Pilot" kit

The second set tested was made up from a Readi-Rad kit, and a novel point was the special arrangement of the mains unit section below the receiver baseboard. Except for the addition of a grid-bias battery this Readi-Rad set was quite ready for operation.

The valves (a special set was supplied) were plugged in, the mains connected, and stations came rolling in at once. A Readi-Rad frame aerial was used with this outfit.

Apart from the slightly unconventional layout of the set and mains portions, this Readi-Rad assembly differs only in minor details from the published layout. It worked entirely satisfactorily, and may be strongly recommended.



Complete with the mains unit—a Readi-Rad-built "Century"

The third set was supplied by the H. & B. Radio Co. and was built complete from a Standard kit of H. & B. parts for the "Century Super." It closely followed the published layout, the mains section being on a separate base. Operation was found to be easy, the results up to standard, and the tone entirely satisfactory. A special H. & B. frame aerial is also available.

A "Century Super" Query

SIR,—I have studied with interest C. H. A.'s letter in last week's issue of "A.W.," and I certainly think that he appears to have discovered an easy and convenient method of capturing the ultra-shorts without going to the trouble of disconnecting the frame-aerial.

There are, however, one or two points regarding which I am not entirely clear, and I shall be greatly obliged if he would be good enough to elucidate them for me.

He says that he twisted the flexible leads from the frame-aerial leading to the terminal block. Did he have to remove the spacers to do this?

What exactly was the method of the twisting? Was it an actual close twist of the three wires as shown in, for example, the illustration of the lower part of the leads from the A.C. unit to the set? If so, I don't quite understand what he says about keeping the wires three inches apart. Does this mean that the cable thus formed by the three twisted wires was put into turns three inches apart? Or does it mean that he ran the wires on a former?

T. H. (Twickenham).

Short-wavers

SIR,—In a recent issue under the heading of "Around the Short-wave Dial" inquiries are made regarding two mysterious stations one of which broadcasts Oriental music. Radio Saigon working on 48 metres puts out Annamite music every evening. As Saigon is seven hours ahead of England it should be picked up between midday and 4 p.m. Singapore has only an amateur station, but Kuala Lumpur, in the Federated Malay States, is building a short-wave station which will be run by the Government with amateur programmes.

D. W. M. (Singapore).

Reversed Reaction

SIR,—I have constructed the "Music Leader," using the "Arcadian Portable" coil, and whilst I am very satisfied with reception on the long waves I have had no success with short-wave stations. I cannot seem to get a proper reaction effect on the medium waves and feel that there is only some small fault.

J. D. (Birmingham).

It seems to us that the winding of your special H.F. tuning coil is incorrect. We have learned that some samples of coils sent out from certain manufacturers had the medium-wave winding connections reversed, thus giving rise to a reverse reaction effect on the medium-waves only.—ED.

"Challenge Four" Receiver

SIR,—I have considered building the "Challenge Four" receiver, but I wish to instal it in a gramophone cabinet. As it would be inconvenient to slide the back of the set away each time I wish to change wavelength, I am wondering whether it would be possible to arrange the coil switches on the front panel.

M. S. (London, E.).

We see no reason why you should not arrange the coils on their sides, with the switches protruding through the front panel. Some slight rearrangement of the components will be necessary, but this should not prove to be a difficult task. All you have to be careful about is, the two S.G. valves must not be brought closer together, and the leads to the valve grid circuits must be kept as short as possible. The windings of the tuning coils must not be in the same plane as those of the H.F. choke, L.F. transformer, or output choke, etc. Direct interaction will then be avoided. Do not place the coils any nearer to the screens than at present or damping will be experienced.—ED

A Wavelength Suggestion

SIR,—A propos the remarks of your correspondent H.R.P. (S.W.17). I am sorry I missed "Thermion's" suggestions regarding 5XX, but I have often wondered why it was not possible to put all the National Programme transmitters on the long wavelength of 1,554.4 metres, and thus not only secure better reception over a wider area, but release several medium wavelengths for Regional and Local programme purposes. Separation of National and Regional programmes in the same region would also be easier.

E. A. H. (Edinburgh).

Using a Pick-up with the "Century Super"

SIR,—Regarding the letters published in "A.W." with reference to running a pick-up with the "Century Super." I find the following method to be very satisfactory and it entails *no* alteration to the existing wiring. Use a valve adaptor, which is made up as follows. Required parts: one suitable valve holder; three valve legs (taken from a dud valve). Turn the holder upside down and solder the legs into the anode and filament holes, *leaving the grid hole free.* Do not push the legs too far into the sockets, leaving sufficient room to insert the valve into the correct place in the holder.

Now connect the two wires from the pick-up, or the volume control, one to the adaptor-valve-holder grid terminal, the other to the low tension minus terminal. Then all that is required to work the pick-up is to take out the second detector valve, plug the new adaptor into the holder. Then again fit the detector valve into the adaptor.

By the above method there is no alteration to any wiring. The volume control can, of course, be fitted to the panel and a plug and jack connection made to the pick-up. It is, of course, essential to take out the adaptor when working the set normally, and it can be stowed away in a spare place in the cabinet, or clipped to a holder.

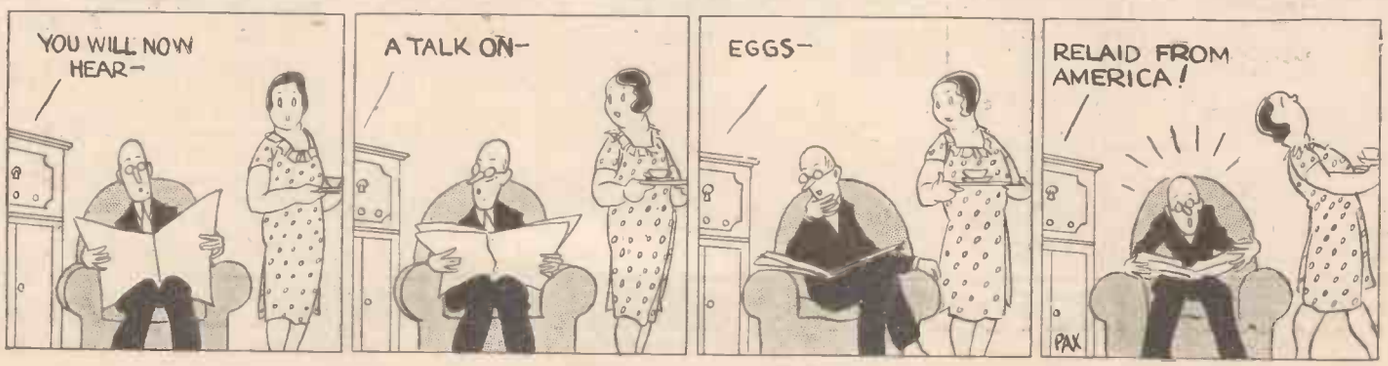
I should like to add that my set is all you claim for it. I have made a push-pull extra stage output, with two P625A valves. The volume is tremendous. I picked up seven American stations early one morning on the medium waves at fair speaker strength.

H. J. G. (Norfolk).

The "Exhibition Three"

SIR,—I have read reports in your journal about different sets of yours, but I have not seen anything about your "Exhibition Three." I built this set as soon as it was published, and I have received sixty stations. I am using the following valves: PM12, Lissen HL210, and Lissen P220. The results are good enough for the most critical listener.

F. S. (Colchester).



IS YOUR TRANSFORMER OVERWORKED?

An interesting point on the subject of rectifier output is raised in this article by our Technical Editor

IF you want to start an argument with an A.C. expert the quickest way to do this is to ask him what is the current supplied by the high-tension winding on a rectifier transformer. I do not mean a quibble about a few milliamps. The question is a simple common-sense one, but two people equally blessed with common sense will give you two different answers, and bring forward good reasons for their statements.

"But," you will object, "how can there be any argument at all? If we are supplying 50 milliamps D.C. then the current supplied by the transformer must

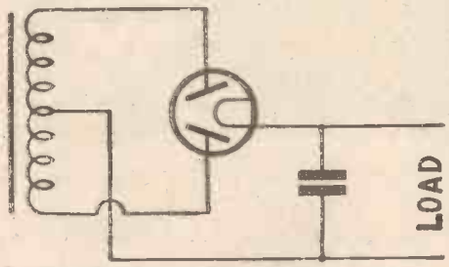


Fig. 1. Circuit of simple double-wave valve rectifier

always be somewhere around 50 milliamps anyhow." "No," replies expert B, "It is only 25 milliamps, the other 25 being supplied by the second half of the transformer." We are, of course, assuming a simple double-wave valve rectifier as in Fig. 1.

Expert B argues on these lines. He says: "We're taking 50 milliamps load out of the reservoir condenser. I am not concerned with fractions of time; all I know is that the juice comes sometimes through one half of the rectifier and sometimes through the other half, but the two operations follow each other so quickly that as far as I am concerned they are continuous. Therefore, I am getting a continuous stream of 25 milliamps through each half of the rectifier adding up to make 50 milliamps."

A Knotty Problem

"My dear sir," objects expert A, "you're talking absolute rot. You cannot regard the two feeds through the separate halves of the rectifier as continuous. They interlink one with the other. The current first flows through one half and then through the other, and therefore each current must be equal to the total current supplied, namely 50 milliamps."

Expert B sees what he thinks is an obvious fallacy in the argument of his colleague and with a gleam in his eye proceeds to descend upon him. "You say that the current supplied by each half of the winding is 50 milliamps."

"Yes."

"Suppose the voltage on each half is 250. Your total voltage is 500, so your transformer is supplying 500 volts at 50 milliamps, which is 25 watts. The voltage on the reservoir condenser will only be somewhere around 250, the same as that on each half of the transformer, and if this is supplying 50 milliamps your output power will only be 12½ watts. What do you know about that?"

Expert A scratches his head. "All I know is that I have measured the current and it is 50 milliamps."

So the problem is left. On the one hand the current has been measured and is found to be a certain value, but the theoretical value is only about half this. Who is right? In order to investigate this I made a number of measurements on a rectifying circuit not only of the type shown in Fig. 1, but also on a single-wave circuit, which is shown in Fig. 2. In each case I put two meters in the lead between the transformer and the rectifier. One of these was an A.C. meter which reads the heating value of the current, while the other was a simple D.C. meter which only reads the average value. A third D.C. meter measured the actual load taken from the reservoir condenser so that we could find what the current supplied to the rectifier was in terms of the load taken out of the reservoir condenser.

Two Effects

The results proved that both experts were partly right. The current read on the D.C. meter was the same as that taken by the load, within quite close limits. Now, expert B argued on the average value of the current supplied to the rectifier, regarding his currents as a continuous stream just sufficient in quantity to make up for what was taken out by the load. A D.C. meter reads the average value of the current and this was found to be the same as the load current, thereby proving his case.

On the other hand, expert A was also right because under certain conditions the A.C. meter read twice the D.C. current. This was not always the case, but the current on the A.C. meter was always

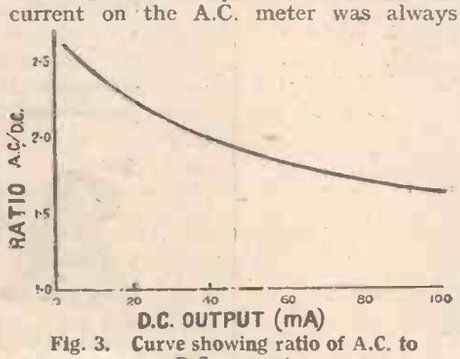


Fig. 3. Curve showing ratio of A.C. to D.C. current

considerably larger than on the D.C. meter. The curve shown in Fig. 3 gives the ratio of the A.C. to the D.C. current for various loads, and it will be seen that at small loads the ratio is more than 2 : 1. As the load increases the ratio falls to about 1.6 : 1.

The reason for this is as follows. The reservoir condenser in Fig. 2 has a certain voltage across it, while the voltage on the transformer is fluctuating, being sometimes above and sometimes below the condenser voltage. Current will only flow through the rectifier into the condenser when the voltage on the transformer is greater than that on the condenser. When we are taking a small load from the reservoir condenser the voltage is high, and the transformer voltage only exceeds the condenser voltage for a small interval of time. The reservoir condenser has, therefore, to take all its supply of current in a very sudden rush.

The current from the transformer is thus in the form of large pulses lasting quite a short time followed by relatively long

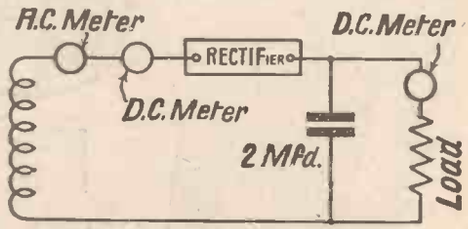


Fig. 2. Circuit of single-wave rectifier

periods during which no current flows. The heating effect of such a current is much greater than its average value, being about 2 : 1 as we have seen.

As the load increases, the voltage on the condenser falls, and the transformer voltage exceeds the condenser voltage for a longer period. Thus the current rush is not so severe and the heating effect of the current is not so greatly in excess of the average value. At the same time even on heavy load the effective current taken from the transformer is more than 50 per cent. greater than the D.C. value.

The Question of Power

When designing a transformer we have two effects to consider. One is the heating of the winding and in estimating this we must obviously use the A.C. value of current, which as we have seen is proportional to the heating effect.

The second effect which we have to take into account is the voltage drop on the transformer due to the resistance of the winding. If we want to deliver a certain voltage to the rectifier we must arrange for the transformer to give this voltage *on load*, taking into account the voltage drop caused by the resistance of the winding, and designing the transformer to give a little more volts than we actually need to allow for this. Here again the proper current to use when working out the voltage drop is the A.C. value. This appears obvious on the face of it and was actually proved by a further series of measurements in which the voltage on the transformer was measured with an electrostatic voltmeter for various currents. Knowing the resistance of the transformer the effective current to produce the voltage drop could easily be worked out and this was found to coincide with the

(*Continued on page* 980)

Postcard Radio Literature

GET THESE CATALOGUES FREE

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

Radio Safety

As there is always a small amount of danger by lightning in summer-time, I think you would be wise to get details of the Eldoradio automatic lightning protector and aerial discharger made by the Eldoradio Manufacturing Co. A folder can be had describing it. **279**

Quality Speakers

To hand is an item of news. A completely new range of speakers, units and chassis have been put on the market by Baedekers Trading Co, and I feel sure that in the wide selection of instruments available you will find something of interest. Write for a free folder. **280**

Magnum Sets

I have just received two leaflets describing the Magnum Regional one-valver and the Magnum Regional crystal set, both of which are specially recommended for the North Regional area. Burne-Jones & Co., Ltd., who make these sets, have produced 11,000 sets for the wireless for the blind scheme and these Regional receivers are the outcome of this experience. **281**

Good Valves

I recommend to your attention a very helpful catalogue produced in connection with Lissen new-process valves. In this you will find full characteristic curves and working details of all Lissen valves. Range includes two-, four-, and six-volters, pentodes, and mains rectifiying valves. **282**

Tungar Chargers

Anybody who is interested in charging a number of accumulators from A.C. mains should get a copy of the folder which deals with Tungar battery chargers. The smallest in this range charges six and twelve-volt accumulators (or a corresponding number of two-volt cells) at a maximum of five amperes. Larger chargers are also available. **283**

A Pentode Choke

When working a pentode in the output stage of your set, you need to have special arrangements connecting up the valve with the speaker. H. Clarke & Co. (Manchester), Ltd., have just produced a new Atlas pentode output choke in two separate types, CP and CPS. All pentode users should get a copy of the folder which may be had showing the best methods of using these special chokes and giving full technical details. OBSERVER. **284**

A NEW USE FOR GRAMO-RADIO!

MUSIC of the fiddles and dancing around the Maypole was all very well for our grandparents when they lived in rural parts. Modern rustics want nothing less than moving-coil loud-speakers and dance music from London!

I have a glorious example.

Last week-end I stopped awhile at Horsell, Surrey, and found a village fête in full swing. Marquees shielded the sun from those who sipped tea beneath their shade. More energetic souls made a mass attack on the coconuts. But for one thing it might have been happening in a past generation; that one thing was the Robot Voice. Above the tea sipping and the coconut shying I heard the voice of Jack Payne, amplified to giant strength Curiosity was pressing. I investigated and found the source of this unusual usurper of the fiddle and Maypole.

The Countess Balfour at the microphone

It was, need it be said, an amplifier. A super amplifier! It had, they told me, been designed by the AMATEUR WIRELESS Technical Staff and was a three-stage job, push-pull output, working from A.C. mains.

The man in charge waxed technical. "We get about 10-watts A.C. output," said he, "and four public-address type B.T.H. R.K. moving-coils around the ground give even more volume than we need."

The record being amplified was nearing the end of its run.

"Wait a bit," said the operator, "we've a microphone here, and I want to put over an announcement." He flicked a switch, tapped the microphone and the Robot Voice boomed out an S.O.S. over the village. He told me that the Countess Balfour, when opening the fête, had used the public-address "mike," and her clear voice came over well. Then he went back to gramophone record dance music and kept the fête-goers singing. Frankly I wonder that every little village does not have its own amplifier and loud-speaker. First-rate music would then be always "on tap."

Fiddler and Maypole, your day is done! The "10-watt A.C. P.P.'s" and the "B.T.H. R.K.'s" have sounded your death-knell!

A. R. B.

RADIOGRAMS

THE commentary by Squadron-Leader Helmore on the Royal Air Force Display at Hendon, on June 27, will open with Event No. 7, Inverted Flying and Aerobatics by instructors from the Central Flying School. The other five events which will be described to listeners are the Fly Past by Flying Boats, Flight Aerobatics, Parachute Descents, Parade and Fly Past of Men and Experimental Types of Aircraft, and the Catapult Event, the latter being a demonstration of apparatus which enables heavy aircraft to take off after a run of less than forty yards.

Chinese White, an Anglo-Chinese play by Val Gielgud, the B.B.C. productions director, was produced at the Arts Theatre Club two years ago. The author and Jean Bartlett are now collaborating in a broadcast version of the play and it will be heard by National listeners on July 2, and Regional listeners on July 4.

Mr. H. G. Wells comes to the microphone again on July 13, when he will contribute his views to the series of talks which is being broadcast on "Russia in the Melting Pot."

Not only is Yvonne Arnaud a charming actress, she is a talented musician as well. On July 12 she will be the pianist in the performance of the Chausson Concerto, which is to be broadcast by the International String Quartet.

An unusual programme will be broadcast on June 27 (National). Those taking part are all street artistes, or "buskers"—people who entertain theatre queues. Listeners will hear Fred Walker's Street Band, Finnelli and Partner, Josh Cairns, George Gorman, and Fred Lester and Cyril.

Another series of examples of English Eloquence opens on the National wavelengths on June 28, the first broadcast being the last sermon preached before King Edward VI, by Bishop Hugh Latimer.

Ian Hay's *Tilly of Bloomsbury* is to be broadcast on June 26 (National), and 27 (Regional).

Pouishnoff, the first famous pianist to be heard by wireless in this country, will give a recital in the London Regional programme on June 22. In the early days he would not broadcast under his own name, but gave several recitals anonymously and without fee as an experiment. The thousands of letters which the "unknown pianist" received soon convinced him that broadcasting would not harm his reputation.

L. du Garde Peach is preparing another satire on similar lines to his *Path of Glory*. The new effort is called *Love One Another*, and it will deal with a world from which all hatred has been eliminated by a mysterious electric ray.

A singer who appeared at the old 5GB studios during the Children's Hour when she was only eleven years old, will sing in the Birmingham studio concert on June 29.

The Hasland Silver Band, which comes from the little village of Hasland, near Chesterfield, will give a concert from the Birmingham studio on June 29.

Excerpts from some light and comic operas will be broadcast from Midland Regional on June 30. The concert will be conducted by Frank Cantell and Geoffrey Dams will be the soloist. The orchestral items include a selection from Edward German's *A Princess of Kensington*, and part of a suite of dances from "Tom Jones."

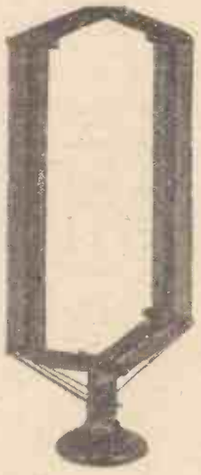
Some popular songs by Sanderson will be broadcast during the ballad concert at the Midland Regional station on July 2. A 'cello solo by Sammartini will be given by Harold Bates. Lilian Evetts will be heard in pianoforte solos.

Sara Sarony, the popular entertainer in the Midland programmes, will appear during a concert by the Birmingham Military Band on July 2. She will be heard in an "Act of Reminiscence," when many familiar artistes will be recalled.

County cricket will be the subject of the Sports talk from Cardiff on June 29, by Mr. N. V. H. Riches.

NEW WEARITE FRAME AERIAL

"CENTURY SUPER" users will be interested to know that a new Wearite frame aerial has been produced. This is a dual-range centre-tap job, mounted on a round base with a bearing that allows a full swing. The two sections of the frame are concentric and the wood-work supporting the turns is arranged in rather a novel manner; there is no centre portion. The turns are conveniently brought out to sockets on a small strip on the base of the frame and the general workmanship of this aerial is highly commendable. The price is 35s.



This is the new Wearite dual-range frame aerial

BROADCAST TELEPHONY

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

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN			
25.53	*11,751*	Chelmsford (G5SW)	16.0
242	*1,238*	Belfast	1.2
261.3	*1,148*	London Nat.	68.0
288.5	*1,040*	Newcastle	1.2
*288.5	*1,040*	Swansea	0.16
288.5	*1,040*	Plymouth	0.16
288.5	*1,040*	Edinburgh	0.4
288.5	*1,040*	Dundee	0.16
288.5	*1,040*	Bournemouth	1.2
288.5	*1,040*	Aberdeen	1.2
301.5	*995*	North National	70.0
309.9	*968*	Cardiff	1.2
356.3	*842*	London Reg.	70.0
376.4	*797*	Glasgow	1.2
398.9	*752*	Midland Reg.	38.0
479.2	*626*	North Regional	70.0
1,554.4	*193*	Daventry (Nat).	35.0
*testing on 479.2 m. (626k.)			
AUSTRIA			
218	*1,373*	Salzburg	0.6
246	*1,220*	Linz	0.6
283	*1,058*	Innsbruck	0.6
352	*851*	Graz	9.5
453	*666*	Klagenfurt	0.6
517	*581*	Vienna	20.0
also testing on 1,249 m. from 8.0 p.m. (Mon. Wed. Sat.)			
BELGIUM			
206	*1,456*	Antwerp	0.4
215.6	*1,391*	Radio Conférence Brussels	0.25
244.9	*1,224.8*	Schaerbeek	0.5
338.2	*887*	Brussels (No. 2)	20.0
508.5	*590*	Brussels (No. 1)	20.0
BULGARIA			
318.8	*941*	Sofia (Rodno Radio)	1.0
CZECHO-SLOVAKIA			
263	*1,139*	Moravska-Ostrava	11.0
279	*1,076*	Bratislava	14.0
293	*1,022*	Kosice	2.5
341.7	*878*	Brunn (Brno)	34.0
487	*617*	Prague (Praha)	5.5
487	*617*	Cesky Brod	75.0
(testing shortly)			
DENMARK			
281	*1,067*	Copenhagen	1.0
1,153	*260*	Kalundborg	10.0
ESTONIA			
296.1	*1,013*	Tallinn	0.7
465.8	*644*	Tartu	0.5
FINLAND			
220.8	*1,358.3*	Helsinki	15.0
291	*1,031*	Tampere	1.0
291	*1,031*	Vüpuri	15.0
1,796	*167*	Lahti	54.0
FRANCE			
219.9	*1,364*	Fécamp	1.0
237.2	*1,265*	Nimes	1.0
238.5	*1,258*	Bordeaux-Sud-Ouest	2.0
240	*1,250*	Béziers	0.6
249	*1,205*	Juan-les-Pins	0.5
255	*1,175*	Toulouse (PTT)	1.0
265	*1,130*	Lille (PTT)	15.0
272	*1,103*	Rennes	1.2
285.4	*1,051*	Montpellier	2.0
287.1	*1,045.1*	Radio-Lyons	0.5
294.1	*1,020*	Limoges (PTT)	0.5
304	*936*	Bordeaux (PTT)	20.0
314.3	*954.5*	Natan-Vitus (Paris)	0.5
316	*950*	Marseilles (PTT)	1.5
328.2	*914*	Grenoble (PTT)	3.0
329.3	*911*	Poste Parisien	1.2
345.2	*869*	Strasbourg (PTT)	15.0
368.8	*813.4*	Radio LL (Paris)	0.5
385	*779*	Radio Toulouse	8.0
447	*671*	Paris (PTT)	2.0
466	*644*	Lyons (PTT)	2.3
1,445.7	*207.5*	Eiffel Tower	15.0
1,725	*174*	Radio Paris	17.0
1,725	*174*	" "	85.0
(testing shortly)			
GERMANY			
31.38	*9,560*	Zeesen	15.0
217	*1,382*	Königsberg	1.7
219	*1,369.7*	Flensburg	0.6
227	*1,319*	Cologne	1.7
227	*1,319*	Münster	0.6
227	*1,319*	Aachen	0.3
232.2	*1,292*	Kiel	0.31
239	*1,256*	Nürnberg	2.3
246.4	*1,217.2*	Cassel	0.3
253.8	*1,182*	Gleiwitz	5.6
259.3	*1,157*	Leipzig	2.3
269.8	*1,112*	Bremen	0.3
276.5	*1,085*	Heilsberg	75.0
283.6	*1,058*	Magdeburg	0.6
283.6	*1,058*	Berlin (E)	0.6
283.6	*1,058*	Stettin	0.6
318.8	*941*	Dresden	0.3
325	*923*	Breslau	1.7
360	*833*	Mühlacker	75.0
372	*806*	Hamburg	1.7
390	*770*	Frankfurt	1.7
418	*716*	Berlin	1.7
452.1	*662*	Danzig	0.2
473	*635*	Langenberg	17.0
533	*563*	Munich	1.7
559.7	*536*	Kaiserslautern	1.0
559.7	*536*	Augsburg	0.3
566	*530*	Hanover	0.3
570	*527*	Freiburg	0.35
1,635	*183.5*	Zeesen	75.0
1,635	*183.5*	Norddeich	10.0
HOLLAND			
31.28	*9,599*	Eindhoven (PCJ)	30.0
299	*1,004*	Hilversum	8.5
299	*1,004*	Radio Idzerda (The Hague)	3.0
1,060	*283*	Scheveningen-Haven	5.0
1,875	*160*	Huizen	8.5
HUNGARY			
550	*545*	Budapest	23.0
ICELAND			
1,200	*250*	Reykjavik	21.0
IRISH FREE STATE			
224.4	*1,337*	Cork (6CK)	1.5
413	*725*	Dublin (2RN)	1.5
ITALY			
25.4 and 80		Rome (3RO)	9.0
247.7	*1,211*	Trieste	15.0
296.1	*1,013*	Turin (Torino)	8.5
312.8	*959*	Genoa (Genova)*	1.5
332	*905*	Naples (Napoli)	1.7
441	*680*	Rome (Roma)	75.0
453.2	*662*	Palermo	8.5
456.6	*657*	Bolzano (IBZ)	0.2
501	*599*	Milan (Milano)	8.5
*testing on 525 m.			
LATVIA			
525	*572*	Riga	13.0
LITHUANIA			
1,935	*155*	Kaunas	7.0
NORTH AFRICA			
363.4	*825.3*	Algiers (PTT)	13.0
416	*721*	Radio Maroc (Rabat)	10.0
1,250	*240*	Tunis Kasbah	0.6
NORWAY			
230	*1,271*	Kristianssand	0.625
240.6	*1,247*	Stavanger	0.625
364	*824*	Trondelag	1.35
366.2	*819.2*	Frederiksstad	0.7
453.2	*662*	Porsgrund	0.8
493.4	*608*	Bergen	1.35
587.1	*511*	Hamar	0.8
1,071	*280*	Oslo	75.0
POLAND			
214.2	*1,400*	Warsaw (2)	1.9
234	*1,283*	Lodz	2.2
244	*1,229*	Wilno (tests)	22.0
314.2	*954.8*	Cracow	1.5
335	*896*	Poznan	1.9
381	*788*	Lvov	21.0
408	*734*	Katowice	16.0
1,411.8	*212.5*	Warsaw —Raszyn	158.0
PORTUGAL			
290.5	*1,033*	Lisbon (CTIAA) also on 42.9 m.	2.0
ROMANIA			
394	*761*	Bucharest	16.0
RUSSIA			
427	*702.5*	Kharkov	25.0
720	*416.6*	Moscow (PTT)	20.0
800	*375*	Kiev	20.0
937.5	*320*	Kharkov (RV20)	25.0
1,000	*300*	Leningrad	100.0
1,060	*283*	Titlis	10.0
1,073	*279.6*	Rostov Don	4.0
1,103	*272*	Moscow Popoff	40.0
1,304	*230*	Moscow (Trades Unions)	165.0
1,481	*202.5*	Moscow (Kom)	40.0
SPAIN			
266.5	*1,125.6*	Valencia	8.0
349	*860*	Barcelona (EAJ1)	8.0
368.1	*815*	Seville (EAJ5)	1.5
424	*707*	Madrid (EAJ7)	2.0
453	*662.2*	San Sebastian (EAJ8)	0.6
SWEDEN			
230.3	*1,304*	Malmö	0.75
257	*1,166*	Hörby	15.0
306.9	*977.2*	Falun	0.65
322	*932*	Göteborg	15.0
436	*689*	Stockholm	75.0
542	*554*	Sundsvall	15.0
770	*389*	Ostersund	0.75
1,220.5	*244*	Boden	0.75
1,352	*221.9*	Motala	40.0
SWITZERLAND			
244.1	*1,229*	Basle	0.65
246.7	*1,215.7*	Berne	0.5
403.5	*743*	Söttens	32.0
458.2	*658*	Zurich	0.5
459.2	*653*	Beromuenster	77.0
680	*442*	Lausanne	0.6
760	*395*	Geneva	1.5
TURKEY			
1,216.2	*246.6*	Istanbul	5.0
1,538	*195*	Ankara	7.0
YUGOSLAVIA			
307	*977*	Zagreb (Agram)	0.7
430.6	*696*	Belgrade	3.0
574.7	*522*	Ljubljana	2.8

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LOUD-SPEAKER RESPONSE

ANY ordinary musical tone is built up of a fundamental frequency and various harmonics. It has been shown by experiment that the fundamental frequency can be filtered out of a complex tone, and the ear will still identify the "pitch" of the missing note. Of course much of the original musical quality has disappeared. It is this tolerance of the human ear that is responsible for the continued use of some of the earlier types of loud-speaker. Many of these instruments are only capable of covering a mere fraction of the total frequency-band necessary for true musical reproduction.

B. A. R.

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

Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4.

"IS YOUR TRANSFORMER OVER-WORKED?"

(*Continued from page* 974)

A.C. value of the current. Many transformer designers utilise the D.C. value when working out the secondary windings of the transformer, but this is inadequate, and may result in overheating.

We are left with one problem propounded by expert B to clear up, and that is the question of the *power*. Let us consider the case of the single-wave rectifier. If we take out 250 volts 40 milliamps and we have to put in 250 volts 80 milliamps, on the face of it it looks as if we are putting in twice as much power as we are getting out, which would make the rectifier a very inefficient arrangement. The answer to this is that in a circuit carrying a pulsating current the power is not the product of the volts and the amps, but only 50 to 70 per cent. of this value. A pulsating current or voltage may be represented as a steady voltage with a fluctuating voltage superposed. The power, therefore, is the steady average power together with the fluctuating power, which is sometimes added to and sometimes subtracted from the average power. For this reason the power is not the product of the current and voltage, but a smaller value as we have seen. This disposes of the last remaining bogey and shows how both experts were apparently right due to a failure to discriminate between average and R.M.S. values of current.

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