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Popular Wireless

Every Wednesday
PRICE
3d.

No. 550. Vol. XXII.

INCORPORATING "WIRELESS"

December 17th, 1932.

THE P.W. ALL-IN-THREE

CONSTRUCTIONAL DETAILS INSIDE

Also:

SHORT-WAVE HOOK-UPS
□ □ □
RADIOGRAM REMINDERS

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By Val Gielgud

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[ADVT.]

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"K"

GROUP

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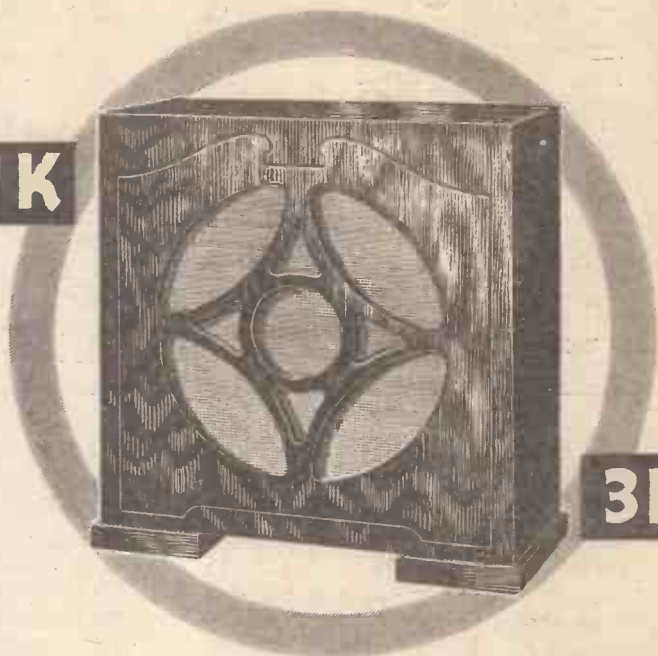
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Catalogue P.W.61S. free on request.

31K



31/6

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66K



15/-

66KC



19/9

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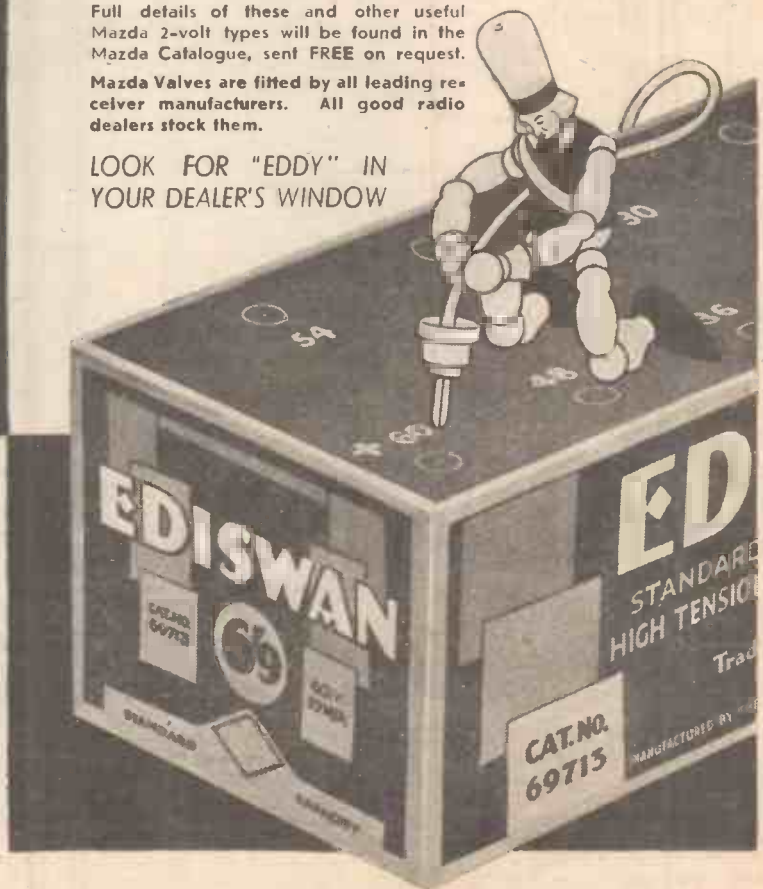
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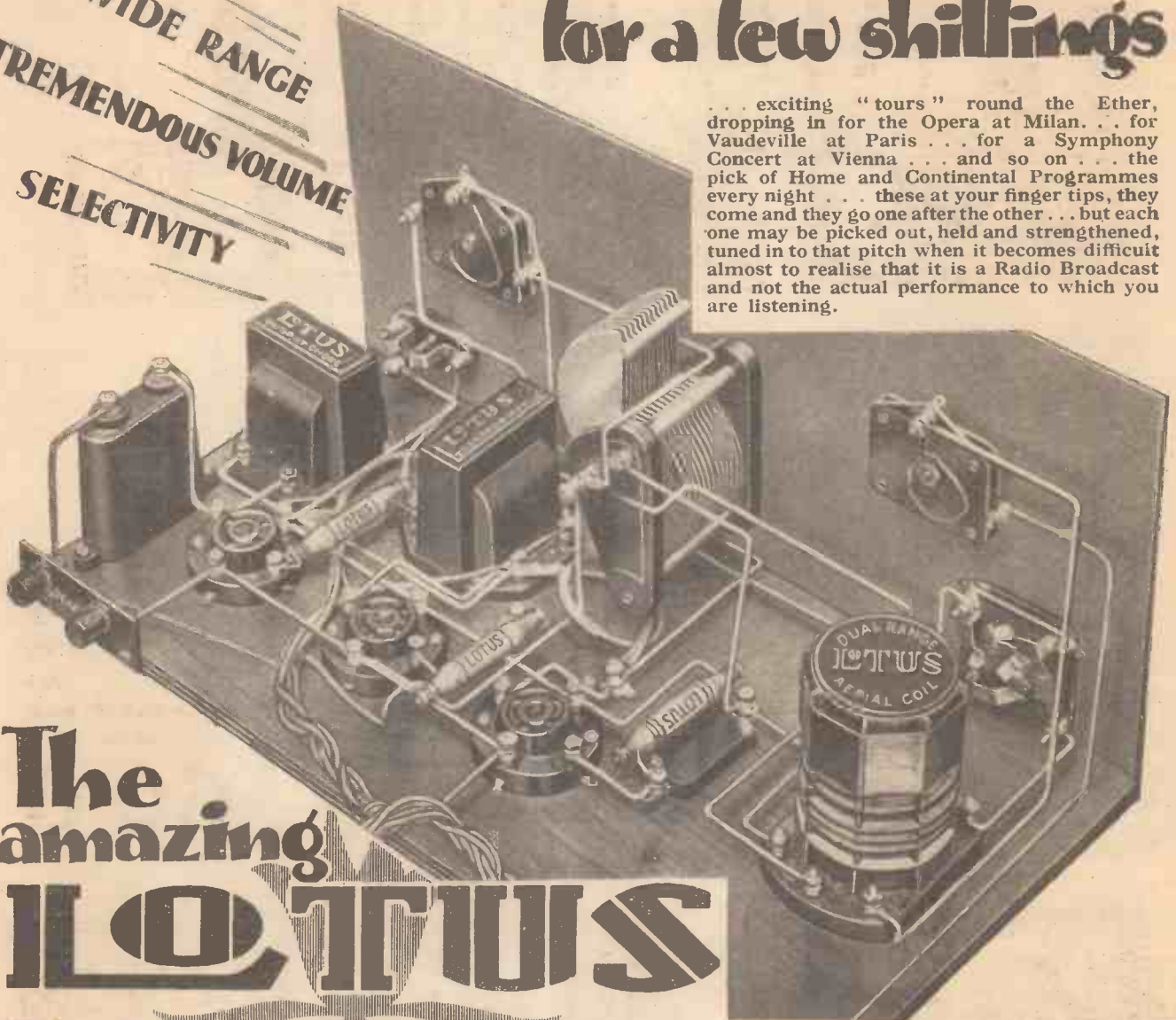
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V.168

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TREMENDOUS VOLUME
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The amazing **LOTUS** **LANDMARK 3 KIT**

39/6

The amazing LOTUS LANDMARK 3 KIT is a revelation in its performance, to amateur and expert alike. Built entirely with LOTUS GUARANTEED COMPONENTS, their Guarantee is virtually built into your set... amazingly simple to construct. If careful attention be paid to the wiring diagram, immediate success is assured. In fact, so simple are the details of construction, that a schoolboy could build it with ease. And look at the price—39/6. Wherever could you buy a modern Kit of Guaranteed Components for so small a sum?

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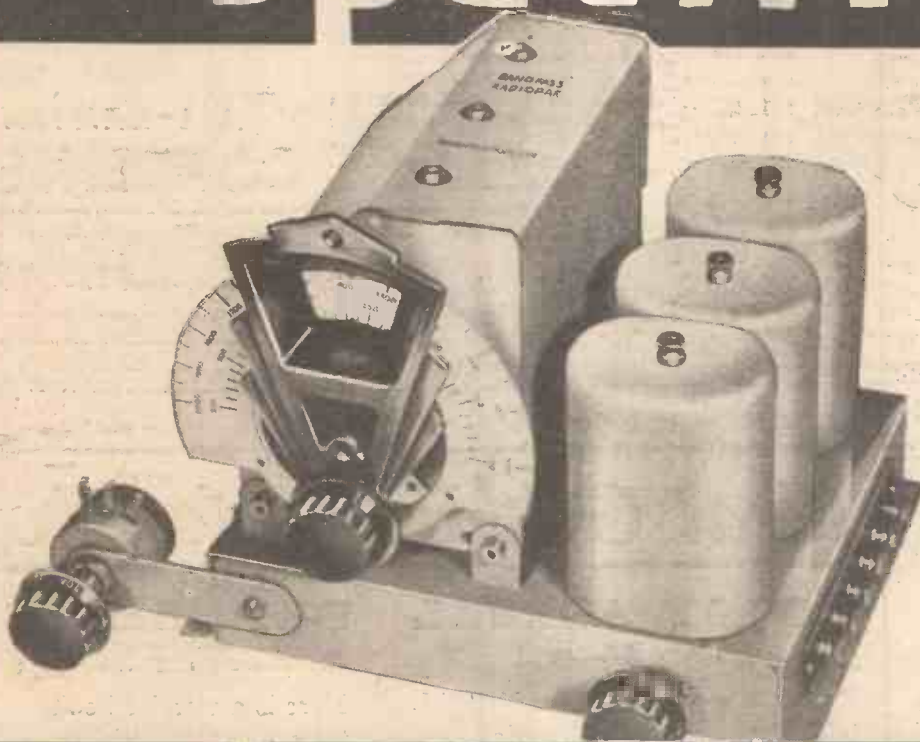
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FOR THE "P.W."
"ALL-IN" THREE
Type 535A/50,000
with extra knob
for Reaction Con-
denser.

60'6

P.W. ALL-IN THREE

THE band-pass 'Radiopak,' on account of its superlative value to set constructors, has been used in the "Popular Wireless" "All-In" Three.

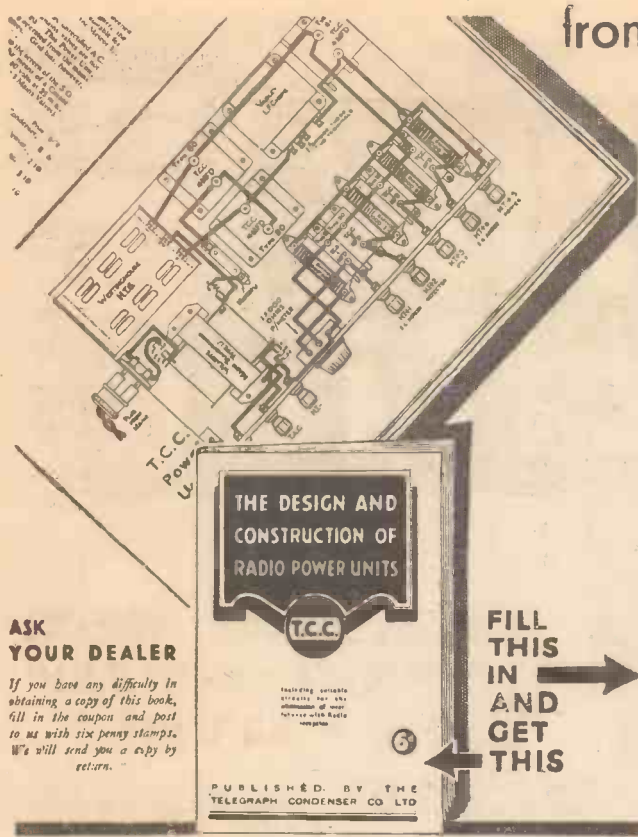
The band-pass 'Radiopak' simplifies set construction as well as it simplifies selectivity. Revolutionary in conception and design, neat, compact, and robust, above all the 'Radiopak' is efficient. Consisting of screened coils with provision for reaction, ganged condenser with drive, combined

volume control, and on-off power switch, mounted neatly on a metal chassis, the 'Radiopak' needs only the addition of valves, low-frequency circuit, loudspeaker, and batteries or mains unit to form a complete receiver.

Because the coils and condenser are matched with the highest possible degree of accuracy before leaving our factory, all ganging difficulty is eliminated, and each unit is supplied with a tuning scale calibrated in wave-lengths.

BRITISH RADIOPHONE LTD., Aldwych House, Aldwych, London, W.C.2

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from "THE DESIGN AND CONSTRUCTION OF RADIO POWER UNITS"

CONTENTS

T.C.C. one of the oldest firms in radio have produced this authoritative book on power units. Packed full of real useful data, with complete constructional details of four Radio Power Units—it shows the way to better and more powerful reproduction—to cheaper radio. These power units solve your battery problem—no longer will you suffer distortion due to inadequate power. Build one of these A.C. Power Units and get the best from your set. For D.C. users there is a valuable chapter on D.C. Apparatus. Get your copy Now!

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 FOUR T.C.C. POWER UNITS with full constructional details.
 ROTATING RESISTANCE CALCULATOR

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The filament with the highest electron emission efficiency of any Battery valve filament in the world.



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The high slope Screen Grid valve for extremely sensitive reception and increased range in screened coil sets.
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by

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entitled:—



"S.T. 400"—ANOTHER TRIUMPHANT SUCCESS

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MORE ABOUT THE "S.T. 400"

□ □ □

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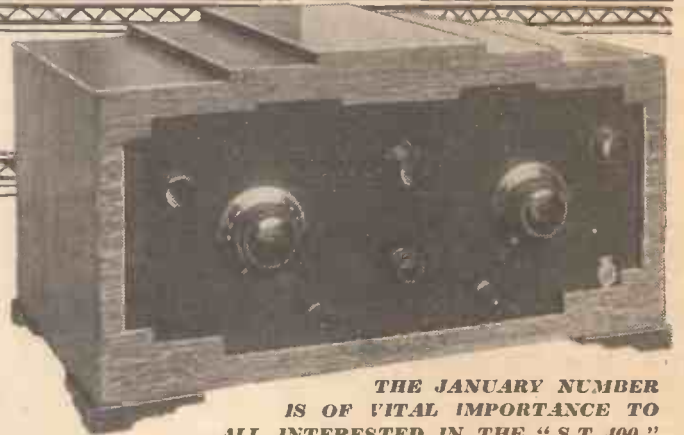
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COSSOR MELODY MAKER Model 335. Complete with Valves, Speaker, and Cabinet. Employs Cossor Variable-mu S.G., H.F. stage, Detector and Power Valves. Cash Price £7/17/6. With **10/-** order
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As described this week.

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Or 12 monthly payments of 8/9.

KIT "B" As Kit "A" with valves, but less cabinet and speaker. CASH or C.O.D. Carriage Paid £6/8/3.
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KIT "C" As Kit "A" but complete with valves, Peto-Scott Console cabinet and Atlas P.M. moving-coil speaker. CASH or C.O.D. Carriage Paid £9/15/3.
Or 12 monthly payments of 18/-.

FIRESIDE CONSOLETTA
As described last week.

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or 12 monthly payments of 14/7.

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or 12 monthly payments of 18/11.

KIT "C" As Kit "A" but with valves and Cameo "Embassy" Cabinet. CASH or C.O.D. Carriage Paid. **£22-2-6**
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APEX As described in "Popular Wireless," October 8th.

KIT "A" Author's Kit of specified components including ready drilled panel and terminal mounts, but less valves and cabinet. CASH or C.O.D. Carriage Paid. **79/-**
One Set of Valves, £1/12/3. One Specified Cabinet, 15/-.

KIT "B" As Kit "A" but with valves, less cabinet. CASH or C.O.D. Carriage Paid £5/11/3.
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KIT "C" As above, including valves and cabinet. CASH or C.O.D. Carriage Paid £8/6/3.
Or 12 monthly payments of 11/7.

APEX WITH EXTENSER CONTROL
As described in "P.W." November 26th.

KIT "A" Author's Kit of specified parts including ready drilled panel and terminal mounts but less valves and cabinet. CASH or C.O.D. Carriage Paid. **£4-10-6**
Or 12 monthly payments of 8/4.

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Or 12 monthly payments of 11/3.

KIT "C" Complete Kit of specified parts including ready drilled panels and terminal mounts, valves and cabinets. CASH or C.O.D. Carriage Paid, £6/17/9.
Or 12 monthly payments of 11/7.

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Dear Sirs, Please send me CASH/C.O.D. H.P.
for which I enclose £ s d CASH/H.P. Deposit.

NAME
ADDRESS
P.W. 17/12/32

Yours for Better Radio this Xmas - Peto-Scott

Every day we receive letters like these:

★

Wolverhampton,
7/11/32

Dear Sirs,

..... Now I must say a few words about your 337 All-Electric. I think I am right in saying I bought the first in Wolverhampton. I have never heard one to beat it for natural voice and clear tone. I can get as many stations as I want, in fact more than I want. Everybody who has heard it speaks highly of it. One in particular tells me it is better than one he has (Radiogram) which cost 40 guineas. I am wishing your 337 every success as I say anyone requiring a set they can't buy anything better or cheaper.

Yours faithfully,
(Signed)

★★

Minehead,
17/11/32

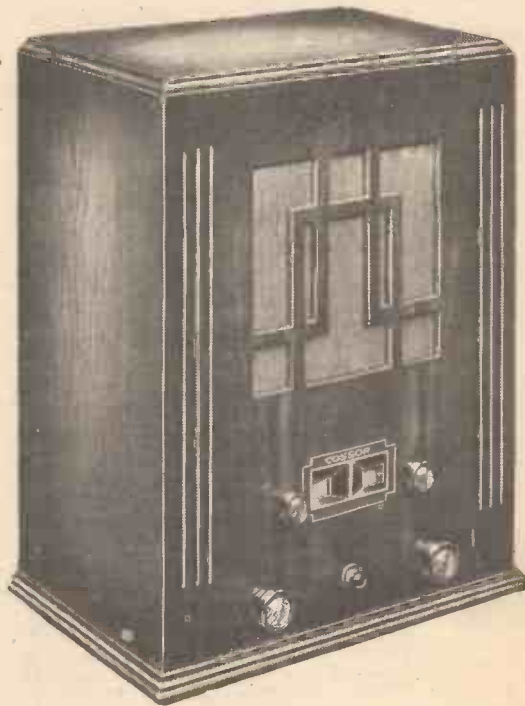
Dear Sirs,

Before deciding to buy your £9.15 Kit (Model 336) I was able to hear no less than five all-mains sets with self-contained moving coil speakers, all of the latest type by first-class makers and widely advertised, including superhets and your £17.17 four valve model (Model 533A). I found all but the last mentioned perfectly hopeless. In the search for selectivity practically everything else has been sacrificed. The outstanding defect is gross over-accentuation of the bass notes, which involves 'booming' so that the human voice sounds as if it were being projected into a large metal trumpet. Your set alone is free from these defects and reproduces the voice as nearly perfectly as seems possible. Without possessing any special knowledge on the subject, it seems as if every other method of securing selectivity, except your variable-mu valves, is a failure. The success of the last named method is marvellous...

Yours faithfully,
(Signed)

★ " ... get as many stations as I want ... "

★★ " .. reproduces the voice as nearly perfectly as seems possible ... "



BATTERY MODEL 335

with Self-Contained Loud Speaker
Kit of Parts includes 3 Coossor Valves (220 V.S.G. Variable-Mu Metallised, Screened Grid, 210 H.L. Metallised, Detector and 220 P. Output); Individually Shielded Coils. All-metal Chassis and all parts for assembling the Receiver as illustrated; handsome cabinet 18½ in. x 13½ in. x 10½ in. and 10 in. Balanced-Armature Loud Speaker. Provision is made for fitting Gramophone Pick-up Socket and Plug.

Price **£7.17.6**

Hire Purchase Terms: 17/6 deposit and 9 monthly payments of 17/6

BATTERY MODEL 334

Kit of Parts, similar to Model 335 except that no loud speaker is supplied. Handsome cabinet 9½ in. x 13½ in. x 10½ in.

Price **£6.7.6**

Hire Purchase Terms: 14/- deposit and 9 monthly payments of 14/-

ALL-ELECTRIC MODEL 337

with Self-Contained Loud Speaker
Kit of Parts for All-Electric Melody Maker Model 337 similar to Model 335 (as illustrated) but for all-electric operation. Price, including Coossor Valves, Cabinet, 18½ in. x 17½ in. x 10½ in. Loud Speaker and all parts

Price **£11.15.0**

Hire Purchase Terms: 25/- deposit and 11 monthly payments of 21/-

ALL-ELECTRIC MODEL 336

Kit of Parts, similar to All-Electric Model 337 except that no loud speaker is supplied. Handsome cabinet 10½ in. x 17½ in. x 10½ in.

Price **£9.15.0**

Hire Purchase Terms: 19/6 deposit and 10 monthly payments of 19/6

ALL-ELECTRIC MODEL 338

Kit of Parts for All-Electric Melody Maker Model 338 Chassis. Identical with Model 336 except that no cabinet is supplied. Escutcheon and template for drilling your own cabinet is included.

Price **£8.15.0**

Hire Purchase Terms: 32/6 deposit and 8 monthly payments of 20/-

All-Electric Models for A.C. Mains only. 200 to 250 volts (adjustable), 40-100 cycles.

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MELODY MAKER**

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Please send me free of charge a full size Constructional Chart, which tells me how to build the Coossor ^{Battery} ^{All-Electric} Melody Maker.

(★ Strike out type not required.)

Name

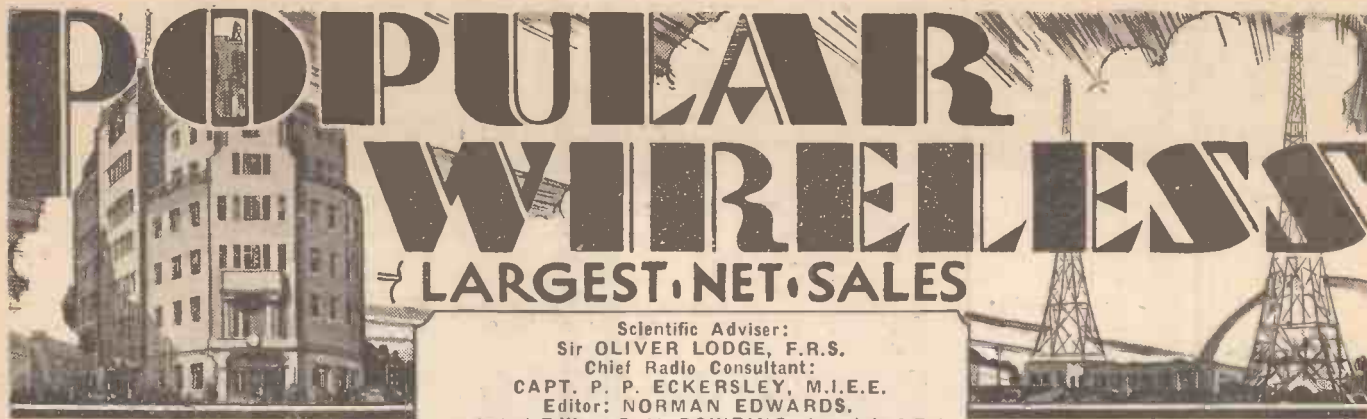
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PANTOMIME SUGGESTION
 OTHER PEOPLE'S
 LICENCES
 NOT THE SAME THING!
 A TIMELY HINT

RADIO NOTES & NEWS

DUSTY BUSINESS
 RADIO STAMPS
 1933 JOY GIFT
 CHAMPION CRUMPET

The B.B.C.'s Pantomime.

THIS year's special Christmas riot of laughter and music which is to be broadcast on December 26th and 27th as a pantomime, "Jack and the Beanstalk," is to be written by Ernest Longstaffe, which ought to be a guarantee for its success. If any further security is needed it may be found in the fact that the cast includes Leonard Henry. By the way, this Jack is to have a Jill in addition to his customary Beanstalk. Suggestion for next year: "Bluebeard and the Merry Wives of Windsor."

Sir H. Wood's New Job.

IT really is true that the busiest people have the most time to spare. Here is Sir Henry Wood, a busy man if ever there was one, calmly taking on the Presidency of the newly-formed Music Industries Council.

This Council will represent every section of the musical community, including music printers, for "the encouragement of adequate recognition of the cultural and educational value of music in all its forms." The energy of great men makes me almost ashamed to go to bed.

How It Is Done.

THE first four Imperial Airways "Atlanta" aircraft for the Cairo-Cape Town air route are to be equipped with Marconi wireless apparatus, and Marconi-Robinson direction-finding attachment. But what lies behind that simple statement? It may be thought that one has simply to get a wireless set and tie it to the aeroplane.

Well, the fact is that before this particular apparatus could be designed a Marconi aircraft expert spent six months flying over the African route, searching out good and bad areas, etc., for different wavelengths, and so forth.

The Way the Licences Go.

IN Holland at the end of September, 294,800 receivers were owned by individuals, and 259,360 persons were registered as members of groups sharing sets worked on domestic telephone wires. Listeners, 68 per 1,000 head.

In Italy there are now 239,000 licensed listeners, out of a population of 42 millions. Milan heads the list with 31,157, Rome

having but 19,362. New Zealand has increased its licences by 7,000 since last year, and now has 81,656—a result due to the B.B.C.'s Empire scheme. Listeners, 49 per 1,000 head of population.

Our Television Competition.

THIS closed on December 7th, and I am happy to be able to announce that from our point of view it has been entirely successful. Thousands of entries have been received, and already it has been observed that the information which they embody is very valuable indeed. Whatever the result may bring to individual competitors, there is no doubt that the combined efforts of all will play an important part in the development of the future television programme. I am sure that you will all

THEY SAY—

for completely satisfactory reproduction it is highly desirable to have two tone controls. (Page 837).

a frame aerial will not exhibit directional effects so long as it is in any way earthed. (Page 821).

Readers may think that I am conservative, conventional, obstinate—call it what you will. (Page 848).

It is always somewhat fascinating to "lay bare the bones" of a set in this way. (Page 833).

All is no longer quiet on the "Empire Broadcasting Front". (Page 842).

await with great interest our further announcements about this competition, and what will follow from the pens of the prize-winners.

Set-Testing Interest.

MR. DOWDING asks me to say that as a result of his invitation to readers to ask for an opportunity of seeing our new set-testing system being applied, he has received many requests, and will reply to each applicant in due course, but that it will require some little time to do so and fit in the visits to suit the convenience of each one. I am not surprised at the response which he has had, because his article in our issue of December 3rd is so interesting that I nearly wrote to him myself. But they have not let me go near

their doo-hickeys since I sent my typist along there to ask for the loan of a "Band-Pass" for a Queen's Hall concert!

A Rumour Contradicted.

THE "trade" had a bit of a jolt recently when rumours were abroad to the effect that the Ford Motor Company would shortly be manufacturing radio sets in Great Britain, or that apparatus made in Detroit would be imported here. The Ford Motor Company has denied the rumour.

There appears to be no connection between this matter and Mr. Ford's recent illness, his recovery from which we all rejoice at, for he is a great and a good man.

The B.B.C. Empire Broadcasts.

SO far as my information goes, the first report of the B.B.C.'s Empire Broadcasting Scheme tests is one from the Malay States reading, "Empire broadcasts fine. Transmissions 16.9 and 25.3 metres perfect." I am looking forward to hearing the views of the new scheme from some of my own pet correspondents in out-of-the-way parts of the Empire.

Radio Manufacturers, Attention!

R. M. C. (Glasgow), who appears to have special knowledge of Australia, puts in a plea for prompt and effective action on the part of British manufacturers to wrest the radio trade in the Empire from the hands of the U.S.A. "Our manufacturers have gained a high reputation on the Continent," he says. "Why do they not attempt to gain one in our Empire? Tariffs can no longer be blamed."

Exactly! And what more appropriate time could there be for an intensive campaign, with the new B.C.C. Empire service just about to begin?

Changing Valves in S.W. Sets.

REFERRING to A. T.'s (Kenya) difficulty when changing the last valve of his short-wave set, a reader of Brixton Hill suggests that the trouble is due to the fact that the new valve takes a different current, thus affecting the anode current of the other valves, even though the difference be of the order of only two milliamps.

My correspondent suggests that A. T. may find consolation in reflecting that the more efficient his circuit the greater will

(Continued on next page)

ARIEL'S RUNNING COMMENTARY ON RADIO—(continued)

be the variation he observes. Well, I leave the S.W. experts to snarl over this point and thoroughly enjoy themselves.

A "Brush Discharge."

IN a statement which was read before the American Congress of Physical Therapy in New York, Dr. Nikola Tesla, the world-famous electrician, said that when he felt the need for a brush down, he simply charged his body with one million volts, as a result of which all dust, etc., on the body is thrown off.



I resolutely stick to soap and pigs' bristles! If civilisation develops according to Tesla's notions, bath night is going to be just plain heck with the stopper out for my great-grandchildren.

Brudder Bones to Return.

OWING to a predilection for negro spirituals and plantation songs, which, the B.B.C. confesses, it has always harboured and nourished, there is to be a revival of the "nigger minstrel idea" at Portland Place, and the first broadcast of the troupe will probably be given early in the New Year.

This new venture may be successful; I hope it will; but I would suggest that the B.B.C. ought to have tried to ascertain whether its predilection for negroid snuffling and moaning is shared by the listening public.

Philately and Radio.

WHY they call stamp-collecting "philately" passes my comprehension. That, by the way.

I was about to remark that with the exception of a postage-stamp bearing the bust of Popoff, the Russian who used a coherer circuit for the reception of "atmospheries" and on the strength of that is claimed by the Bolsheviks to have invented wireless, I have not seen a stamp commemorative of radio.

Aeroplanes figure profusely, and quite logically, on air-mail stamps, and all kinds of other objects are depicted to the delight and despair of the collector, but no country, so far as I know, has immortalised Marconi, Lodge, Fleming or De Forest in the albums of philatelists.

Just—But Not Profitable.

IT has come to my notice that the Spanish authorities have made a regulation prohibiting anybody from acting, singing or speaking before the "mike" unless

he or she can prove that him or her has paid hers or his licence fee, and has possessed a receiver for more than three months. Rather a pin-pricking rule, I suggest. Fancy our insisting on



Bernard Shaw or H. G. Wells having a radio receiver before "allowing" them to address us by wireless! And wouldn't

it be better to insist upon people showing that they can act, sing or talk before they are allowed to take the freedom of the ether?

Christmas Treat.

IF you are able to spend a little extra this Christmas on radio talkie I advise you to get the December "Modern Wireless." It's a great shilling's-worth, and the sets which, amongst a wealth of other goodly matters, it presents, aim very high. The "Diodion" Super-Seven, for instance, a super-het. with something new about its make-up. Or what about the "Whole World" Five, eh?

Ambitious, what? Nevertheless, no country in the world is beyond its reach. If you are planning to give yourself a 1933

SHORT WAVES.

The B.B.C. arrangements for broadcasting strange sounds have been fairly successful, but all attempts to catch the faint notes of a post-office assistant saying "Thank you" to a purchaser seem to have failed.

"Punch."

We read of wireless receiving sets which are practically fool-proof. Another widely-felt want is the fool-proof microphone.

According to a news item, a man named Alexander recently made a violin which only measures two inches in length and can be played.

Were it not for the latter drawback, this novelty should certainly be brought to the notice of the B.B.C.

A Scottish listener was recently fined £5 for failing to take out a wireless licence, and it is stated that during the two days which followed the prosecution, no less than 220 licences were taken out in that particular district.

An obvious case of a sprat to catch a Mac.

William: "I've got a new name for my radio set. I call it the Railroad Receiver now."

Robert: "Why?"

William: "Because it whistles at every station."

THE LOUDER LUNACY.

I've heeded not the stories which asserted That you, Diana, while appearing kind, Were oftentimes malignant, and exerted A baleful influence upon the mind.

But, since I found, as all in vain with tireless Fingers I turned each knob to left and right, That in the ether, judging by my wireless, There must have been some dirty work last night,

I feel that if such cacophonous squealing Recurs, and you are justly to be blamed, The lunacy I soon shall be revealing Will be correctly named.

joy-gift have a look at this set before you buy a new bike or a set of Dickens—and you'll thank me for the tip.

Spoke Werry 'Andsome.

SOME of us old hands seem to have lost sight of the man who really did show the B.B. Company of 1922 things about music which it did not know—I refer to Stanton Jefferies, who, though fulfilling an important rôle in the B.B.C. organisation, seldom if ever gets any public recognition.

Therefore, I was glad to read the following, which is an extract from a B.B.C. announcement about the late Mr. Percy Pitt: "Percy Pitt found Stanton Jefferies guiding its musical destinies with a keenness and a wisdom and ability which he has never ceased to applaud. Broadcast-

ing in this country owes an incalculable debt to the courage and the farsighted enterprise of its youthful pilot of those early days."

North Reg.'s "White Elephant."

FERVID, adolescent admirers of Uncle Eric (North Regional) sent him a crumpet measuring two feet in diameter, to help him deliver his talk on "Crumpet Carving in the 18th Century," and thereby created a problem—its disposal—which up to date has not been solved. The typist refused to use the gift as an air-cushion; the cat swooned at the sight of it and eventually laid her family in the hall-porter's overcoat! Oh, blind generation! Can you not see that it should be handed over to "Effects" for use in producing "Dull Thud"?



Radio Advertising.

THE movement for radio advertising in this country gathers strength, not amongst listeners, but amongst those who might benefit by its success. The newspapers, of course, discourage the idea because Advertisement Revenue is even more sacred than Policy.

As the editor of a well-known trade journal puts it, "In this country we buy our radio sets and pay a licence for them, as we do our motor cars. Our cars are supplied without rubber mats bearing slogans, and we expect, too, to be free of advertising matter when we buy radio."

Do They Listen, Though?

AN amusing example of radio advertising is furnished by the American firm called the "International Heating Company." I suppose they deal in stoves. However, they choose to broadcast at 6.30 a.m.—in the winter—a time when, they think, the American family will love to hear about warmth. But my knowledge of human nature bids me believe that those folk who need not rise at 6.30 would prefer to be warm in bed; and that those who must get up at that frightful time have a jolly good reason for it, and one which prohibits them from listening to broadcasting!

Is This a Record?

I HEAR that (non) Bracing Bournemouth has gone practically all-radio, for it contains 22,459 homes (not counting nests, birds, bees, wasps, for the use of), and of these 21,039 are licensed for radio reception.

Evidently pines produce prodigious probity. Moreover, these figures prove what my grandma used to say regularly once a year after spending a month there, viz., "Bournemouth is so relaxing!" All honour to the gem of Hants.





ALL ABOUT CONTROLLING VOLUME

IN these days of high-amplification valves, S.G. stages and a super-abundance of powerful broadcasters, the question of volume control is one that affects nearly every listener.

Any set that is capable of bringing in foreign transmissions on the loudspeaker is practically certain to require some means of reducing the strength of the local programmes to a degree adequate for normal listening, otherwise such powerful transmissions as our own Regionals will tend to overload one or more of

THE BEST METHODS REVIEWED
 By A. JOHNSON-RANDALL.

the valves, or to come through with such force as to make listening unenjoyable to most of us.

It occurred to me recently when I was carrying out some alterations to a design of my own, that a few pictorial diagrams showing the best methods of volume control, together with a brief description of the "pros and cons," would be a considerable help to readers who are desirous of fitting such a control to their existing set.

There is usually room on the panel of most receivers for a potentiometer or differential condenser, because these are always small size components.

Alternatively, the terminal-strip at the back can be pressed into service, but

the snag here lies in the inconvenience of having to place one's hand round the back of the set in order to make an adjustment.

Now the scheme used must always depend to some extent upon the type of circuit, and also, of course, on the layout of the components.

Cause of Instability.

In some instances the layout may need modification in order to bring the terminals in the right positions for wiring up to the potentiometer or differential condenser.

Therefore, in these cases it is better not to alter the layout, but rather to adopt some other method which can be introduced without modifying the set.

What I mean by this is that a change in the position of a single component may at times cause instability; on the L.F. side it might make the set howl or whistle. So I can only discuss the various

methods, and leave it to you to choose which is the most suitable for your particular receiver.

Volume controlling can really be split up into two parts. You can have a pre-detector or pre-H.F. control, which enables you to increase or decrease the incoming programme before it is rectified by the detector.

On the other hand, you can put your control on the L.F. side of the set, and simply cut down the volume by reducing the amount of energy applied to one of the L.F. valves.

My personal opinion is that those who have an S.G. stage will usually find it

PRE-DETECTOR TYPES—POTENTIOMETERS ON THE L.F. SIDE—FOR PICK-UPS.

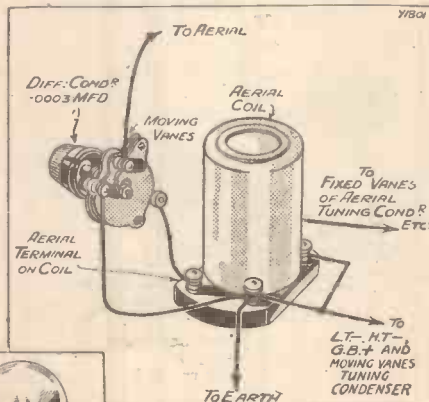
advisable to use the method which operates prior to detection. For example there is the variable-mu valve, a very satisfactory scheme, indeed; the potentiometer scheme across the aerial winding, so that the amount of energy applied to the grid of the S.G. valve can be varied at will.

Or there is that very simple scheme which makes use of a differential condenser connected directly in the aerial/earth circuit, the aerial connection going to the moving vanes of the differential condenser, and the two sets of fixed vanes being joined between the aerial and earth terminals on the aerial coil.

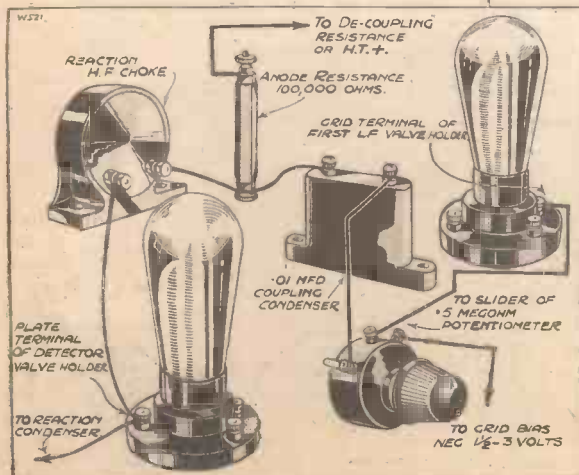
The differential method is popular because it is so easy to install. All that is needed is a .0003-mfd. differential

(Continued on next page)

USING A DIFFERENTIAL

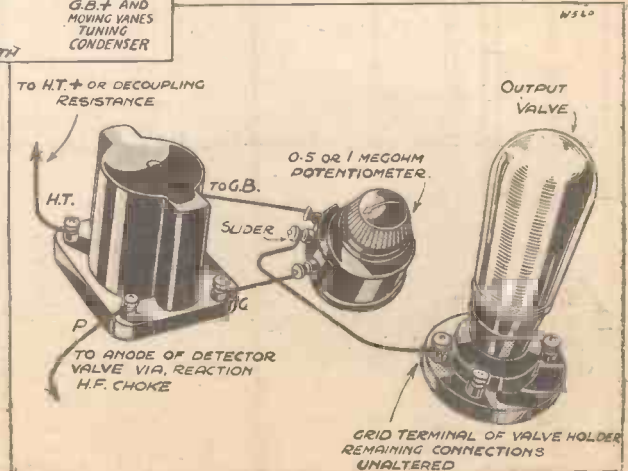


FOR AN R.C. STAGE



Three ways of varying the set's output. The differential scheme prevents S.G. and detector overloading. The other two methods are particularly suited to receivers of the detector and L.F. type, but can also be used in other classes of circuit.

ACROSS THE SECONDARY



ALL ABOUT CONTROLLING VOLUME

(Continued from previous page.)

condenser, and the modifications to the circuits are negligible.

The only drawback to this scheme is that with some circuits, especially those of the "ganged" type, the capacity

FOR PICK-UPS



When using a gramophone pick-up it is convenient to place the volume control on the turntable. On the right is a useful method to employ with powerful sets, and provides a ready means of cutting down the input to the S.G. valve.

across the coil tends to upset matters; but if the aerial coil has a separate primary winding, this capacity is of little consequence.

The variable-mu valve is becoming more popular every day, and there is no doubt that it does provide a means of reducing the amplification of the set without introducing distortion, and it has a second advantage in so far as it can be used as a stabiliser in circuits that are liable to get out of hand.

But you cannot "variable-mu" any and every circuit arrangement without taking certain precautions, otherwise you are apt to find that your grid-bias battery is "shorted" by some factor which you have not foreseen.

There is one point which you must always remember in connection with variable-mu's. It is this: unless the grid-bias battery is switched out of circuit when the set is not in use, it will gradually discharge itself through the potentiometer, and so run down all too quickly.

Switching Out the G.B.

To overcome this, you can use a three-point on-off switch for switching off the filaments and simultaneously disconnecting H.T.—

Then, by joining the G.B. + end of the variable-mu grid battery to the H.T.—side of the three-point switch, all battery circuits will be broken when the set is switched off.

The other side of the grid-bias battery must, of course, go through the potentiometer to the L.T. negative.

If you figure this out for yourselves, I do not think you will have any difficulty in seeing what I mean.

A Safety First Method.

The method which I have shown in the lower pictorial diagram on this page is

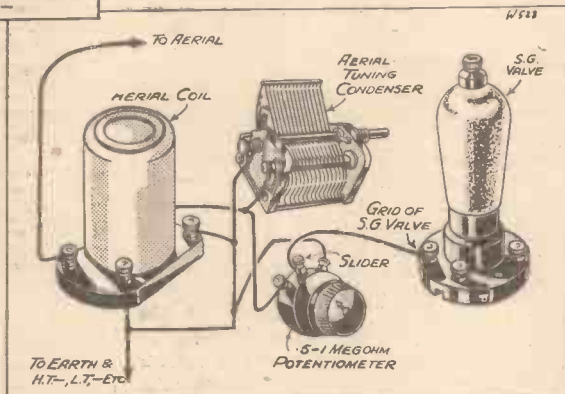
probably the best one to employ with such a set, because I have taken the precaution of applying the bias to the grid of the variable-mu valve through a 1-megohm grid leak, and of separating the grid of the valve from the coil winding by a small fixed condenser. This prevents any unexpected "shorts."

For sets such as a det. and L.F. or det. and 2 L.F., and in cases where the layout will not permit the use of a pre-detector control, the volume can easily be adjusted by equipping one of the L.F. stages with a potentiometer or resistance.

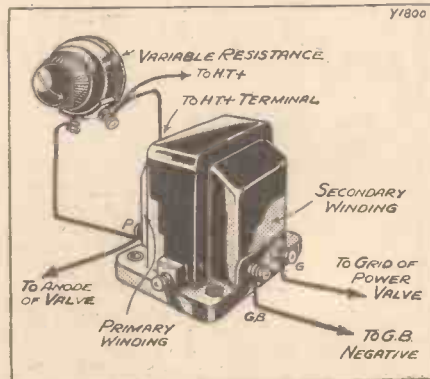
One popular scheme, when the first L.F. stage is resistance-coupled, is to remove the grid resistance, replacing this by a 1/2-megohm potentiometer, connected as shown in the pictorial diagram. This scheme does not introduce any distortion, and is a very good one.

An alternative, which can be applied to

PREVENTS OVERLOADING THE S.G.



ACROSS THE PRIMARY



A variable resistance across the transformer primary is very effective, but the value needs careful choosing. On the right is the variable-mu system, the bias being applied to the valve via a grid leak.

sets with either 1 or 2 L.F. stages, is that of joining a 1/2 or 1-megohm potentiometer across the secondary winding of the L.F. transformer, connecting the slider to the grid terminal of the following valve.

The only connection that is altered is the one normally joining G terminal on the transformer secondary to the grid terminal on the valve-

holder. This lead is removed from the valveholder and, instead, taken to one side of the potentiometer.

The grid-bias connection remains unaltered.

When Using a Gramophone.

Then there is a third method; namely, the use of a variable resistance across the primary winding of the L.F. transformer.

Generally speaking, about 50,000 ohms suffices, this type of volume control being especially suited to transformers having a really high inductance primary winding.

Finally, there is the question of controlling the output from a gramophone pick-up. In pick-up work, as distinct from radio, it is always better to have the control on the turntable, rather than to attempt to cut down the volume by means of a potentiometer in the amplifying equipment itself.

You see, the potentiometer directly across the pick-up enables the input to the amplifier to be controlled at the source, and therefore one can easily stop any valve overloading taking place.

The value of the potentiometer used in conjunction with a pick-up is normally lower than one used in an R.C. or transformer-coupled stage; 50,000 ohms is an average value, but it is best to follow the makers' instructions on this point.

Varying the Screen Volts.

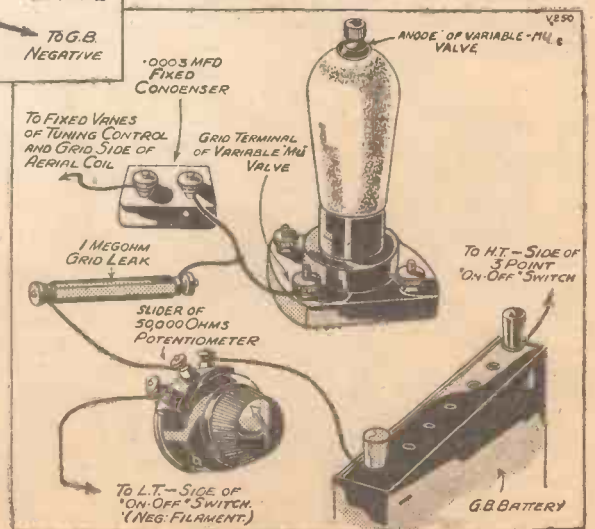
There are, of course, other methods of adjusting the volume, such as a potentiometer for varying the voltage on the screening grid of an S.G. valve.

Personally I am not at all keen on this scheme, which, although effective purely as a control of strength, tends to introduce distortion.

Then, again, there is the "losser" control, which depends for its working upon the insertion of a resistance—a 0-400-ohms variable resistance is usual—between one end of the aerial-grid coil and the tuning condenser.

The introduction of resistance into the tuned circuit causes damping, and while certainly lowering the amplification it also reduces selectivity, an undesirable feature these days.

THE VARIABLE "MU"



Hearing Europe on— The "FIRESIDE CONSOLETTA"



BEFORE we commence our account of the operation of the "Fireside Consoletta," and describe the ease with which station-selection may be achieved, we should like to deal with one or two points for which there was insufficient space last week.

Probably the best way we can draw attention to them, and at the same time enumerate circuit features that deserve special mention will be to consider briefly the fundamentals of the circuit. It is always somewhat fascinating to "lay bare the bones" of a set in this way, especially of such a high-power long-range receiver as this one.

Selectivity Control.

To begin, then, the aerial terminal (on the baseboard at the rear) is connected to the screened coil unit via a .0001-mfd. variable condenser. (This is for selectivity control, and is accessibly fixed to the side of the cabinet, the connections being made by two flex leads).

This aerial coil unit, self-screened and with internal switching, is tuned by the first section of the ganged .0005 variable condenser, and the complete tuned stage is connected direct to the grid of the S.G. amplifying valve.

Reaction from the plate circuit of the detector valve to its grid circuit is effected by the coils inside the H.F. unit, which is

connected to rather a large number of other components. Be sure not to mix up any of its leads.

Another caution might as well be inserted here for the benefit of the inexperienced, and that is: watch the leads are not "nipped" when putting lids on coil units.

It is easy to cut through the insulation of a wire by careless pressure on a coil-unit lid, and it can cause no end of trouble. So, before pressing a lid home, watch that all leads are safely in the centre of their slots, and not touching the screen or likely to be cut by the lid when in place.

To revert to the consideration of reaction.

The construction of this attractive table receiver was covered in our last number, and this week the "P.W." Technical Staff deals with the operation and connecting-up details.

This is of the differential type, and the control is handily placed on the front of the cabinet, above the tuning control. If you have not yet fixed it use flex leads, and keep them *short and direct*. So powerful is the set that reaction need be used but little, and only to bring up very distant stations.

Generally the reaction control is set at minimum and left there, the ganged tuning alone being sufficient to select the required programme. For the weaker stations, however, reaction is there if wanted.

Adequate decoupling of the detector stage is ensured by a decoupling resistance and 2-mfd. condenser; and, incidentally, a similar arrangement is used for the first

L.F. circuit, which enables even a rather poor H.T. supply to be used without motor-boating or other sign of instability.

This makes the set equally suitable for use with mains units or batteries, and also has a bearing on the excellent quality obtainable from it.

Between the detector and the grid of the first L.F. valve are the volume control and also the radiogram switch. Placed thus, the volume control serves for both radio and gramophone regulation, while the switching is of the simplest type needing no further comment.

Any Type of Loudspeaker.

The coupling between the first L.F. valve and the output or "power" valve is by low-frequency transformer; and finally, the set's output is "filtered" by a choke-capacity output circuit, of the type that has been found so satisfactory in practice that it has become almost standard.

Any type of loudspeaker, provided it is capable of handling a big volume is suitable, and many will distinctly benefit from this set's filtered output. Such "filtering" also economises in H.T., and enables long loudspeaker extensions to be made to other rooms with perfect safety.

The value of the grid bias needed will depend upon your output valve—the most important valve in the set, since it generally determines the choice of the H.T. supply as well as fixing how much bias will be necessary.

The flex leads to the grid-bias battery need not be very long, but be sure that they are long enough to reach the battery as it stands on the baseboard, and that the plugs fit tightly with no tendency to work loose.

Unusually Simple.

As regards H.T., 2, 120 or 150 volts is the usual value for this, the H.T. +1 final voltage being chosen experimentally as already explained. It is usually in the neighbourhood of 80 volts.

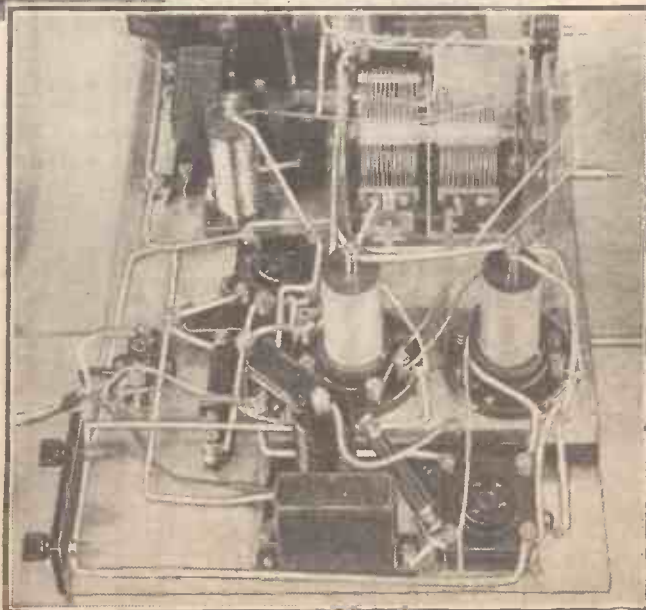
As constructional work on the set is unusually simple, no more need be said except, perhaps, to mention the

(Continued on next page.)



The set's cabinet is divided by a shelf, on which the batteries stand and above which is the loudspeaker. The set proper stands at the base of the cabinet below the shelf.

IN AND OUT OF ITS CABINET



HEARING EUROPE ON THE "FIRESIDE" CONSOLETTA

(Continued from previous page)

braided lead which connects the fixed vanes of the first (aerial) tuning condenser and the first tuning-coil unit.

Such shielded or braided leads are best earthed to the braid, and in this instance no special lead is used for this purpose, but the braid is placed under the lid of the first coil unit in such a position that when this is in place it jams against the braid and affords for it adequate connection to earth.

Perhaps we ought to point out that the on-off switch is incorporated in the coil unit: and also, that a fuse is inserted in the H.T. negative lead, so that an accidental short circuit some day may not prove to have an expensive penalty attached to it, but merely the necessity for a new fuse.

(If you contemplate using the set for a pick-up later on, remember that under such circumstances it is unnecessary to alter G.B.—1's position in the G.B. battery when going over to gramophone.)

Good on Poor Aerials.

Whenever it becomes necessary to alter a grid-bias plug, *switch off the L.T. before doing so.* If that simple piece of advice had been better remembered in the past, many a good valve that found a premature dust-bin might still have been functioning satisfactorily.

The question of the operation of this set for a Continental tour is an easy one to deal with. It is, as already hinted, an extremely powerful receiver, with a really big range, and for that reason it is a good performer on poor aerials.

On indoor and short or low aerials, it seems to reach out without effort, though, of course, very sub-standard aerials may infer the necessity for the use of reaction

that would normally be unnecessary for the reception of the station concerned.

On first tests the "local" and chief

When the switch is over to long waves it will probably be found that the selectivity control (aerial-series condenser on left of cabinet) can with advantage be left always in the "all-in" position.

On medium waves, where keener station-separation is called for, it can usually be set either "all-in" or "all-out," or in some intermediate position for normal reception, the tuning control then being sufficient to bring in the desired station without the need for any other manipulation except, perhaps, the regulation of the volume control.

Getting Selectivity.

What position the selectivity control will thus usually be set in depends upon local circumstances—distance from the nearest broadcasting station, size of aerial, and so forth.

Generally, a big aerial means the selectivity condenser will have to be set nearly, or at its minimum, while the smaller or indoor aerial, naturally more selective, will enable the aerial series condenser to be "all-in," or near that position.

Here is a tip about selectivity that the comparatively inexperienced may be glad to know, though it is rather obvious and will have been practised long ago by the more experienced listener. Always search for a distant or difficult station with the volume control at maxi-

imum strength. If it gets overpoweringly strong as it "fades in," cut down by the aerial series (selectivity) control, rather than by the L.F. end volume regulator, as in that way you will assist selectivity, which is not the case when volume is controlled only at the L.F. end.

Adjusting the Trimmers.

Finally, a few words regarding the adjustment of the ganged-tuning condenser. The front section of this (nearer the panel) is "trimmed" by a knob concentric with the main tuning knob. The front section tunes the aerial coil.

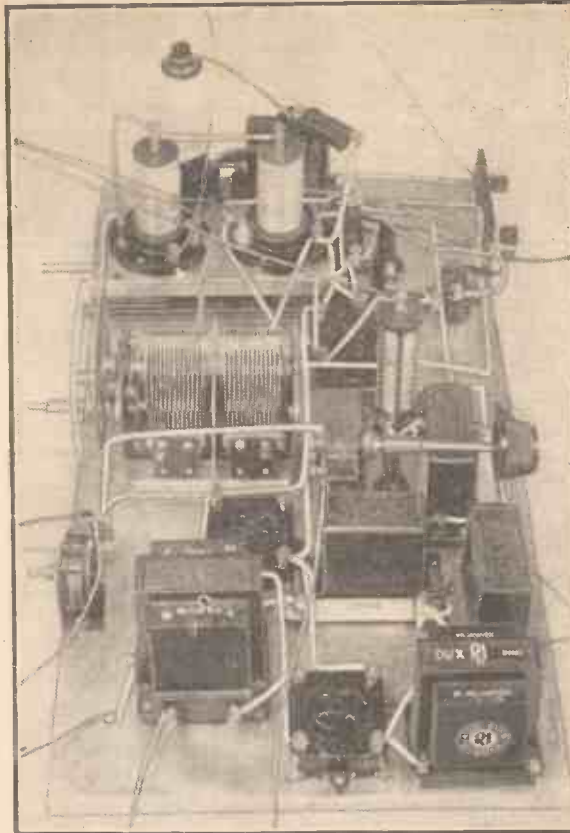
The back section, which tunes the H.F. coil is, therefore, the only one which requires *permanent* trimming. The process is simple and is carried out as follows:

First of all set the panel trimmer "all out," i.e., turn its knob fully to the left. Then screw the star-wheel which controls the rear section trimmer fully in.

Having so adjusted both trimmers, tune in a fairly weak station somewhere near the centre of the dial. Do not touch the front section trimmer on the panel, but do all the *permanent* trimming on the rear section. By the way, the aerial series condenser should be "all in" while trimming.

Slowly screw out the star-wheel until the station is as loud as it can be got. That is all there is to be done. Every station can be subsequently "trimmed" when tuned in by adjustment of the panel trimmer.

WHEN THE NEEDLE IS AT WORK



—Control on a bracket with fits in above the baseboard, and fixed near to the double-gang tuning condenser is the radiogram switch. This is controlled from the back of the set by a knob on an extension handle.

high-power stations will be received almost without the trouble of looking for them, and a note should be made of the various condenser readings for future reference.

SELECT YOUR COMPONENTS FROM THIS LIST

Baseboard, 18 in. × 10 in.

Cabinet (Camco Embassy).

- 1 2-gang .0005-mfd. tuning condenser (Polar Uniknob, J.B. Radioplane, Lotus Utility).
- 1 .0001-mfd. to .00015-mfd. variable series aerial condenser (Telsen Type W.190, Polaf, Graham Farish, Ready Radio, Lotus Igranic, Lissen, Ormond, Cyldon).
- 1 .0003-mfd. to .00035-mfd. differential reaction condenser (Keystone, Gra'am Farish, Lotus Telsen, Ready Radio, Peto-Scott, Polar, Bulgin Cyldon, J.B.).
- 1 5-meg. volume control (Igranic Megostat, Wearite, R.I., Varley, Gra'am Farish, Lewcos, Tunewell, Watmel, Sovereign, Magnum).
- 1 2-meg. resistance and holder (Gra'am Farish, Goltone, Dubilier, Telsen, Igranic, Lissen, Watmel, Ready Radio, Ferranti).
- 1 80,000-ohm resistance and holder (Graham Farish) Ohmite, Dabillier, Colvern, Ferranti).
- 1 45,000-ohm resistance (Colvern Strip, or see above).
- 1 30,000-ohm resistance (Colvern Strip, or see above).
- 1 1,000-ohm resistance (Graham Farish Ohmite, or see above).
- 1 2-gang screened coil unit (Lissen).
- 1 H.F. choke (Lewcos Super, Atlas, Bulgin, Lotus, Peto-Scott, R.I., Ready Radio, Varley, Dubilier, Lissen, Wearite, Magnum, Watmel, Goltone).
- 1 H.F. choke (Ready Radio screened grid or see above).
- 1 Rotary change-over switch (Bulgin Type S.86, Ready Radio, Tunewell, Colvern).
- 3 2-mfd. fixed condensers (Telsen Type W.226, T.C.C., Dubilier, Gra'am Farish, Lissen, Igranic, Ferranti, Formo, Sovereign).

- 1 1-mfd. fixed condenser (Telsen Type W.231, or see above).
 - 1 .01-mfd. fixed condenser (Dabillier Type 610, T.C.C., Ferranti, Igranic, Graham Farish).
 - 1 .0003-mfd. fixed condenser (Dabillier Type 670, Ready Radio, Telsen, T.C.C. Lissen Ferranti, Igranic, Gra'am Farish).
 - 1 .0001-mfd. fixed condenser (Dubilier Type 670, T.C.C., Telsen, Igranic, Gra'am Farish).
 - 4 Valve holders (Benjamin Clearer Tone, Bulgin, Clix, Igranic, Formo, Lissen, Lotus, Ready Radio, Telsen, W.B., Wearite, Peto-Scott, Goltone).
 - 1 Output choke (R.I. Audirad, Igranic, Lissen, Varley, Ferranti, Atlas, Wearite, Bulgin, Lotus, Tunewell).
 - 1 L.F. transformer (Lotus Type-3, ratio 1-5 or 1-3 or 3:1, Atlas, Bulgin, Multitone, R.I. Varley, Sovereign, British General, Lissen Telsen, Ferranti, Igranic, Tunewell).
 - 1 Fuse holder (Bulgin Type F.5, Goltone, Belling & Lee).
 - 1 Terminal strip, 3 in. × 1½ in. (Goltone).
 - 2 Terminals (Belling & Lee, Clix, Goltone, Igranic, Ealex).
 - 8 Battery plugs and spades (Clix, Belling & Lee, Ealex, Igranic, Goltone).
 - 6 yards of systoflex and 7 yards of 18-gauge tinned copper wire (Goltone and Wearite).
 - 1 60-ma. fuse (Belling & Lee Serafuse).
 - 1 3½-in. switch bracket (Wearite).
 - 1 ½ in. × ¾ in. coupling link (Wearite).
 - 1 ½ in. × 2½ in. extension spindle (Wearite).
 - 1 Piece of .004-in. copper foil, 18 in. × 10 in.
 - 3½ in. of flexible metallic single-screened tubing (Goltone).
- Screws, flex, etc.

THOUGHTS about XMAS RADIO

IN the majority of people's minds the main thing about Christmas is its associations.

The word carries with it a perfect kaleidoscope of pictures fading one into the other: the red dressing-gown and white whiskers of Santa Claus, improbably crystalline snow, children's parties, bloated turkeys and obese plum puddings, presents, and large bunches of mistletoe in the hall.

But more important than any of these, though with most of us it remains in the background of our thoughts and only comes into the foreground during the service on the morning of Christmas Day, is a phrase—a phrase which stands out even in those pages which are so rich in magnificent groupings of words, and which will never be forgotten as long as Christmas is celebrated amongst mankind—"On earth peace and good-will towards men."

In considering the possible relationship between Christmas, the oldest Christian festival, and broadcasting, the youngest medium of expression, one cannot fail to be struck by the fact that there is a close approximation between the motto of the B.B.C., and that phrase which is, practically speaking, the motto of Christmas. For the B.B.C., with a certain magnificent optimism, chose to write "Nation shall speak peace unto Nation" underneath its coat of arms.

Peace—the Urgent Necessity.

It may appear that this juxtaposition of ideas is a trifle far-fetched, and yet the point of contact is not so distant as at first sight it may seem to be. Amongst Christian people, indeed, amongst intelligent people and people of normal kindness and good-will, the permanent establishment of peace has become a thing of the most obvious and most urgent necessity to the human race. Particularly has this been the case since the blood bath of the last war, which surely has been sufficient lesson to the blindest or most obtuse.

Yet such a student and practitioner of human nature and human affairs as Mr. Winston Churchill has written only the other day, without fear of contradiction, that the history of man is the history of war. And though on every hand we find examples of lip-service and good intentions paid to the theory of the establishment of world-wide peace through the agency of the League of Nations, a world-wide combination of the labouring classes, or a combine of the intelligentsia, we find also that in practice the budgets for armaments do not diminish, the soldiers drill, the bombing aeroplanes are built, the scientific laboratories continue their hideous experiments in scientific murder without surcease.

BY VAL GIELGUD.



A Special Article from the pen of the B.B.C.'s Director of Productions.

What has all this to do with the question of broadcasting? However presumptuous it may appear, some of us who have been for some years engaged in the task of broadcasting programmes, and in the examination of the effect of those programmes upon our vast audience, begin to feel that it is in the practical application of the motto of the B.B.C. that the most worthy aspect of our work can be found; that it is in broadcasting and in the choice of programme items for broadcasting that there comes into existence a definite means by which the idea of peace can be made a present and a living thing in the majority of homes all over the world; that by broadcasting nations can speak peace to each other; and that the idea of peace can become so familiar a thing that war must ultimately and in reality become as unthinkable as is cannibalism to-day.

An Amusing Fallacy.

Mr. Hilaire Belloc has written somewhere that the idea that the extension of travel among the peoples of the earth will make them appreciate each other better is fallacious. On the contrary, he asserts that the better one nation knows another, the worse it grows to dislike it. But this assertion, though amusing, is a fallacy.

The increase of the knowledge of the circumstances, the characteristics, and the difficulties of other nations leads in the long run to greater understanding, if not to greater liking. And it is from misunderstandings that conflict, and ultimately war, arises.

In the eyes of a great many people, the pacifists have made one great mistake. They have made their creed an emasculate

one. They have failed to point out that in a crusade against war there is as much scope for the strong, the intelligent, the aggressive, the vigorous, as there is in the ranks of their opponents. They hand themselves over to the doctrinaires, to philosophers, to men of the study and the pen.

The Weapon for Pacifists.

Almost automatically they drive those who should be their best supporters into the opposite camp; and this is for the most part because their weapons are those of the pamphlet, the sermon, the article, the conventional speech. And this is where broadcasting comes in. Broadcasting is the weapon *par excellence* which is offered hilt first to the hand of what may paradoxically be called the militant pacifist. And the pacifist, if he is to be effective, must be as determinedly militant as the most militarist of Junkers.

Now broadcasting has this peculiar latent power for one main reason. Unlike the theatre, the cinema, the sermon, or the mob orator, it is a medium of expression which, for its effect, owes nothing to mass emotion in its audience. Broadcasting has, of course, potentially the largest audience in the world, and at the same time actually the smallest. What I mean by this is that the speaker on the microphone may be addressing millions and is certainly addressing tens of thousands. But he is addressing those millions or those thousands in individual units, or, at largest, in family groups. Most important of all, he is addressing the plain middle-class citizen who is the mainstay of all constituted society, by his own fireside.

Plain—But No Fool.

Now, the plain man, contrary to the belief of a good many people, is no fool. He may be stampeded by the atmosphere of a public meeting to cheer the veriest platitudes or the wildest assertions of a clever tub-thumper; or by the atmosphere of a crowded music-hall to roar with laughter at jokes which, told to him in cold blood, would only provoke a yawn. (Which, by the way, is one of the main reasons why a broadcast variety programme often falls so flat.) But he is not, in his heart, convinced psychologically, by the effects of such spasms of mass-emotion. He reacts, certainly, but his point of view, his fundamental convictions, remain unmoved.

But let him be brought, persuaded or driven to a conclusion uninfluenced by such mass emotionalism, and it is quite a different story. He is affected as an individual, not as an unconsidered unit

(Continued on next page.)

LITTLE use is made in L.T. circuits of this instrument—the most important of all electrical meters. The milliammeter has received plenty of attention, so that the H.T. circuit is well looked after.

It should first be realised—and this is indeed elementary—that since in any circuit of fixed resistance the current that flows is proportional to the impressed voltage, the ammeter is able to give all the information that a voltmeter can give and then some!

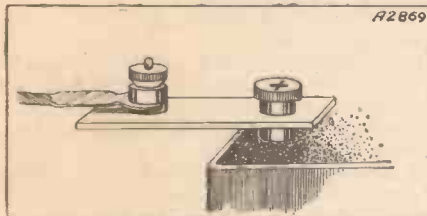
Permanently in the circuit the uses of the ammeter are many and varied and it is only necessary to outline a few of the more important ones.

In Normal Operation.

The "basic reading" referred to frequently later, is that shown on the meter when the receiving set is in normal operation on a battery neither too freshly charged nor yet run down. This reading should be marked on the ammeter dial very clearly in red ink.

The circuit to the set should contain a master rheostat of low resistance—say 5 to 10 ohms—and "big" enough to carry

AVOIDING CORROSION



Here's a simple dodge to keep L.T. leads clean. Just a strip of lead with holes either end. Easy, isn't it?

the total amps for all the valves—say 1 amp. It is quite useless to attempt to incorporate the usual single valve rheostat which is designed to carry current for one valve only.

State of Charge.

Faulty and dirty connections are, of course, indicated by the impossibility of attaining the basic reading with the rheostat all out, and similarly a faulty pin connection at a valve is shown up and finally located by a low reading and by finding which valve, on removal, does not affect the low reading given.

More important still, however, is the function of the ammeter in showing the state of charge of the batteries.

When fully charged the battery will deliver more current to the valves than they should have, because of its higher voltage. This is checked by increasing the resistance until the basic reading is obtained.

It is obviously best to do this backwards, i.e. before switching on put in more

in a crowd. And multitudes of individuals can only be reached, and persuaded, as individuals, by broadcasting.

The Peace of the World.

It is upon the bringing of the plain man to the conviction that war must not occur again that the future peace of the world depends. Philosophers may theorise; men of good will may aspire; economists may assert; but the fact remains that from time to time the feeling comes to the plain man that perhaps it is better to risk dying for an idea than to continue living

**THE NEGLECTED
AMMETER**
By W. R. THOMSON.
An article of practical interest
to owners of battery sets.

than sufficient resistance, decreasing this until the ammeter needle reaches the basic reading.

As the battery voltage falls, the rheostat is turned until the resistance is "all out," to maintain the basic reading. Finally, the time comes when the basic reading cannot be reached and the battery must be recharged.

It is claimed that this method is very much easier than either the voltmeter or simplified hydrometer method of testing, since the ammeter is always in circuit in the suggested diagram given.

A further vital duty the ammeter may be called upon to perform is to indicate that the battery is actually being charged. With a charger it is so easy to switch on, hear the hum, and assume that all is well.

Suggested Connections.

Dirty connections easily prevent the flow of any current, and it is the ammeter's job to show that charging is taking place.

A convenient arrangement is to have two batteries—one of, say, 45-amp. hour and the other of, say, 20-amp. hour nominal ratings. The former is used as the main supplier and the latter as a reserve until it is convenient to recharge.

Suggested connections for the combined charging and delivery circuit are given in the diagram.

The position of the ammeter is important since it is always "on duty" automatically, no matter what is going on.

The master single-pole double-throw switch makes the circuit either a charging or a delivery one, with no danger of confusion of both with resulting damage to valves. If necessary the usual automobile ignition switch, with 4 terminals (like the Remy), can be used with advantage, since the operating key can be withdrawn with the switch in the neutral position, putting both set and charger out of action.

In using such a switch it is necessary to remove one of the two cross contacts, and to connect together one pair of adjacent terminals to give terminal "A" in the diagram.

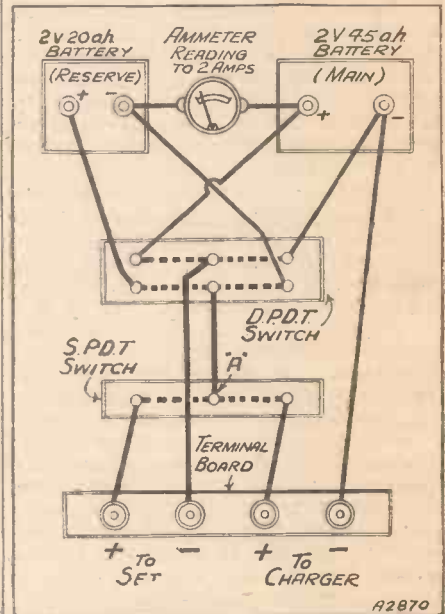
The double-pole double-throw switch is used in both the charging and delivery circuits. In the latter case its function is clear, as it picks up current from either battery through the ammeter and delivers

it to the set. With switch to left the small (reserve) battery is in operation, and with switch to right the large (main) battery is in operation.

When charging, since the batteries are of different capacities and yet using the same charging current, it is necessary to continue the charging of the larger one after the smaller one is fully charged. With the D.P. switch to the left both batteries are on charge in series, while in the right position only the larger battery is on charge.

If the charger has tapings marked 2, 4, and 6 volts, greater control over the charging rate is possible. For example, with the plug in the 6-v. tapping and

MAKING IT SIMPLE



With this wiring plan to help you, no difficulty will be experienced in making up a charging unit which will keep your L.T. always in good trim.

using 2-v. batteries it will be found that the two batteries are charged at about 1 amp. while the rate goes up to about 1½ amp. when charging the larger cell alone.

It should be noted that this arrangement can be used with 4-v. batteries equally well, but that the charging rates will be lower.

Instead of connecting wires directly to the battery terminals it will be found better to prepare four strips of lead about ½ in. wide by 1 in. long as extensions to the battery terminals. These have holes at both ends and accommodate the wires and terminals as shown.

Corrosion can be thus effectively watched and checked, while the wire connections remain clean since the greased surfaces of the strips prevent creeping of the acid.

**THOUGHTS
ABOUT XMAS RADIO**
(Continued from previous page.)

without ideas. The last occasion when this happened to the plain man of this country was when the neutrality of Belgium was violated. The result then was War.

In similar circumstances in the future, the result will again be War. And to

prevent similar circumstances from ever arising is the task of the pacifist, and more especially—always assuming that the ideal of "No more war" is accepted as the most urgent part of present-day ideals—of the broadcasting organisations of the world.

B.B.C. Inspiration.

There is, therefore, perhaps a good deal to be said for the inspiration which caused the British Broadcasting Corporation to choose for its motto a paraphrase of the original Christmas message to mankind.

RADIOGRAM REMINDERS

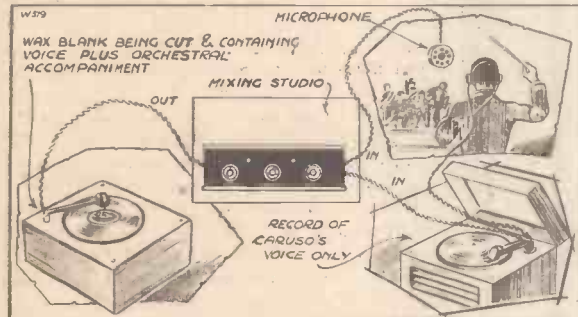
TWO most interesting happenings have occurred during the last few weeks in the realm of "canned" music; the first is the re-recording of Enrico Caruso's voice, and the other is the release of a number of most attractive Christmas records. Both these items are due to the energies of H.M.V., and they are to be congratulated on both.

Let us take the Caruso record (for only one has yet made its appearance) and at the outset state that the result is extremely fine. It is too much to expect that with only the acoustic recording to work on a completely translated record of a by-gone voice should be achieved, but a great deal towards that goal has been done. And this is how it was tackled.

As you know, Caruso was recorded by means of a metal horn, the sound-waves actuating the wax cutter at the recording studios. This system (the acoustic one) was not nearly as good as the present-day electrical recording.

A Brain-Wave.

So H.M.V. had a brain-wave. They realised that if only Caruso had lived later he would have been able to make records by the electrical system that would have done his marvellous voice true justice, especially when the discs were played on a radiogramophone of good design. So they decided to try and correct the acoustic recording to make it sound as if it were done electrically.



Accordingly after much mathematical work in the research department they took the original Caruso record (of *Vesti la Giubba* from Pagliacci, and the well-known air of *M'Appari* from *Martha*) and they played it over very faintly, recording as they did so the result.

This gave them mainly the voice with faint traces of the orchestral accompaniment: This faint reproduction was led through electrical correcting filters which straightened out the inaccuracies caused by the acoustic recording. The result was an improved vocal record of Caruso.

This was then played through a pick-up connected to the mixing panel of the recording amplifiers. But in addition a branch line from the Caruso record went to the headphones of a conductor who synchronised the playing of a completely fresh accompaniment with the singing he heard through the 'phones. This accompaniment was passed through the mixing panel and

Records for Christmas—How the Caruso re-recordings were done —Tone controlling.

recorded along with the corrected voice. The result is a record with added life, though the accompaniment is inevitably a little smudgy owing presumably to the remnants of the first acoustic recording of the orchestra, but this is very little, and the sum total is a really good disc. Well done, H.M.V.!

CORRECTING THE TONE

Gracie Fields always makes a good record, doesn't she? But I find that usually some very definite tone controlling is necessary with her voice, and indeed tone correction is advisable with all records. What is more, the tone correction should be variable, so that it can be altered according to the requirements of the particular disc on the turntable.

The reason is that the recording concerns do not attempt to provide any fixed standard of recording amplitude. The result is that if a record is played with, say, a dance number on it, and the amplifier is corrected to give lifelike reproduction of the trumpets and other brass, then the record is changed to one of, say, Gracie Fields, the result is probably terrible in its over-emphasised high notes.

I have found that invariably it is necessary to reduce the high-note lift when changing over from dance to Gracie or some soprano. On the other hand, variable correction of the bass is also desirable, for many records have quite a remarkable amount of bass recorded, while others have a very small amplitude of the same frequencies.

Thus, for completely satisfactory reproduction it is highly desirable to have two tone controls, one to give control over the high notes and the other to adjust the amount of bass in the reproduction.

Special Receiver.

In this regard I am experimenting at the moment with a special receiver designed for the radio-gramophone enthusiast who wants to get the very best out of both radio and record. It will contain rather a large number of valves, and therefore will be rather costly, but the large number of stages of amplification are required because the tone-controlling devices will be elaborate and complete.

It is not possible to get complete tone control and transient reproduction of good order without having plenty of amplification in hand, for all tone control aims at dropping the frequency characteristic at some point or other, at the same time retaining the amplification at the frequency band which it is desired to accentuate.

This necessitates (especially in resistance-coupled amplifiers) plenty of amplification so that the overall power of the receiver does not suffer.

In the case in point the tone correction will be variable at each end of the musical scale, and at the same time the general level of correction of either end will be adjustable without upsetting the relative proportions of the two correct sections.

CHRISTMAS RECORDS

The problem of entertaining Christmas parties is not an easy one, and the release of some ingenious competition records and other discs of topical character will do a lot to assist the harassed host this month.

Here are some of the most ingenious that have been devised by H.M.V. Among the competition type you will find the

"Guess the Tunes" very good fun. There are two discs of these, played on C 2298 and C 2492, and containing ten semi-classical tunes on either side of each disc that are well-known.

B 3875 contains a selection of 53 popular musical comedy tunes on it, and the answers to them can be had on application to the gramophone company. In the case of the previously-mentioned two records the answers are given at the end of each side.

"B a c k Your Fancy" is a racing record that will be very popular this Christmas. It contains on six concentric tracks the sounds of a horse race at Alexandra Park. At each end of each track an announcer states that a certain horse has won.



The sounds on each track are exactly the same, and it is impossible to tell which track you are on until the result is played. (B 4085.)

Very Good Fun.

Fortune-telling always creates amusement at parties, and for this purpose Claude Hulbert and his charming wife, Enid

LISTEN TO THESE!

- "Gracie's Christmas Party" H.M.V. GRACIE FIELDS AND HER MOTHER.
- "Love is the Sweetest Thing" H.M.V. RAY NOBLE AND HIS BAND.
- "Double Damask" H.M.V. CICELY COURTNIDGE.
- "The Hulberts in America" H.M.V. JACK AND CLAUDE HULBERT.
- "Columbia on Parade, No. 2" Col.
- "The Old Brigade" Col. DEBROY SOMERS AND NORMAN ALLIN
- "You're My Everything" Decca. ELSIE CARLISLE.

Trevor, have co-operated in making a 10-inch disc. On one side the ladies' fortunes are told, and on the other Claude does the same for the other sex: (B 3979.)

More serious in character is the series of twelve discs (one for each month of the year) that have been made by R. H. Naylor, the astrologer. These are predictions of the future that are based on the month of your birth, and should be very valuable in parties all the year round.

There are other funny records that will act as very fine entertainment, so I advise you to study the record catalogues this month.

THE MIRROR OF THE B.B.C.

By O. H. M.

ADVENTUROUS TALKS

THE CHRISTMAS PROMS.—"NEW YEAR OVER EUROPE"—A MEMORABLE TWELVE MONTHS—REGIONAL PROGRAMMES.

TWO or three years ago the B.B.C. was severely criticised in certain circles for the "unwholesome range" of its talks. Professors Dobb and MacMurray were the speakers whose remarks, the one on politics and the other on religion and morality, became the storm-centres.

Although apparently justifying its policy and its speakers at the time, it was noticeable that there was less "chance-taking" thereafter. Challenging topics were avoided, and criticism died down. But now it looks as if the B.B.C. were to take the 'bit in its teeth and tear off.

Both Professor Dobb and Professor MacMurray are leading figures in the Spring series of talks. Professor Dobb will broadcast on behalf of Communism; Professor MacMurray will lead the series "Some Makers of the Modern Spirit," in which Karl Marx will bulk.

The "A Doctor to a Mother" will be revealing of many things which would make the drawing-room furniture of the Edwardians shudder. And, last but not least, Professor J. B. S. Haldane will have a field day on the air at the cost of belief in a future life. So altogether there will be no lassitude Portland Place way when the sterner critics get wise to their coming opportunities.

More About Christmas.

Popular tunes and songs of bygone days played by the B.B.C. Orchestra and sung by Alice Lilley (soprano), and the Wireless Chorus will make a fine attraction on Thursday, December 29th, especially as Mr. Joseph Lewis will be in charge of it. On that night, too, Mr. Vernon Bartlett is giving a talk from Rome in the series "The World and Ourselves." Friday, December 30th, has another of the ever-popular "Music Hall" entertainments, the details of which are not yet finally settled, after which is another Orchestral Concert with pianoforte solos by Frank Merrick.

Saturday is New Year's Eve and in some respects it is a pity that it falls in the same week as Christmas. It is also the opening night of the first Christmas Season of Promenade Concerts which Sir Henry Wood and the B.B.C. Symphony Orchestra are giving at Queen's Hall every night for two weeks.

The concert will be broadcast in two sections, from 8.0 to 9.45 p.m. and from 9.55 to 10.35 p.m., the programme being of the usual Saturday night "Prom." popularity, and the artistes Evelyn Scotney, Harold Williams, and Solomon. Half an

A FILM STAR IN THE STUDIO



Many listeners who expected only to hear familiar songs in John Watt's recent "Old Favourites" broadcast must have been agreeably surprised to be entertained by Marta Eggert, the German film star, in the programme.

hour, however, has been reserved for a vaudeville entertainment at 7.30 p.m., and there is dance music following the "Prom." until 11.5 p.m., when the Special New Year's Eve programme begins.

It is as yet rather too early to give details of this special programme, but it is expected to take the form of a production entitled "New Year Over Europe," in the course of which six European capitals will each contribute a brief entertainment. The idea is full of fine possibilities and capable of being worked into a fitting climax at a week of excellent programmes as well as the final item of a memorable year of broadcasting.

What Birmingham Thinks—

And now for the Regionals. Take London first, and the Midland Region, with which it works in such close association. Music of a Christmassy nature is there in plenty on Sunday, Monday, Tuesday and Wednesday, December 18th to 21st, and on the evening of the latter day is also one of Charles Brewer's delightfully enjoyable entertainments called "Nine-Thirty Novelties."

Last year the Midland Regional producer put on a series of "Nine-Thirty Novelties" for his own region, and which London listeners complained they should have been allowed to share, so that in the first of this year's series the "grouse" is to be eliminated. I am sure that what Birmingham and the Midlands thought to be so good, London and the Home Counties will enjoy just as much.

Birmingham provides a carol service for mid-day listeners on Thursday, December 22nd, while on the following evening John Ansell, an old friend of scores of thousands of listeners, returns to the studio to conduct one of his popular orchestral concerts: Christmas Eve brings programmes by the Crosfield Soap Works Band, a "Miscellany" entertainment, of which we have had several already, orchestral music (very Christmassy) and dance tunes.

Until the afternoon at 3.55 p.m. Regional listeners will share the Christmas Day programmes of the National transmitters. At that time they are to have a Grieg Recital by Arthur de Greef (pianoforte) followed by a Grenadier Guards Band Concert, with songs from Ben Davies (tenor).

(Continued on page 876.)

AFTER reading the B.B.C.'s selection of plays to be broadcast in the National and Regional programmes during the next few weeks, one is forced to the conclusion that the supply of plays written expressly for the microphone falls lamentably short of the demand.

With one or two exceptions, the B.B.C. has borrowed lavishly from the theatre; and wisely, too, for we notice among the plays selected "The Immortal Lady," by Mr. Clifford Bax, "The Forest," by Mr. John Galsworthy, "The Green Goddess," by William Archer, and "Jack and the Beanstalk," by Mr. Ernest Longstaffe.

These are all good plays with very strong casts, so play-loving listeners can look forward to the future without misgivings. At the same time, I would prefer to see a larger sprinkling of essentially radio-plays.

Good radio-plays can be written—in fact, they have been—as was proved by the recent production, "The Family Tree," by

THE LISTENER'S NOTEBOOK

A rapid review of some recent radio programmes from home and abroad.

Philip Wade, produced by Howard Rose. I call this a most interesting example of a successful wireless-play. The character-drawing was excellent; there was a sufficiency about every part to sustain our interest right to the very end, and this without the support of devices which we are now so accustomed to find employed as a safeguard against our interest flagging.

I saw so much encouragement to radio-play writing in this play that I am a little surprised to find such disparity between the number of theatre and radio-plays in the B.B.C.'s winter plays publication.

As a consolation, however, Mr. C. Whitaker-Wilson, whose "Christopher Wren" was broadcast in October, has written another new wireless play, called "Mozart," to be performed in the National programme on December 19th. This play, I am told, has been carefully prepared for the microphone, and consists of a series of scenes from Mozart's life.

When I discovered, despite programme promises, that it wasn't Evelyn Waugh himself before the microphone delivering his outspoken address "To An Old Man," but Ronald Watkins in the rôle of deputy for Mr. Waugh, I couldn't help feeling I had been had. To me, half the attraction of these talks lies in the fact that we are privileged to hear the voices of these famous folk; for isn't this a feature which, but for broadcasting, would ever remain unfamiliar to us?

(Continued on page 871.)

TELSEN

DUAL-RANGE COILS



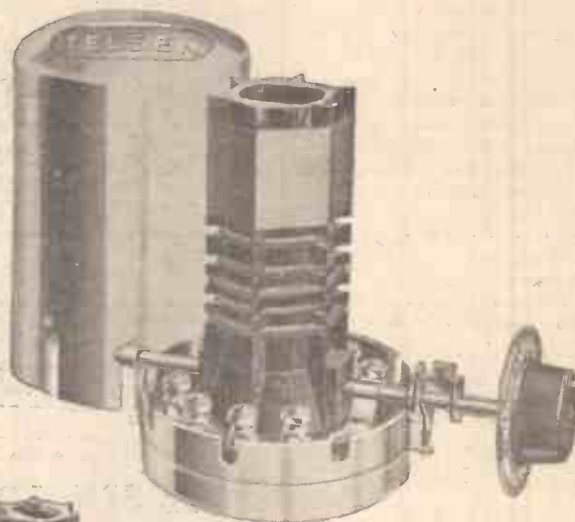
TELSEN DUAL-RANGE AERIAL COIL incorporates a variable selectivity device, making the coil suitable for widely varying reception conditions. This adjustment also acts as an excellent volume control, and is equally effective on long and short waves. The wave-band change is effected by means of a three-point switch and a reaction winding is included ...

7/6



TELSEN H.F. COIL may be used for H.F. amplification with Screened-Grid Valve, either as an H.F. Transformer or, alternatively, as a tuned grid or tuned anode coil. It also makes a highly efficient Aerial Coil where the adjustable selectivity feature is not required

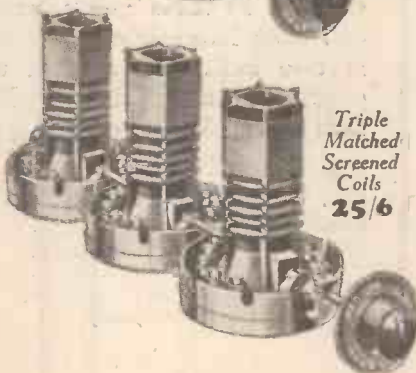
5/6



Twin Matched Screened Coils
17/-



Triple Matched Screened Coils
25/6



TELSEN SCREENED COILS

The result of much research and experiment, these coils embody the ultimate efficiency attainable in a perfectly shielded inductance of moderate dimensions. Provided with separate coupling coils for medium and long waves, they are suitable for use as aerial coils or as anode coils following a screened-grid valve, giving selectivity comparable only with a well-designed band-pass filter. The coils are fitted with cam-operated rotary switches with definite contacts and click mechanism, and are supplied complete with aluminium screening cans, bakelite knob, and handsome "Wave Change" escutcheon plate, finished in oxidised silver

8/6

Full instructions are supplied with every Telsen Screened Tuning Coil, showing you the alternative methods of mounting the coils, either singly, or in twin-matched or triple-matched form as required.

TELSEN

RADIO COMPONENTS

TELSEN RADIO COMPONENTS ARE 100% BRITISH

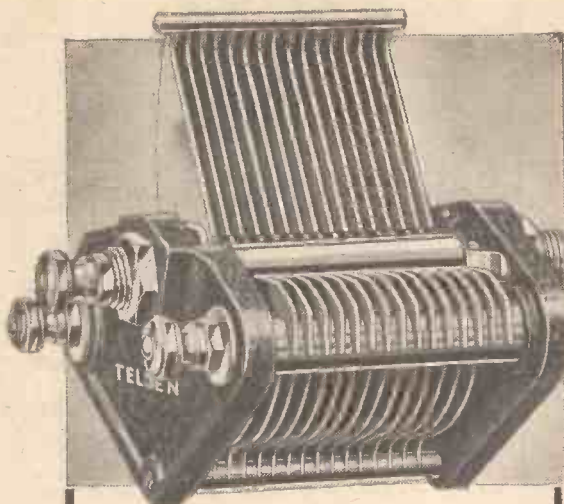
ANNOUNCEMENT OF THE TELSEN ELECTRIC CO. LTD., ASTON - BIRMINGHAM

PRECISION



TELSEN TELORNOR

An illuminated Disc Drive embodied into an unusually handsome silver oxidised escutcheon plate, complete with artistically grouped Volume, Tuning, On-Off and Push-Pull controls 7/6



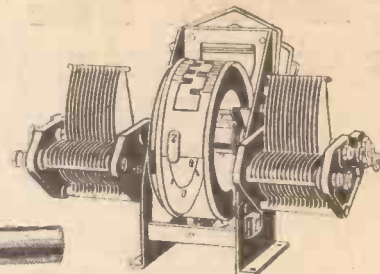
TELSEN LOGARITHMIC VARIABLE CONDENSER

THE precision and sturdy construction of this component ensures years of faithful service. Its frame is braced by three solid pillars, and the vanes clamped at three points, making distortion impossible. The rotor is also built into a rigid unit, generous bearings preventing backlash or endplay.

Cap. .00025	4/6
Cap. .00035	4/6
Cap. .0005	4/6
Cap. .0005	(left-hand movement with trimmer) ...	5/-
Cap. .0005	(right-hand movement with trimmer)	5/-

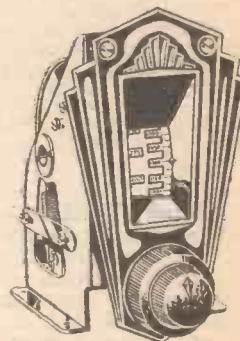
TELSEN

RADIO COMPONENTS



TELSEN DRUM DRIVE AND CONDENSER ASSEMBLY

A complete drum drive and ganged condensers tuning unit, with a handsome escutcheon finished in oxidised silver. An extra scale (marked in wavelengths) is supplied free 17/6



TELSEN DRUM DRIVE

Embodies numerous refinements, including cord drive and rocking stator trimmer. An extra scale graduated for wavelength tuning is supplied free of charge . . . 8/6



TELEXOR

Illuminated disc drive covering both the medium and long wavebands, without switching or changing coils. Incorporates automatic wave-change, and special tuning condenser giving "log law" tuning over the full circle in both directions. 10/6



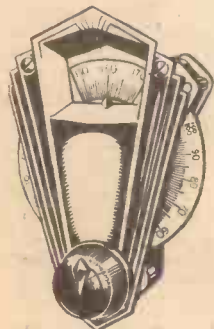
TELSEN SMALL FRICTION DISC DRIVE

A low priced disc drive for auxiliary controls. It is extremely robust and may be used for main tuning condensers where considerations of space make it desirable 2/6



TELSEN SLOW MOTION DIAL
(Black or Brown Bakelite)

Made with a gear ratio of 8-1, the disc being graduated from 0-100 in both directions. Supplied complete with instructions for mounting on all panels up to 3/16" thick . . . 2/-



TELSEN ILLUMINATED DISC DRIVE

Fitted with handsome silver oxidised escutcheon plate and incorporating an improved movement, making for delightfully easy tuning . . . 3/6

TELSEN RADIO COMPONENTS ARE 100% BRITISH
ANNOUNCEMENT OF THE TELSEN ELECTRIC CO., LTD., ASTON, BIRMINGHAM

Capt. Eckersley's QUERY CORNER

Under the above title, week by week, our Chief Radio Consultant comments upon radio queries submitted by "P.W." readers.



Don't address your letters direct to Captain Eckersley; a selection of those received by the Query Department in the ordinary way will be answered by him.

The Same But Different.

S. R. (Poole).—"I recently built a receiver, the circuit being identical with a friend's set which gives excellent results. Although these two sets have been duplicated in every way, and tested on the same aerial and earth, and with the same batteries and valves, my version is not up to the standard of my friend's.

"I am very puzzled, and so is my friend. What would account for the fact that one set gives wonderful punch, whereas the other is just ordinary?"

Now that's not fair!

You say $A=B$; but why does $A \neq B$? I should suggest that A does not equal B, and that, therefore, B does not equal A.

You say "Yes, but *why* doesn't $A = B$ when I've made the two things exactly the same?" I say "You haven't made them the same." But you say "Then why are they not the same?" I could legitimately say, "Well, you made them so how should I know?"

But, generous as always, I can suggest (a) are the valves the same? Change over first the whole set of valves, and then continue until you (might) find a dud. (b) Are the components the same? Try testing the several same components in the same way.

Sorry, but it is as difficult for me as for you, isn't it?

Making a Crystal Set Selective.

S. M. (St. Albans).—"The trouble-free reception given by a crystal set appeals to me, and I still employ a simple crystal receiver for listening to my local stations.

"Separation of the two transmissions is not, however, very easy, and I was wondering whether the Eckersley Tuner could be used with a crystal detector."

I think so. But nothing like so efficiently as with a valve.

The usefulness of the tuner was largely determined by the use of retroaction. Conversely a crystal will "damp" the circuits badly. But while the tuner could not be so sensitive as the ordinary plain circuit arrangement commonly used with crystal, I think if you had a good long aerial, that wouldn't matter, as you could get it sensitive enough and certainly it would be quite selective enough.

Tuned or Aperiodic?

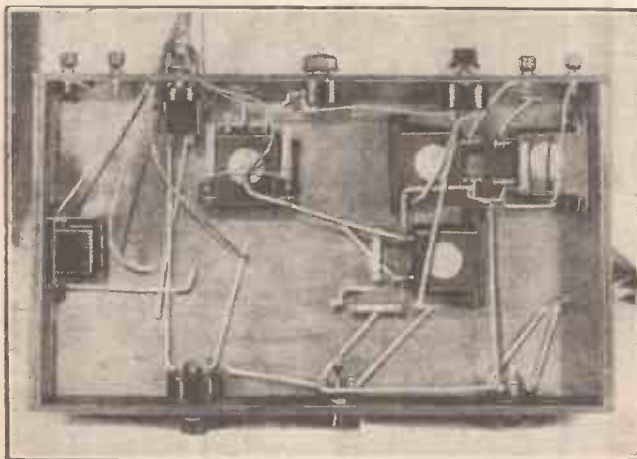
B. K. (Carmarthen).—"I know that a tuned H.F. stage gives greater amplification than an untuned stage, but I have no idea as to the relative figures. Is there very much difference in the step up between these two methods?"

With very high impedance valves, such as are used in modern practice, amplification depends upon the impedance of the grid and anode paths in parallel.

It is fair to expect a combined impedance of the order of 100,000 ohms. This is easily given by a tuned circuit. For untuned impedances you say you use (or try to!) inductances or resistances. The inductances would have to be of the order of 20 millihenries to give an impedance of 100,000 at one million cycles frequency.

The resistances would be of 100,000 ohms. But you cannot build either an inductance or a resistance without self-capacity. This self-capacity is in parallel with the untuned components—with the

OVERCOMING DECOUPLING PROBLEMS.



The present-day demand for compact receivers is often difficult to satisfy, since modern circuits are fully decoupled. This calls for extra condensers and resistances which all take up space. A solution to the problem is to mount decoupling gear under the baseboard, as is done in this "P.W." receiver for D.C. mains.

inductance it may be useful making a small inductance into a tuned circuit; with a resistance it exerts a fatal shunting effect. So we abandon any idea of resistance coupling for H.F. and choose between choke and tuned circuit.

Which is the better? One cannot say, because at some frequencies the choke will have a very high impedance, thanks to its self-capacity; at others, a too low impedance, because it has fortuitously gone out of tune.

The tuned circuit is always in tune, always calculable, and, of course, the purposely introduced large tuning capacity completely swamps any small self-capacity.

Directional Reception.

H. N. (Hampstead).—"I have a frame aerial and cannot make it directional. I find that I always get the best results when the frame points to the outdoor aerial. Why is this?"

I should say two reasons combined. Firstly, a frame aerial will not exhibit directional effects so long as it is in any way earthed.

Then suppose you had an unearthened frame, the outdoor aerial will pick up and re-radiate comparatively strongly all the energies contained in the various stations you may receive. So the apparent direction of all stations is that given by the strongest local source of their radiation, namely the outdoor aerial.

Sulphated Accumulator.

B. A. (Northolt).—"An accumulator left in a run-down state is said to 'sulphate.' What is sulphation and why should it occur when the cell is run down?"

Sulphation implies a deposit of lead sulphate on the terminals. The chemical processes are such that when a battery is charged the action which forms the sulphate is cancelled.

That's a bad answer! But I am a bad chemist.

Frankly, I do not know much about it, and if I did I doubt if a succession of chemical formulæ would help very much to illuminate the hidden parts of the problem.

STATIONS WORTH HEARING

LAST-MINUTE NEWS OF RECEPTION CONDITIONS.

BY this time I expect you have become fully acquainted with Toulouse's 60-kilowatt transmitter, which is generally to be found at work shortly after the regular evening programme has come to an end. The old 8-kilowatt plant gave a pretty good account of itself in this country so far as volume was concerned, though the quality was often far from good.

No Mean Feat.

The new transmitter possesses a commanding voice, and you will not have any difficulty at all in finding it when you make the attempt. Munich's 60-kilowatt transmitter is also at work, and so strong is reception that one need not, as a rule, wait until dusk before trying to tune him in.

Some time ago I wrote that this winter would provide some severe tests of selectivity on the medium waveband, and these are now with us. The separation of Toulouse from the 120-kilowatt Leipzig on a neighbouring channel is no mean feat, and the four stations, Göteborg, Breslau, the Poste Parisien and Milan, all next-door neighbours, are by no means easy to receive clear of mutual interference.

I AM afraid that extra pressure on space in last week's issue compelled me to cut short my remarks on the best times for the reception of Australia and New Zealand. I pointed out that Australia was received best on the 40-metre band roughly between 4 and 7 p.m., while New Zealand came in best from 5 or 6 a.m. until about 8 a.m.

The times on the 20-metre band are: Australia, mid-day till 2 p.m., and New Zealand 7 a.m. till 10 a.m. Taking the mean of the Australian times, one would imagine that Sydney might be heard on his 31-metre wave throughout the afternoon. As a matter of fact, he is better in the mornings, but that is just another of the problems that make the short-wave man sit up from time to time!

A Crop of Letters.

Of the American broadcasting stations, I must say that far more readers are reporting W I X A Z than W 2 X A F. Why this should be I cannot say, as I always find W 2 X A F by far the stronger and more reliable of the two.

Who, by the way, are all the "Pronto" stations? I know they are Italian, but I never hear anything but "Pronto's" from them. It's nice to know where they are, but as entertainment value they do not come up high in the list.

All is no longer quiet on the "Empire Broadcasting Front." Soon after writing last week's notes I heard the new station in action with gramophone records on the 49- and 31-metre waves, and later on the 25- and 16-metre waves. As I fully expected,

In a comparatively short time the need for selectivity will be even greater since every channel, except those devoted to common wavelengths, between 300 and 550 metres will be occupied by a high-powered station.

The increases in power that have already taken place have led to a big all-round increase in field strength, and this has important consequences for the long-distance man. It means that if his selectivity is not adequate with his present aerial, he may bring it up to the mark again by using a much smaller collector and yet not suffer any noticeable loss of volume.

At Full Volume.

I never use anything now but an indoor aerial, for I find that this provides everything that one wants in the way of continental and transatlantic reception.

Outstanding stations on the medium waveband just now are numerous. The list includes Fécamp, Nürnberg, Frankfurt, Trieste, Turin, Heilsberg, Hilversum, Breslau, the Poste Parisien, Brussels No. 2, Strasbourg, Toulouse, Leipzig, Katowice, Beromünster, Langenberg, Prague, Brussels No. 1, Munich, and Budapest.

That by no means exhausts the good stations. On favourable nights there are any amount of others that can be brought in at full loudspeaker volume. Lille, Valencia, Gleiwitz, Bratislava, Bordeaux Lafayette, Marseilles, Milan, Brno, Hamburg, Lwow, Sottens, Berlin Witzleben, Madrid, Paris Ecole Supérieure, Stockholm, Rome, Florence and Vienna are all probable rather than possibles.

R.W.H.



a bumper crop of letters arrived soon afterwards!

GSA (49.6 metres) has been logged more often than the others, and present reports indicate that he is R 6, in Northumberland, R 4 in Yorkshire, and R 7 in Glasgow.

These reports are just about what one would expect. Probably "way down in Cornwall" he is a very fine transmission. I think the south-western folk are going to enjoy themselves with this 49.6 metre transmitter.

GSC (31.3 metres) is reported R 4 in Northumberland. The only reports that have reached me as yet on GSE (25.3 metres) and GSG (16.9 metres) are from Northamptonshire, which doesn't seem far enough away from the station to be of much value.

I find, south of London, that GSA (49.6) is by far the strongest of the bunch.



By G. T. KELSEY.

I HAVE just been examining a copy of one of the most interesting and instructive books that I have seen for some time. It is called "The Design and Construction of Radio Power Units," and in addition to containing full constructional details for four reliable eliminators, the book contains several excellent articles on mains problems in general.

One article in particular deals in a most instructive way with the functions of Electrolytic Condensers, and it is one of the most lucid explanations I have seen.

The book, as I mentioned last week, is published by the Telegraph Condenser Company, Limited, and in my opinion it would be worth every penny of the 6d. charged if it included nothing else but the resistance calculator on the back cover!

"P.W." readers can obtain a copy of this book by sending 6d. (which includes postage) to the Telegraph Condenser Co., Ltd., Wales Farm Road, North Acton, London, W.3.

(Continued on page 870.)

There is not much to choose, at the times I have heard them, between the 31- and 25-metre programmes, but the 16.9-metre chap is a very, very weak little chirp.

He is probably the very one that is going to be most useful to the Empire. Look at the strength that W 3 Z A L, on 16.97 reaches at times!

For My Amusement.

"R. S. W." (Towcester) reports two new stations, H B C on 39 metres and H B L on 31.3 metres. These are both Swiss stations, but who they are I have not yet found out. My receiver is kept busy enough these days, what with listening round for my own amusement, and then trying to find out all these new stations that readers report to me.

"E. J. N." (Newport) reports W E M on telephony, working with the Swiss station H B P. I have often heard W E M on C.W. in the region of 40 metres; he is, as a matter of fact, one of my "landmark" stations, and is always tremendously strong. He is one of the Rocky Point group.

If he is going to start up a telephony service there will be a real noise on the air when conditions are good.

"W. A. L." (Northumberland) makes a rather original claim, having heard all continents in less than twelve hours—from midnight till 10.45 a.m. next day, with six hours' sleep in between! Can someone better this? I have worked all continents in less than twelve hours, but I can't say that I have heard a broadcast transmission from each of them in that time.

W. L. S.

Santa says:—

“Go on, Graham Farish Xmas is just your season”

Xmas, the season of jollification, parties, dancing, high jinks. Overtime for the Wireless or the Radiogram. Your set has got to surpass itself this Xmas. No crackling or fading—just fine, clear, strong, constant tone and volume.

Guarantee your guests and yourselves the last word in perfect reception. Half-a-crown spent on a Filt Percolative Earth will do it. Ten minutes will fix it.

Remember, your Earth connection is your only direct contact with the transmitting station. Unless that is the best you can make it, your reception will be far from perfect—not only at Xmas but now and always.

GRAHAM FARISH **FILT** PERCOLATIVE EARTH **2/6**

Simply bury the copper receptacle containing the wonderful FILT chemical which spreads through the earth, attracting moisture and making a highly conductive area several feet deep. FILT keeps moist and highly conductive, earthing your set perfectly and giving you every ounce of power, range and purity.

Get a Filt and Gard Lightning Arrester from your nearest Radio Dealer or direct (post free) from the Sole Manufacturers

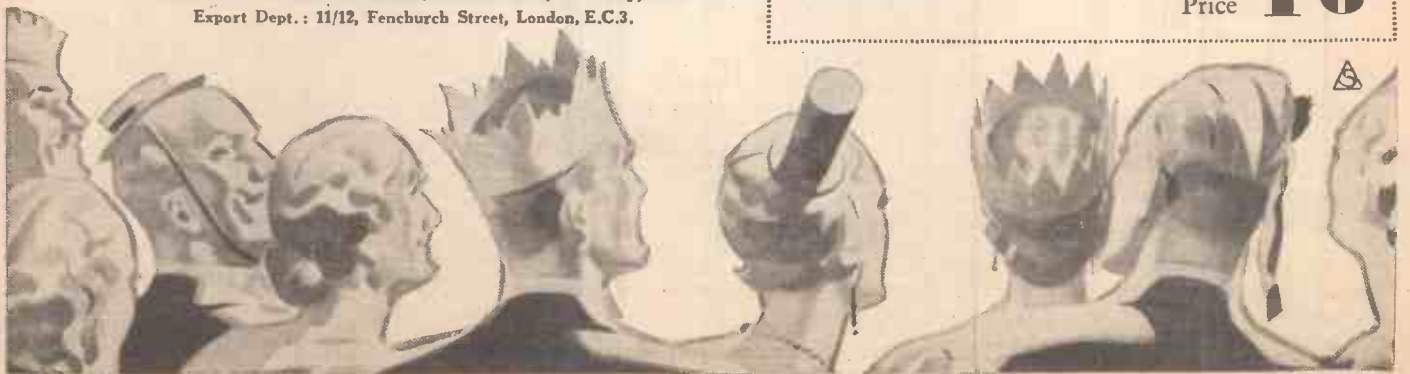
GRAHAM FARISH LTD. Masons Hill, Bromley, Kent.
Export Dept.: 11/12, Fenchurch Street, London, E.C.3.

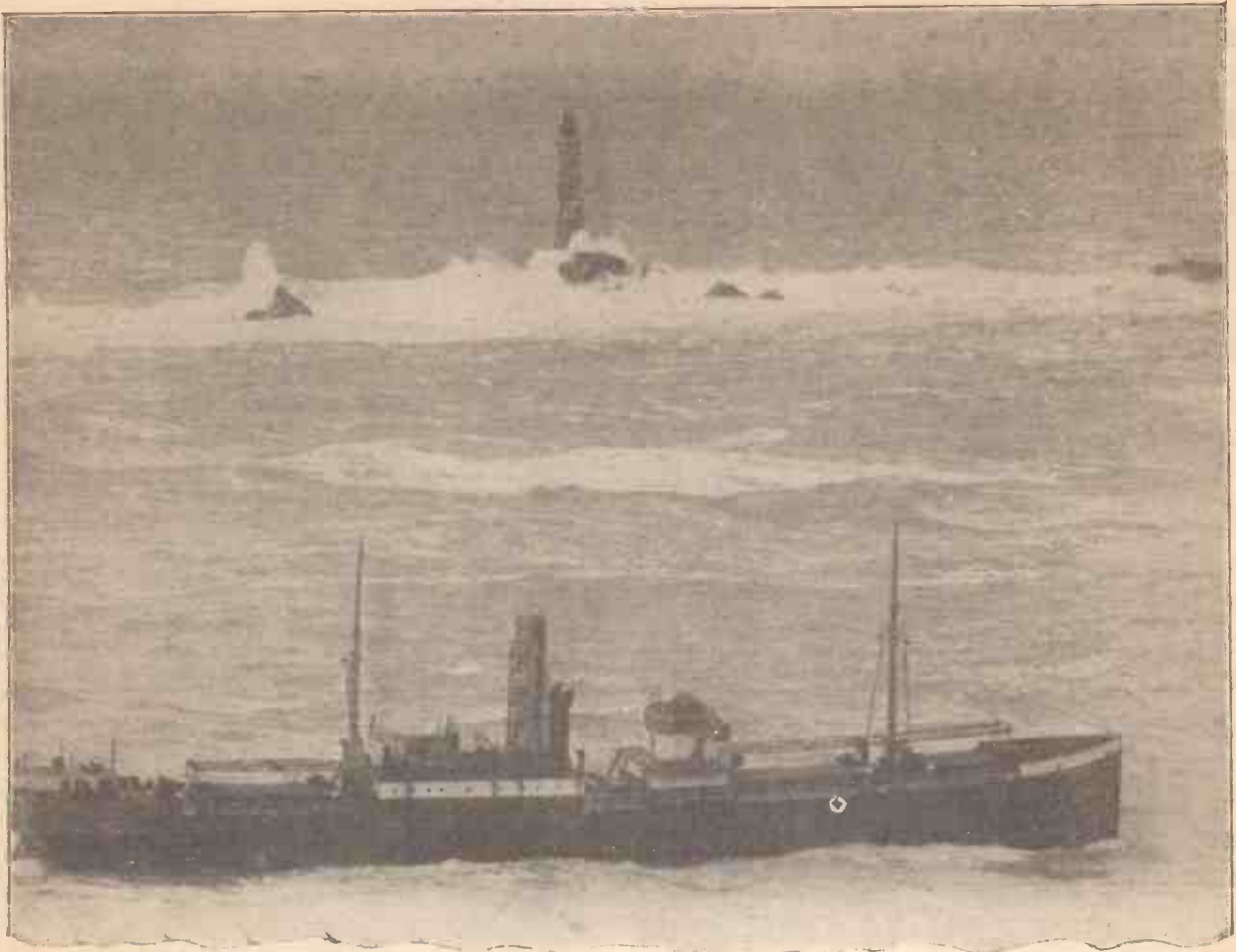


GARD YOUR SET AGAINST LIGHTNING

Cut out the risk of damage by electrical or lightning storms by fitting a GARD lightning arrester. This little protector makes your set so safe from outside interference that you need not even switch off your set before going to bed.

Price **1/6**





Beacon Stations trust to MARCONI VALVES

DAY in day out the beacon station must rap out its Morse, every half hour in fair weather, continuously in fog. Human life and the safety of the vessels in its vicinity depend on that message. The Beacon is an invisible lighthouse and it must never fail. Trinity House dare not risk a faulty valve. That is why they—and the Coastal Authorities of most maritime nations use Marconi Valves. *When lives may depend on a valve they chose Marconi.*

MARCONI A.C. MAINS VALVES

There is a type to give very best results in every position of the A.C. all-electric receiver. Each is constructed to the very latest standards of durable efficiency, a high mutual conductance being combined with long life and silent operation. This is the curve for Marconi M.H.4. a

general purpose type. Note how steep is the slope, despite the length and straightness of the working position.

MARCONI A.C. SERIES

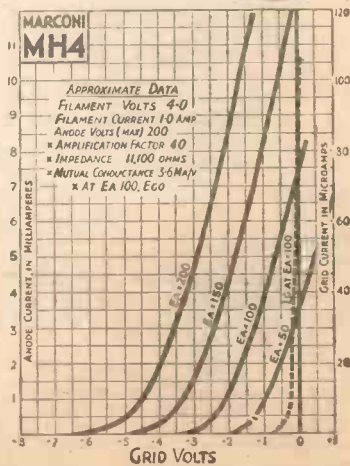
- * VMS4 Variable-Mu S.G. 19/6
- * MS4B S.G. (Single Stages) 19/6
- * MS.4 S.G. (Multi Stages) 19/6
- * MH.4. General Purpose 13/6
- * MHL.4. General Purpose and L.F. 13/6
- ML.4. L.F. and Power 15/6
- PX.4. Super Power 17/6
- PT.4. Pentode (Directly heated) 20/6
- MPT.4. Pentode (Indirectly heated) 20/6
- * Available metallised, if desired.

WHAT IS THE PURPOSE? —

WE HAVE THE VALVE!

Ask your local dealer or write direct to The Marconiphone Company, Radio House, Tottenham Court Road, London,

W.I. for the Marconi Valve Folder which gives curves, facts and figures for all types of Valves.



RECEIVERS

No. 15

of RENOWN



THE "H.M.V." SUPERHET TEN AUTORADIOGRAM.

THE famous "H.M.V." Superhet Ten Autoradiogram is already too widely known to require any sort of formal introduction. It is to radio what the Rolls Royce car is to motoring—a masterpiece of design and ingenuity. An instrument that is in every sense of the word representative of all that is good in modern radio and gramophone practice.

That means—well, what exactly does it mean?

On the radio side, it means an instrument that is within reach of every station worth calling a station in Europe. It means a design that will reject any unwanted station—with particular reference to the locals—in a matter of a degree. Quality, too, from the point of view of reproduction is of vital consequence, as is also the question of ease of operation.

Then what of modern gramophone technique—is not the nearest approach to the ideal to be found in that ingenious mechanism which provides a continuous programme of records automatically?

Masterpiece of Design.

When an instrument can be claimed to provide all these things, and more, there is no disputing the category into which it falls. In our opinion, it is without a shadow of doubt, a masterpiece of design.

And no more fitting description could be applied to the Superhet Ten Autoradiogram!

To turn for a moment to technical considerations, the circuit of this latest "H.M.V." achievement provides a lot that is of interest. Basically, the circuit is that of a super-heterodyne employing a total of nine valves.

The first detector, which is a screened-grid valve, is preceded by a variable-mu H.F. stage to which the aerial is magnetically coupled by an efficient band-pass filter. A separate valve is used for the oscillator, which employs a tuned-plate circuit, for which is claimed freedom from harmonics.

The first detector is band-pass coupled through a tuned transformer to the first intermediate-frequency amplifier, which, in turn, is coupled by a third band-pass unit to the second I.F. amplifier. Both the intermediate-frequency amplifiers are screened-grid valves of the variable-mu type.

The output from the second I.F. amplifier is applied via still another band-pass unit

to the second detector, which is of the anode-bend variety with a specially decoupled anode circuit.

The L.F. part of the instrument, which is built on to an entirely separate chassis, consists of an M.H.L.4, the output of which is parallel-fed to a push-pull intervalve transformer and ultimately to the two P.X.4's which constitute the output stage.

As one would rather expect of a firm of such repute as the Gramophone Company, the constructional features of the Superhet Ten Autoradiogram are of a high order.

Novelty and ingenuity are to be found in every aspect of the design. The radio chassis, for instance, is supported on end to make it easily accessible, and it is mounted on rubber to ensure freedom from microphonic troubles.

Condenser Mounted on Rubber.

A further instance of the thorough way in which the design has been tackled is to be found in the mounting of the main condenser gang, which is secured on rubber in the chassis to ensure that no vibration is transmitted to the condenser plates. Incidentally, the drive to this condenser is taken via a flexible universal coupling.

Another feature, which is evident of considerable foresight, is the assembly of the three pilot lamps for illuminating the medium and long-wave scales and the gramophone indicator. To make replacement easily possible, these three pilot lamps are assembled on a small panel which is instantly removable without disconnecting any wires.

These are but a few of many fine features which are to be found in the design of this remarkable instrument.

With regard to controls, we cannot do better than refer you to the special pictorial explanation on the next page. Apart from the tone control and wave-change and local distant switches, which, in a sense, are only subsidiary controls, the radio part of the instrument is operated by just two knobs—the main tuning control and the volume regulator.

And with just those two knobs, the whole of Europe is at your beck and call! It sounds a lot to claim, doesn't it? Yet our practical tests with the Superhet Ten Autoradiogram have convinced us that the claim is more than fulfilled.

The scales for both medium and long waves are calibrated in wavelengths, and if you want to hear a particular station—well, you just turn the condenser to the appropriate setting, and if the station is on you hear it! Isn't that as near to perfection as it is possible to get?

Record-Changing Mechanism.

Frankly, the sensitivity and selectivity of the radio part of the Superhet Ten Autoradiogram, under the somewhat stringent conditions of our tests, were astonishing, and the quality of reproduction on both radio and gramophone left nothing to be desired.

Of the intricate and ingenious record-changing mechanism, we feel that we need say nothing beyond the fact that in use it is a sheer delight. The joy of being able to listen to eight records one after another, without having once to go near the instrument, is one of those things that has to be experienced to be fully appreciated, but even the prospects are alluring enough, are they not?

The cabinet in which this modern wonder is housed is evidence of the finest possible craftsmanship. It is made from specially picked walnut built upon a solid pillar framework, and it is provided with hand-carved legs.

It is the sort of thing that would look at home in even the most lavishly furnished rooms.

We feel that the Gramophone Company are to be congratulated upon the production of such a remarkable instrument. Without a doubt, it is one of the finest and most complete "home entertainers" that we have yet tested.

TABULATED DATA FOR THE TECHNICALLY MINDED READER

GENERAL DESCRIPTION.—A ten-valve (including rectifier) superhet radiogramophone with automatic record changer that plays eight records continuously, or repeats one record indefinitely.

CIRCUIT DETAILS.—V. 1—Variable-mu H.F. amplifier; V. 2—first detector; V. 3—Oscillator; V. 4 and V. 5—Variable-mu intermediate-frequency amplifiers; V. 6—second detector; V. 7—first L.F. stage; V. 8 and V. 9—push-pull output valves; V. 10—rectifier.

CONTROL ARRANGEMENTS.—RADIO: One for tuning, one for volume, one for tone control, one for local-distant switching, and one four-way switch.

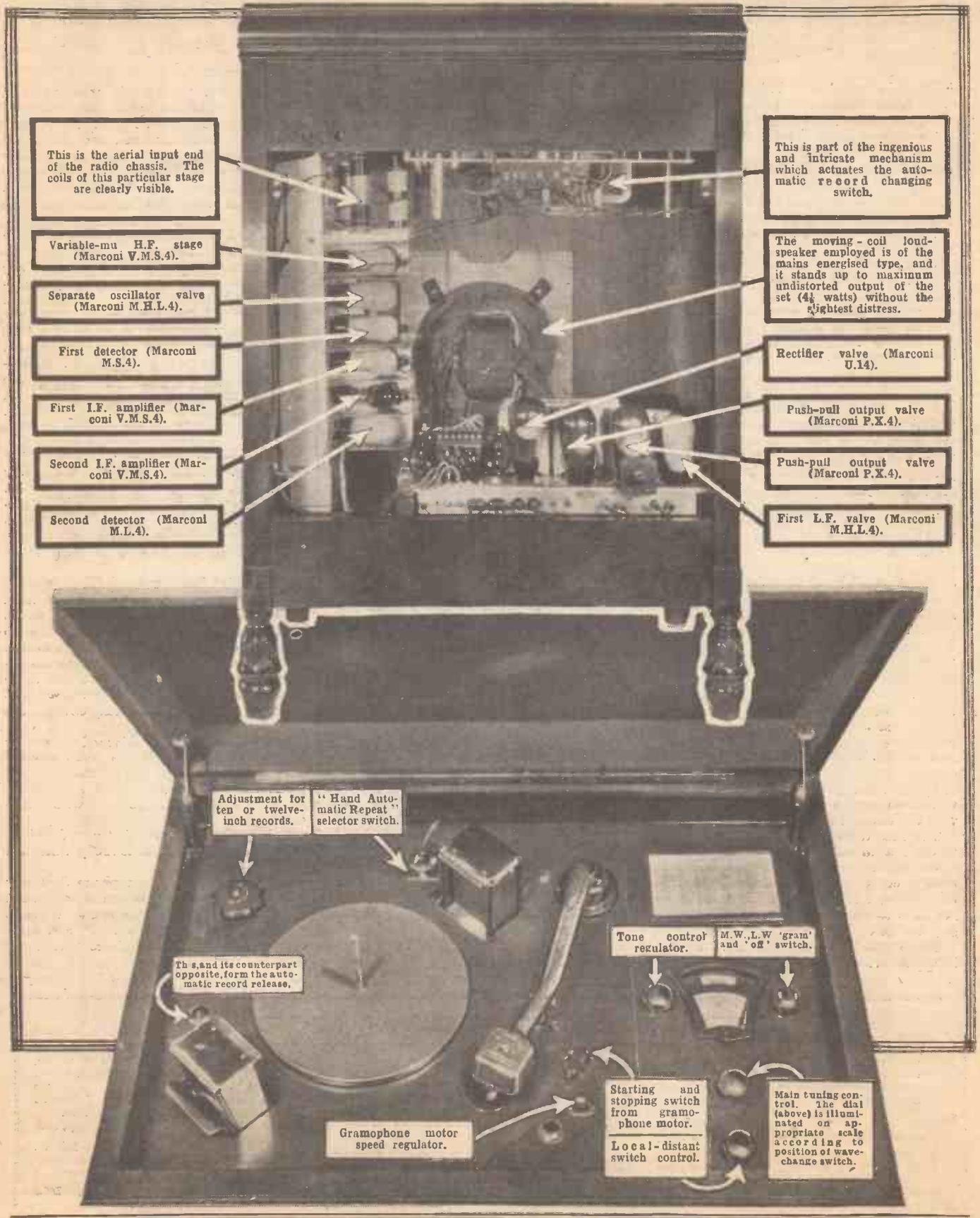
GRAMOPHONE: Main volume control at front operates on both radio and gramophone. In addition, there is a switch to start the gramophone motor, a three position switch which enables the instrument to be used (A) as an ordinary gramophone; (B) as an automatic record changer, and (C) for the repetition of one record indefinitely. A small presbutton at the front enables any record to be rejected.

SPECIAL FEATURES.—(1). High selectivity and astonishing sensitivity on radio side. (2). Effective tone control. (3). Simplicity of operation. (4). Illumination of only the appropriate wave-length scale. (5). Automatic record changer. (6). Superb cabinet work.

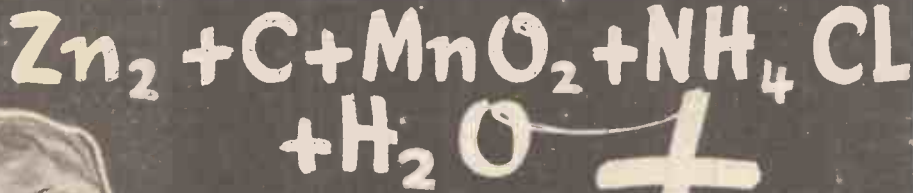
PRICE.—Standard cabinet model, 80 guineas. Special cabinet, 95 guineas.

MAKERS.—The Gramophone Company, Ltd., 363/367, Oxford Street, London, W.1.

The "H.M.V." Super-het. Ten Auto-radiogram—(Continued from previous page).



THE SECRET OF LIFE IN A LISSEN BATTERY



WHAT?

PLUS THAT LITTLE CHEMICAL SOME OTHERS HAVEN'T GOT!

With apologies
to B.P. Plus



There is an exclusive process used in the Lissen H.T. Battery which makes it last longer and provides pure high tension current that makes your radio vividly real!



Short-Wave HOOK-UPS

IN the last article we dealt only with series-fed circuits and their suitability for short-wave work. Several other series-fed circuits are used, but I propose to leave them for the time being and to deal with the parallel-fed equivalents of last week's circuits.

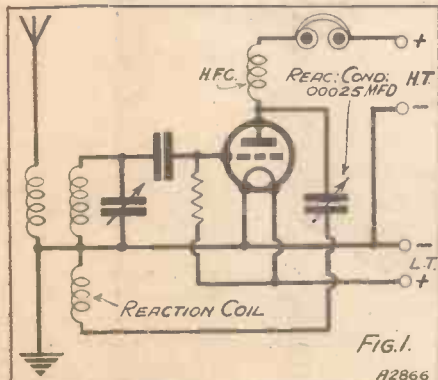
Let us be quite clear, at the outset, that "parallel-feed," applied to a detector circuit, simply means that the H.T. is fed to the valve in parallel with the reaction circuit, instead of in series with it. If you can trace the reaction circuit—the coil and the condenser—going from the plate of the valve straight to earth, that circuit is definitely parallel-fed.

Fig. 1 is one of the simple arrangements possible, and, when it was first used in this country, was known as the Reinartz circuit. So many others have gone by this name since that a little confusion exists. As far as we are concerned, it is just a parallel-fed detector circuit.

A Single Tapped Coil.

Let us deal with the pros and cons of this arrangement. Arguments for: First, it is easy to construct, since the grid and reaction coils may be wound as one coil with a tapping. That is how they always used to be made, when the circuit was first known.

GOOD OLD REINARTZ



In the original Reinartz arrangement the reaction condenser was placed between plate and reaction coil.

There, to be perfectly honest, the "pros" stop, as far as I am concerned. Among the "cons" we have these points to meet: (1) The H.F. choke is now a more important component than it was in the case of last week's series-fed circuits, and must be a good one. Any weakness here will upset results quite considerably,

Inside information about parallel-fed detector circuits and the various reaction methods will be found in this practical article, which also contains some useful data on the practical side of coil-winding for short-wavers. This is the second in a series of short-wave receiver discussions by our popular and experienced contributor, W. L. S.

the other end of the reaction coil. Though it does not look like it at the first glance, this is now the same series-fed circuit that we were dealing with last week. It is identical in every way! All the advantages of the parallel-fed

circuit are present with the additional one that the H.F. choke is no longer a matter of vital importance.

Readers may think that I am conservative, conventional, obstinate—call it what you will—but I cannot find a short-wave detector circuit that gives better results or looks better on paper than that.

I said all that most people will need about coil sizes last week. This time I have a few suggestions to make about the actual construction of the coils. Four-pin coils seem to me to be preferable to pairs of separate plug-in coils.

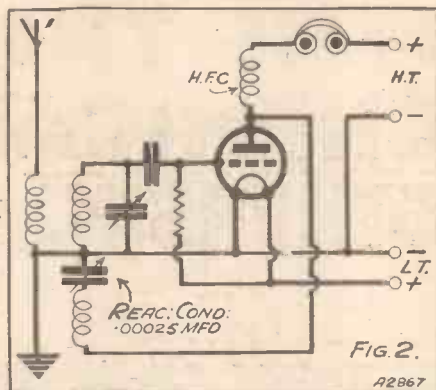
On Standard Formers.

They can either be wound on the standard six-pin formers (in which case the aerial coil can also be incorporated) or special four-pin formers may be made up and the aerial coil pivoted at the end so that variable coupling is obtainable.

Four banana-plugs may be inserted in one side of a length of standard ribbed ebonite former and the coils wound on that. For those who are clever at "home-making" I suggest that it is worth one's

(2) Both sides of the reaction condenser are "live." This means that hand-capacity effects are almost sure to worry us on the reaction dial unless it is mounted back from the front panel. It also means that if we use a metal panel it cannot be

RESHUFFLED REACTION



Here the reaction condenser is shown connected to the filament circuit, to avoid hand-capacity troubles.

directly mounted thereon, but will need bushing.

What can we do about these disadvantages? The answer, luckily, is simple. We simply have a "re-shuffle" and put the reaction condenser on the other side of the reaction coil, thereby making the circuit look like Fig. 2.

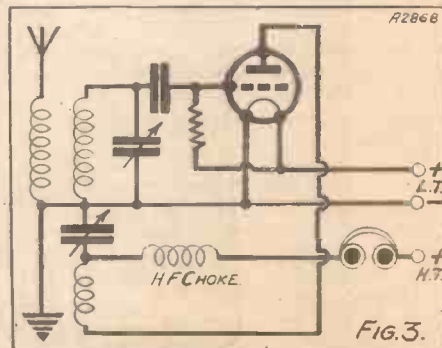
Conditions are now altered quite a lot, since the reaction condenser has one side definitely connected to earth. Hand-capacity troubles have gone, bushing is done away with, and so on, but we still have the fact that the H.F. choke needs to be good.

Hitched on the Other End.

For this reason, I must admit that I am not at all fond of parallel-fed detector circuits for short-wave work. Parallel-fed S.G. amplifiers are excellent; parallel-fed L.F. stages work wonders in curing instability and threshold howl, but parallel-fed detectors, no!

If you look at Fig. 3 you will see that it is the same as Fig. 2, except that the "business end" of the H.F. choke has been removed from the plate and hitched on to

CHOKE CONNECTIONS



An interesting variation of Fig. 2 made by changing over the choke-telephone circuit's terminal point.

while to make real skeleton formers and to mount the pins on a separate strip of ebonite about half an inch away from the former by suitable distance-pieces.

As this is not a comprehensive treatise on short-wave coils, however, I will leave the finer details for readers to settle for themselves.

The 'P.W.' 'ALL-IN' THREE

HAVE you been looking for a really distinctive three-valver to build this Christmas holiday? Something quite out of the ordinary that represents present-day technique so well that only twelve months ago it would not have been possible to build such a set?

Let us imagine for a moment that you have been toying with an idea of this kind, but have not yet decided the merits of the various pros and cons which have presented themselves for your consideration.

How should the three valves be arranged, for instance? Which is better—a detector and two L.F.'s, or H.F. detector and only one L.F.?

Shall it be ganged tuning, or separate

controls? What about fitting a pick-up for gramophone reproduction, either now or as a future possibility?

SOME SPECIAL FEATURES

Open-scale Tuning Marked in Wavelengths—Variable-Mu H.F. Stage—Triple Gang Tuning Unit—Power and Speaker Inside Cabinet.

And these variable-mu valves—are they any extra trouble? And what are the much-talked-of advantages that they are supposed to confer, when it comes down to brass tacks in actual practice?



Yes, there are numbers of questions to consider, and the easy-tongued sceptic who dismisses any new production as "Just another Three" is apt to become very hot and bothered when you put practical questions like the above to him.

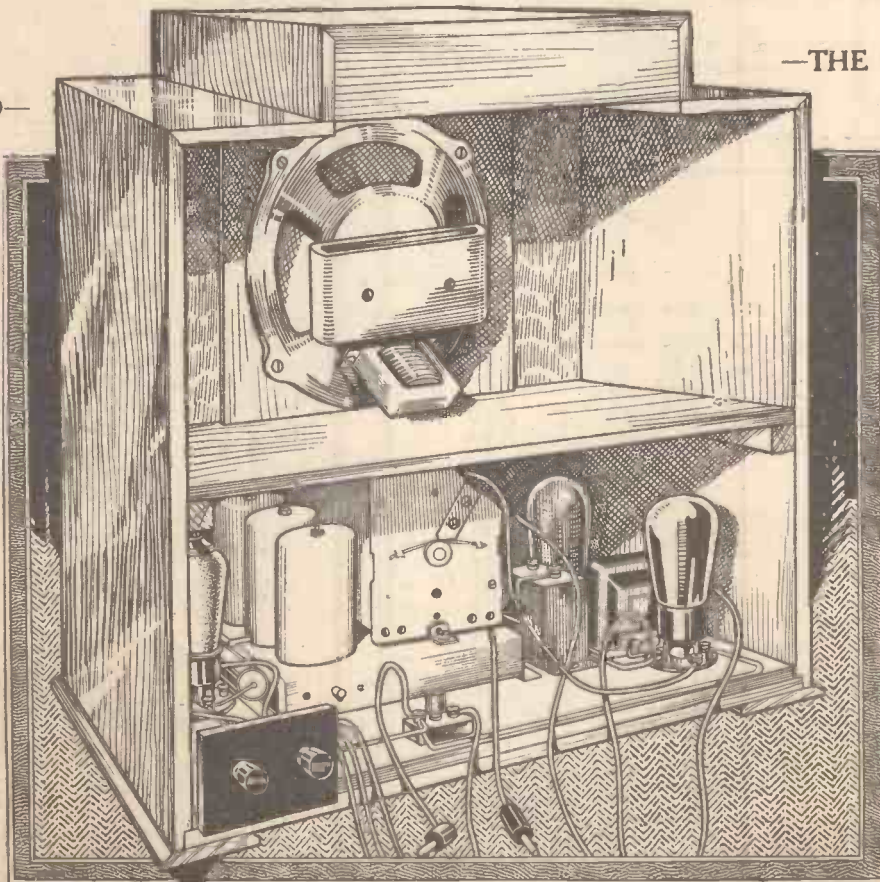
So, before going any farther, we propose to outline quite briefly some of the features

(Continued on next page.)

THE SET

TO BUILD—

- 1 Cabinet with Battery Shelf, fillets and baseboard (no back, but may be covered in cloth) Myers-Hunt.
- 1 .0003 - mfd. diff. reaction condenser (Telsen type W.186, Lotus, Ready Radio, Igranie, Ormond, Polar, J.B., Lissen, Peto-Scott, Cyldon, Formo, Graham Farish, Bulgin).
- 1 2-mfd. fixed condenser (Dubilier type B.C., T.C.C., Lissen, Igranie, Ferranti, Telsen).
- 1 .25-mfd. fixed condenser (T.C.C. type O.F.).
- 1 .0003-mfd. fixed condenser (Telsen type W.242, Ready Radio, Dubilier, Lissen, Ferranti, Igranie, Watmel, Graham Farish, Peto-Scott, Formo, T.C.C., Sovereign, Goltone).
- 1 Radiopack triple unit and volume control (Radiophone).
- 1 H.F. choke (Graham Farish flat type, Lewcos, Keystone, R.I., Dubilier, Ready Radio, Bulgin, Lissen, Varley, Lotus,



In the "All-In" Three we have gone all out for modern methods, with a variable-mu stage of high-frequency amplification and a self-screened tuning unit comprising coils and ganged condensers. Note the ample space for batteries or mains unit on the shelf.

—THE PARTS

TO BUILD IT

- | | |
|--|--|
| Wearite, Watmel, Telsen, Magnum). | Eleex, Belling & Lee, Goltone.) |
| 1 Three-pole change-over switch (Wearite type I.23). | 2 Spade accumulator tags (Clix ring type, Eleex, Belling & Lee). |
| 3 Four-pin valveholders (Lissen type L.N.5069, Telsen, W.B., Igranie, Lotus, | 8 Battery plugs (Eleex, Igranie, Belling & Lee, Goltone, Clix). |

Clix, Bulgin, Benjamin, Wearite, Goltone, Peto-Scott, Tunewell, Ready Radio).

1 20,000-ohm resistance (Graham Farish Ohmite).

1 2-meg. resistance with wire ends (Igranie type Gridu, Ready Radio, Dubilier, Graham Farish Ohmite).

1 L.F. transformer (Lissen Hypernik type L.N.703, Telsen, Igranie, Varley, Ferranti, Lotus, Lewcos, R.I., Ready Radio, Slektun, Bulgin, Atlas Multitone, Tunewell, Graham Farish, Goltone).

1 Fuse holder (Goltone type R.29/59a, Bulgin, Belling & Lee).

1 60 m/a fuse (Belling & Lee Scrufuse, Bulgin, Goltone).

1 Terminal strip, 3 1/4 in. x 2 in. (Peto-Scott, etc.).

2 Terminals (Clix, Bulgin, Igranie,

THE "P.W." "ALL-IN" THREE

(Continued from previous page.)

of this receiver that we think will interest and attract you.

First, although it is "a set that is different," we make no claim to startling novelty; on the contrary, we would stress that one of its strong points is that it is based upon that well-tried and widely-trusted combination, the screened-grid H.F. amplifier, grid-leak detector, and transformer-coupled, low-frequency amplifier.

Yet there are plenty of points of special interest in the "All-In" Three; and, to start with, we will call attention to its appearance. It is a "no-panel" set, and this in itself constitutes quite a break-away from most of 1932's designs.

The Heart of the Set.

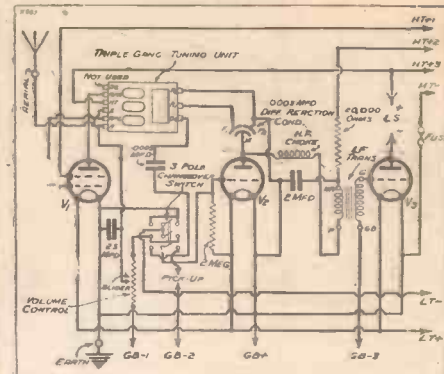
The absence of a panel allows the photographs to show clearly another special feature—the complete tuning unit. Instead of one coil here and another there, to be joined to their condensers by new leads, we have a single compact and comprehensive unit or tuning "pack," with a number of ready-assembled and completely-wired components, constituting the heart of the set.

Fix this unit in place and most of the H.F. wiring is done. There just remains the correct grouping of the low-frequency

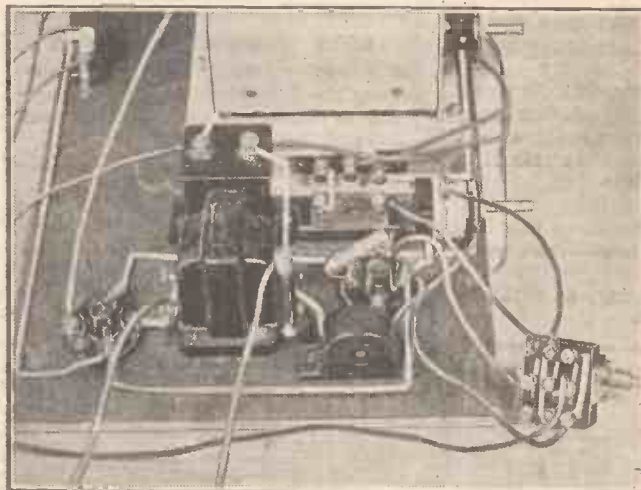
components, valves, etc., around the unit; and as the greater proportion of this remaining wiring is of the kind where spacing is comparatively unimportant the use of a tuning-pack results in simplification, combined with assured efficiency on the high-frequency side of the receiver.

Embodied in this unit is a volume control as well, and it is noteworthy that this not only achieves further compactness, but gives a control of the pre-detector type, which is logically preferable to post-detector control.

Before discussing that, let us remark also upon the considerable practical utility of

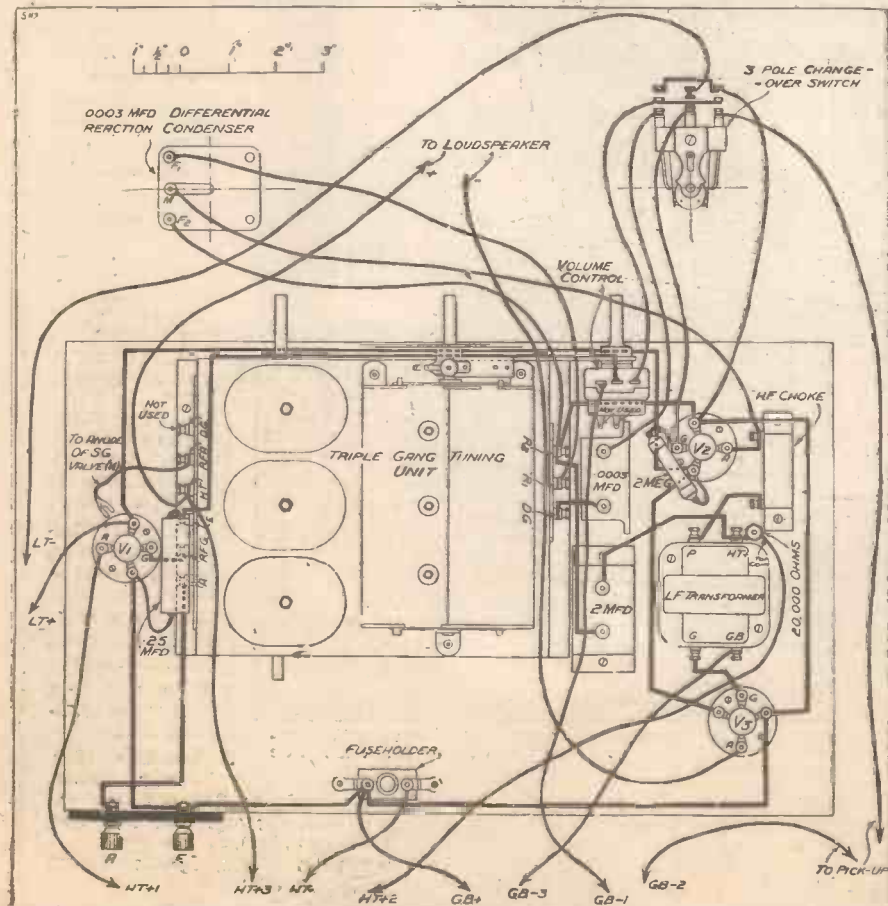


AT THE L.F. END



CIRCUIT CONSIDERATIONS
 At the low-frequency end the self-contained loudspeaker needs no filter circuit—though, of course, one may easily be fitted, if desired.
 Adequate decoupling has been arranged for in the detector's plate circuit, and a fuse is provided in the H.T. negative lead.
 The grid leak is of the self-supported type, and the connections to the 3-pole change-over switch are clearly shown in the wiring diagram.

ON THE BASEBOARD



Flex leads are used for the curving lines, and stiff wire for that which is straight with right-angle bends.

this type of open-baseboard design, where nearly all "the works" are on the one accessible baseboard. It slides into the cabinet from the back, and holes are drilled in the woodwork of the front for the spindles of the controls to project through.

The front of the cabinet, therefore, is of wood, with just the few control knobs and escutcheon plate showing. Very effective!

Immediately above the baseboard we have the loudspeaker, and a glance at the sketch that shows the back of the set will reveal that surrounding this we have ample space for the batteries, mains unit or whatever paraphernalia you may wish to store there.

Consequently the only external leads are those for the aerial and earth, so we have in this receiver a compact enclosed design of considerable artistic possibilities.

Calibrated in Wavelengths.

Any type of loudspeaker may be used, and with the price at which such instruments can now be obtained the whole receiver presents itself as an extremely attractive proposition.

Moreover, its tuning scale is marked in wavelengths, and it is a well-arranged open scale that makes the easily-adjusted tuning a pleasure.

And now for some more relevant details about the practical operation, the results which may be expected, and the difficulty or otherwise of construction—all points to be considered carefully in weighing up which set is best for your own particular needs.

Note that a variable-mu H.F. valve is used. And although there is no need to

(Continued on page 852.)

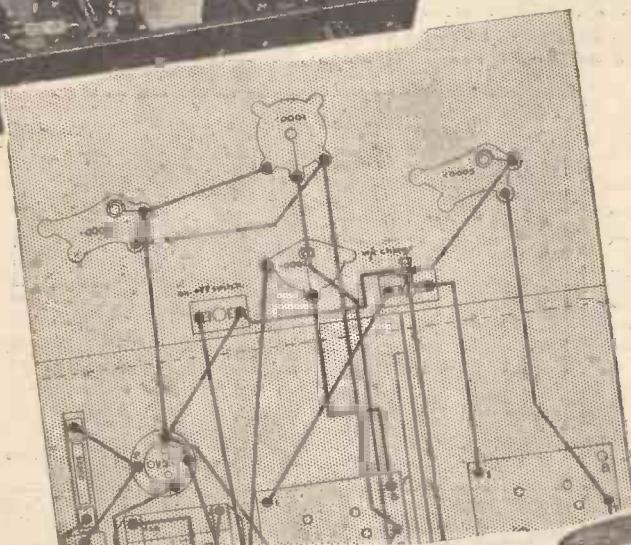
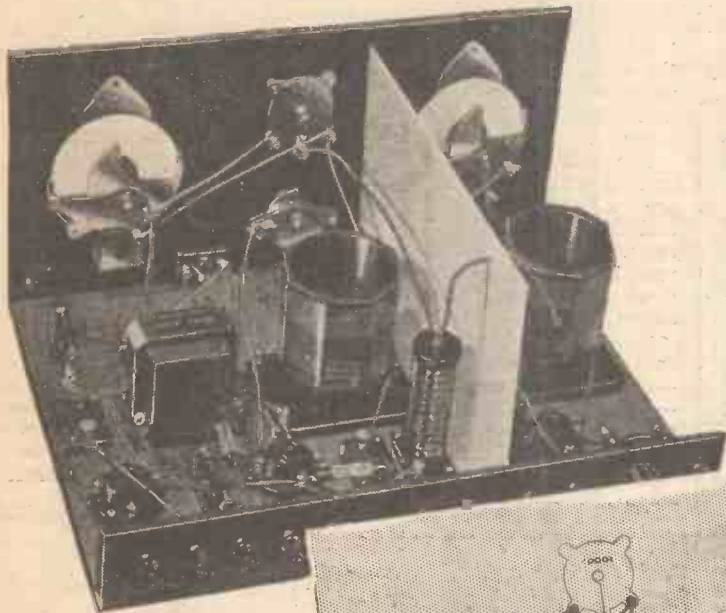
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Ask your radio dealer or post coupon now and we will send you the Kendall-Price 36-page 1/- Book FREE. It contains complete instructions, photographs and diagrams of ten modern circuits, both battery and mains operated, and is invaluable to every constructor.

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FULL-SIZE BLUE PRINTS

Full-size dimensioned blue prints for the ten Prize Circuits are also available at the exceptionally low price of 1/- for the set of ten. If you require these blue prints, enclose 1/- in stamps with coupon.

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If you also require the ten full-size blue prints enclose 1/- in stamps with this coupon. P.W.7

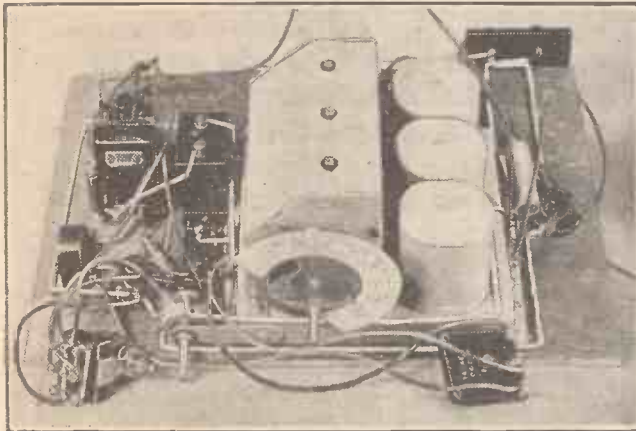
THE "P.W." "ALL-IN" THREE

(Continued from page 850.)

enter into technical details of this, we ought to pay tribute to this type of valve and admit that in hard fact and practical experience it has proved that it can do the job for which it was designed.

A very interesting one it happens to be, too. For the variable- μ 's seemingly impossible task is to magnify the weak and almost imperceptible voltages developed by a very distant station; or alternatively,

MARKED IN WAVELENGTHS



The plainly-marked scale is shown in the picture above, while in the centre illustration it is behind its esoutcheon plate, as in use.

to tackle the comparatively enormous input from a powerful local station—and to do both these tasks without introducing distortion.

In effect it can turn itself into a small-input-with-high-magnification valve or into a large-input-with-unimpaired-quality valve, as desired. And all it asks is that its grid bias shall be controlled according to the class of station that is to be received.

Such control has some very decided advantages, which we have no space to dwell upon but which you will immediately appreciate in use.

Curing "Monkey-Chatter."

(For one thing, that "monkey-chattering" due to cross modulation can be tackled effectively by this type of valve which, properly adjusted, gives a sensibly constant output from a wide variety of input voltages.)

We must, however, resist the temptation to enlarge upon the variable- μ 's excel-

lencies, and mention only the specific facts of immediate constructional interest. Perhaps the illustrations in our last page of this article will be the best way to "nut-shell" these.

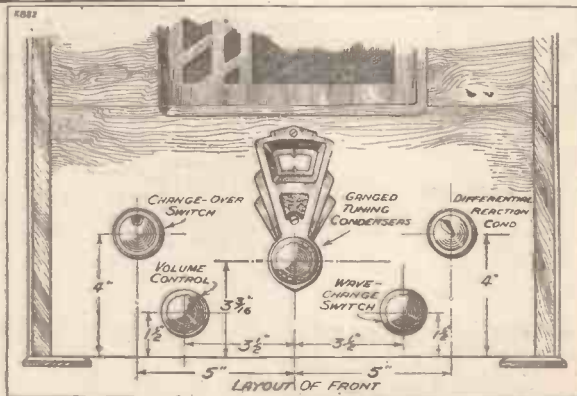
Symmetrical Panel Lay-out.

The central picture shows the controls, and hints at the very attractive appearance of the original cabinet with its formal loud-speaker fret, and symmetrical controls. The top one is the ganged tuning condenser, and we may remark again upon the widely-spaced dial readings, calibrated direct in wavelengths, just like a very expensive factory-produced set. This feature will prove unusually attractive to "the family," but will the other controls prove confusing to the inexperienced? Not a bit of it!

The volume control and wavechange switch are self-explanatory, and incidentally they are part of the tuning unit, integral with the main condenser just above them.

The right-hand upper control is the reaction—differential, of course—and that on the left the change-over switch that gives either

SEEN FROM THE FRONT



The "panel" sketch above also shows how the change-over switch and differential reaction condenser are placed relative to the other controls, and necessary dimensions.

ACCESSORIES TO USE.

BATTERIES.—L.T. Accumulator, 2 volts: Ediswan, Oldham, Pertrix, Lissen, G.E.C., Exide.

H.T. Battery, 120-150 volts: This should be of ample size to deal with the requirements of the valves chosen: Drydex, Pertrix, Lissen, Ediswan, Magnet, Ever Ready, Marconiphone. G.B. Battery, 16 volts: See above list.

LOUDSPEAKERS: Clarke's Atlas P.M., Baker's Selhurst, W.B., B.T.-H., Celestion, Marconiphone, Blue Spot, Epoch, G.E.C., Ferranti, Lanchester, Igranic, R & A, H.M.V.

Recommended Aerial and Earth Equipment: Electron "Superial," Graham Farish "Filt" earthing device.

Three yards of Systoflex and four yards of 18-gauge tinned copper wire (Goltone, Wearite).

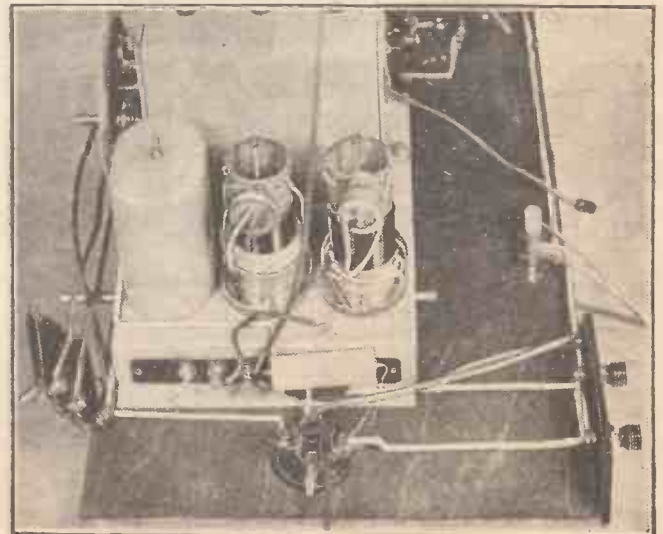
MAINS UNIT.—This should have three plus tappings with output to suit valves chosen, i.e. Heayberd, R.I., Ferranti, Atlas, Regentone, Tunewell, Ekco.

"radio" for ordinary reception, or "pick-up." This latter will enable the gramophone owner to play his records electrically via the loudspeaker, by means of a gramophone pick-up. The photographs give the answer to any query as to the skill needed to build the set. It is simplicity itself.

To illustrate the internals one picture shows two of the coil-cans removed, but remember that this partial dismantling is unnecessary to construction. All that is required is to mount the complete unit on the base-board and wire up its terminals as indicated on our wiring diagram.

The other components have to be grouped around the main unit as shown, and then wired, with stiff insulation.

CANNED COILS



Two of the screening cans have been removed to show the coils in this illustration. Note also how the .25-mfd. tubular condenser is placed.

A Choice of VALVES.	H.F. Stage.	Detector.	Output Valve.	Mains Unit Output Valve.
Mullard ..	P.M.12V.	P.M.1H.L.	P.M.2A.	P.M.202
Cossor ..	220V.S.G.	210H.L.	220P.A.	230X.P.
Mazda ..	—	H.L.2	P.220	P.220A.
Marconi ..	V.S.2	H.L.2	L.P.2	P.2
Osram ..	V.S.2	H.L.2	L.P.2	P.2
Tungsram ..	—	H.210	P.220	S.P.230
Lissen ..	S.G.2V.	H.L.210	P.22	P.X.240
Eta ..	—	B.Y.1814	B.W.604	B.W.602
Six-Sixty ..	SS215V.S.G.	210H.L.	220P.A.	220S.P.
Clarion ..	—	H.2	P.2	—

THIS PICK-UP DOES JUSTICE TO THE RECORD

A pick-up which gives the record its due and reproduces every subtle inflexion of harmony at its tone value. Such is the B.T.H. Pick-up, the choice of leading radiogram manufacturers and radio engineers; and the most widely used of any.

Your dealer will be pleased to demonstrate the various models in the B.T.H. range.



B.T.H. SENIOR PICK-UP (1933 model). This has been completely re-designed and gives an even better response curve than hitherto. Free coupling of the head to the tone arm reduces pressure on records and facilitates needle changing. Price £22.0. (Complete with volume control).



B.T.H. MINOR PICK-UP has been re-designed and improved and now includes a special volume control fitted in the base of the tone-arm pillar. This model is constructed in a one-piece moulding of B.T.H. "Fabrolite" and is recommended to those requiring a highly efficient but inexpensive pick-up. Price 25/-.

B.T.H. SENIOR PICK-UP complete with four adaptors to fit standard tone arms. Price 27/6.



PICK-UP and Tone Arm

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**ABSORBINGLY INTERESTING TO BUILD
70 STATIONS TO CHOOSE FROM
CHRISTMAS
ENTERTAINMENT
FROM ALL OVER THE WORLD**



**GREAT LISSEN CONSTRUCTIONAL CHART TELLS
EXACTLY WHAT TO DO WITH EVERY SINGLE
NUT AND SCREW!**

Firstly, there is the absorbing interest of watching the Skyscraper develop under your own hands from a box of parts to a clean, glistening, all-metal radio receiver. Then the thrill of trying it out—of bringing in stations you have never heard before—of being able to pick any programme you like from your Christmas newspaper and bring it in with certainty—of dancing all Christmas night if you like to bands from the ends of Europe. Lissen have published a 1/- Constructional Chart, giving the most detailed instructions ever printed for the building of a wireless set. You can't go wrong—every part, every wire, every terminal is identified by photographs. Everybody, without any technical knowledge or skill, can safely and with COMPLETE CERTAINTY OF SUCCESS undertake to build this most modern of radio receivers from the instructions given and the parts Lissen have supplied.

GIVE A SKYSCRAPER FOR CHRISTMAS

This new Lissen SKYSCRAPER Kit set is the only one on the market that you can build yourself employing a Metallised Screened-Grid Valve, High Mu Detector and Economy Power Pentode Valves. Around these three valves Lissen have designed a home constructor's kit the equal of which has never been before.

Why be satisfied with whispering foreign stations when you can BUILD WITH YOUR OWN HANDS this LISSEN SKYSCRAPER that will bring in loudly and clearly distant stations in a profession that will add largely to your enjoyment of radio?

You can get the Lissen Skyscraper Chart FREE from any radio dealer, or by posting the COUPON below direct to factory.

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Skyscraper Chassis Kit, complete with Valves, CASH PRICE 89/6 Or 8/6 down and twelve monthly payments of 7/6. Skyscraper Kit complete with Walnut Cabinet and inbuilt Loudspeaker, as illustrated, £6 5s. CASH. Or 11/6 down and twelve monthly payments of 10/6.



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Insert this COUPON in unsealed envelope with only halfpenny stamp, and address to:—
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LISSEN SKYSCRAPER KIT 3

GREATEST CHART EVER PUBLISHED — GREATEST SET EVER BUILT!

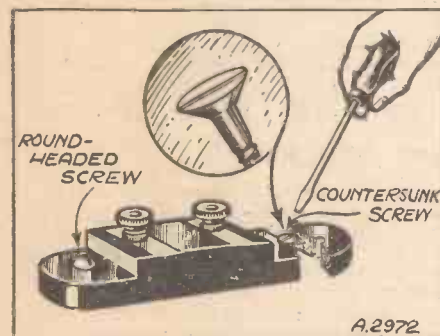


RECOMMENDED WRINKLES

The Turn of the Screw

WHEN screwing down condensers and other components in moulded composition cases, be sure not to use countersunk screws unless the fixing holes of the components are themselves countersunk.

This elementary precaution is often



Disaster follows neglect of elementary precautions!

neglected, with the result that the component splits at the fixing point and is rendered practically useless.

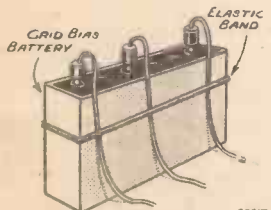
Round-headed screws should, of course, be used.

Securing Bias Leads

IF a wander-plug falls out of its socket in the G.B. battery and is not noticed, the accident may result in a damaged power valve.

The mishap can quite easily occur merely as a result of the battery falling over when being moved for domestic cleaning purposes, for instance.

Running the G.B. leads to the battery's sockets under an elastic band as shown in the sketch is a good guard against the trouble.



Keeping them in order.

Saving Shocks

THOSE experimenters who are in the habit of designing and constructing their own mains units know, probably from bitter experience, that large fixed condensers can hold a considerable charge of electricity for quite long periods. Even after several hours a condenser of, say, 2 mfd., and charged up to a couple of hundred volts, will give a nasty shock.

Most of us, when we remember to do so, discharge our condensers by shorting them with a wooden handled screwdriver before fiddling around inside. But sooner or later the time comes along when we forget to take this wise precaution, and usually with very unpleasant results.

The easiest way out of the difficulty is to arrange matters so that the condensers cannot retain their charge for more than a few seconds after switching off. This can be done very effectively by connecting a high resistance across their terminals, a good value being about half a megohm.

MONEY FOR NOTIONS

Readers are invited to send to the Editor a short description, with a sketch, of any novel and practical radio ideas which they may have encountered.

Ideas from readers which are published will be paid for at our usual rates.

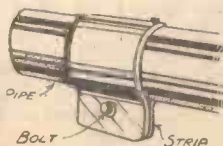
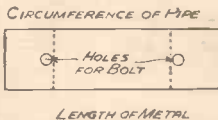
Send your hint to-day to the Editor, "Popular Wireless," Tallis House, Tallis Street, E.C.4.

An Earthing Joint

THE question often arises regarding a satisfactory method of making an earthing joint. In some instances a wire is taken to the most convenient water-pipe, and bound several times, whereas others are in the form of a soldered connection. A very simple yet exceedingly efficient method of making an earthing joint is as follows.

Obtain a strip of metal—copper, for preference—about one inch in width, and shape it round the intended earthing pipe. This will give the length required, and it should be cut accordingly, allowing a little over the actual circumference of the pipe.

Two holes must be drilled, one at either end to enable a bolt to be passed through, as shown in the sketch.



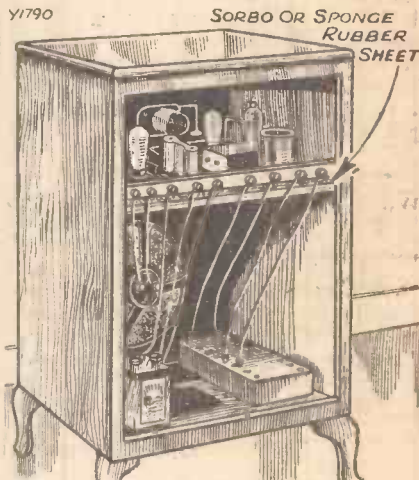
Fasten the connecting strip as tightly as possible.

The portion of the pipe to be used should be thoroughly cleaned with a piece of glass paper, and the metal strip fixed into position by placing it round the pipe, and tightened with the nut and bolt. The bolt can also be utilised as an earthing terminal.

Preventing Microphony

WHEN a receiver capable of giving considerable volume is mounted in a console or radiogram cabinet which also contains the speaker, trouble due to microphonic noises is sometimes experienced. It will often be found that standing the receiver on a sheet of sorbo or sponge rubber remedies this trouble.

With super-het, vibration of the oscillator tuning condenser vanes may cause a loud humming noise on powerful stations, and insulating the receiver in this way almost always prevents this.



A sponge sheet stops vibration.

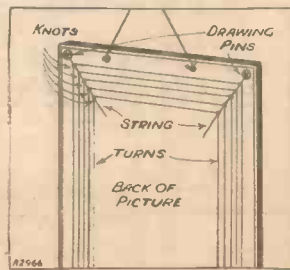
An Indoor Aerial

TO those whom the erection of an outdoor aerial is difficult or undesirable, or where reception of the locals is all that is required, many simple forms of indoor aerials may suggest themselves.

Probably one of the most useful and convenient for medium-wave stations is that indicated in the sketch, the back of a picture being used as a frame.

About 85 ft. of cotton-covered wire will be required, of about 28 gauge, and the turns can be quite conveniently supported by short lengths of string, each turn being spaced about 1/4 in., and held in place by a knot.

A reaction winding can be added by those experimentally inclined, about 60 ft. being sufficient.



(Continued on next page.)

RECOMMENDED WRINKLES

(Continued from previous page.)

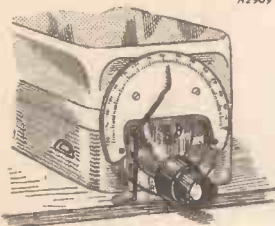
The frame may actually be used in place of the normal tuning coils, of course.

A Simple Dial Indicator

THOSE who go in for trying out circuits as baseboard hook-ups, often dispense with a panel and attach the variable condensers direct to the baseboard. Particularly is this the case with gang condensers of the screened type.

In many cases the indicator for showing the dial readings of such a condenser is dependent upon a panel to support it. In the absence of a panel, a good substitute can be made from a piece of stiff copper wire.

Clamp one end to the baseboard by a screw, and file the other end to a point, and bend the wire so that the pointed end comes immediately adjacent to the degree marks on the dial.

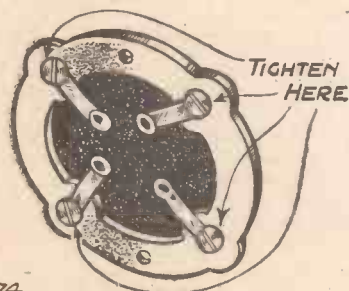


Watch the pointer.

Watch for Bad Contacts

NOTHING is more annoying when a set has been constructed than to find that some bad contact or breakdown is preventing proper operation. One of the best ways to safeguard against this is to examine carefully all component terminals, and to see that the screws holding these are properly tight.

A fruitful source of trouble exists in some of those valveholders which are fixed underneath the terminals by means of screws



A.2974.

Keep the screws tightened all the time as shown.

through the moulding and the metal soldering tags. These screws should be tightened with a small screwdriver before the valveholder is mounted on the baseboard, for it will be very difficult to remedy any looseness after the set has been built.

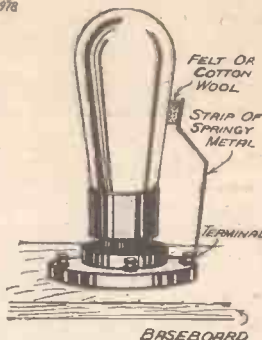
Microphonic Valves

A DIFFICULTY which may be encountered is that caused by a microphonic valve producing a continuous howl, or an unpleasant hollow, ringing noise in the loudspeaker.

The trouble is due to mechanical vibration of the valve's filament, and in the case of the continuous howl is caused by the electrical disturbances of the vibrating filament producing sound waves from the speaker, and the sound waves of the speaker making the valve vibrate further.

A number of schemes may be tried for curing the trouble, such as placing a thick felt or rubber ring round the valve, or loading the bulb with a small piece of metal embedded in plasticine.

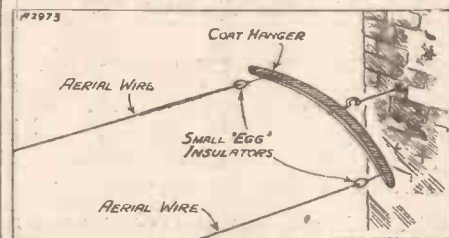
Probably the most effective method, however, is that indicated in the sketch, which completely damps out all vibrations without permitting the bulb to become "solid" with the holder.



This arrangement completely damps out vibration.

An Aerial "Spreader"

ALTHOUGH there is rarely any advantage in it, many people prefer aerials in lofts or attics to be of the twin-wire type. When erecting such an aerial, very



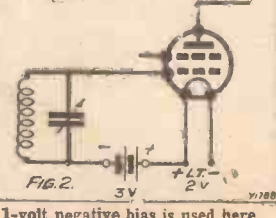
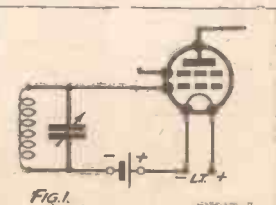
There's a radio use for many a household "gadget."

satisfactory "spreaders" for it are provided by ordinary coat-hangers as shown in the accompanying sketch.

S.G. Bias

IT is well known that the general efficiency of a screen-grid valve is improved by applying a negative bias of the correct voltage to its grid. It is a very simple matter to apply the necessary bias to a mains valve, by inserting a suitable resistance between its cathode and H.T. negative.

Now battery screen-grid valves require a bias of not more than one volt. If we use standard dry batter-



1-volt negative bias is used here.

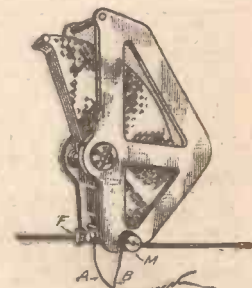
ies, it seems at first sight, that we are limited to a minimum of 1½ volts, unless we use a comparatively complicated potentiometer arrangement. The usual bias connections are shown in Fig. 1. Here the positive side of the grid-bias battery is connected to the negative side of the filament. By using a 3-volt battery and connecting its positive terminal to the positive side of the filament (Fig. 2), we have the required 1-volt negative bias on the grid. This assumes, of course, that a 2-volt valve is being used.

An Improved Trimmer

IN a two-dial receiver the aerial and H.F. tuning condensers rarely keep "in step." They may sometimes be made to do so by adding a little extra capacity to the H.F. tuning condenser—in other words, by "trimming."

A "trimmer" may be formed as in the sketch. A and B are two 3-in. lengths of 18-gauge wire in systoflex sleeving.

Twist them together once or twice to start with and then add more "twists" until dial readings on a given station are similar.

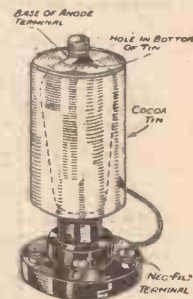


A little twisted wire is all you need.

Screening the H.F.

A MEASURE of screening with an unmetallised S.G. valve can be provided for by using a cocoa (or similar) tin as shown herewith. All that is required is to discard the lid and punch a hole in the bottom.

A lead can be soldered (or otherwise fixed) to the "skirt" of the tin, and connected to the negative filament terminal of the valveholder. It is, however, only advisable to do this if precautions have been taken to ensure that the tin rests on the glass of the valve or the insulated base of the anode terminal.



New use for an old tin!

A Valve Hint

MANY of the modern 2-volt S.G. valves have a metallised coating, which is joined electrically to one of the filament pins on the valve base.

If one of these metallised S.G.'s is used in conjunction with a vertical screen, it is very important to ensure that the valve pin to which the coating is connected goes to the negative filament side of the valveholder.

Otherwise, if the coating is allowed to touch the screen the L.T. battery will be short circuited. Alternatively, the hole in the earthed screen must be made large enough to provide adequate clearance.



Mains?



I-H pentode?

Then it's the

PEN 4V.

Pen 4V is the valve for every set using an indirectly-heated mains pentode.

PRICE 20/-

The valves specified for the "S.T. 400" are P.M.12A (Met.), P.M.1HL (Met.), P.M.2DX, P.M.2A or P.M.202.

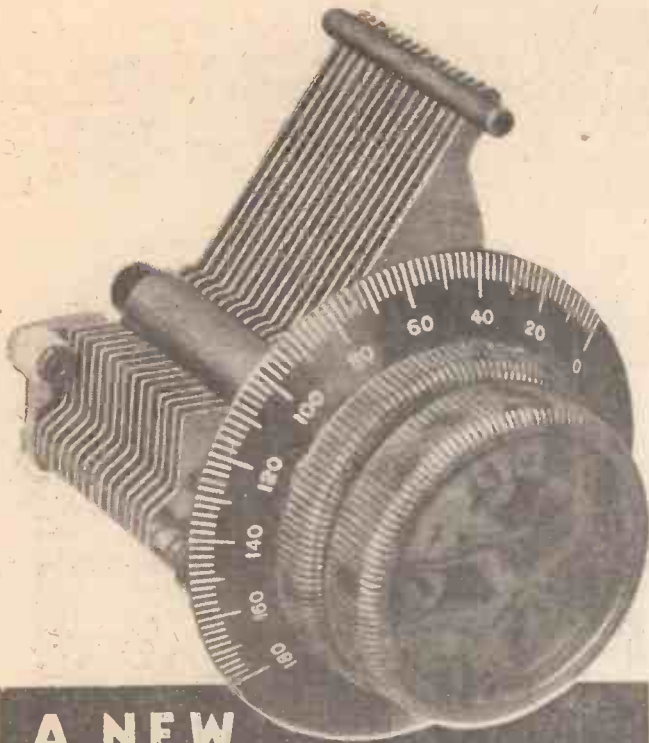
Ask T.S.D.—Whenever you want advice about your set or your valves—ask T.S.D.—Mullard Technical Service Department—always at your service. You're under no obligation whatever. We help ourselves by helping you. When writing, whether your problem is big or small, give every detail. Ask T.S.D.

MADE IN ENGLAND

Mullard

THE · MASTER · VALVE

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



A NEW
Utility **MITE**

Here is the new Utility Mite, with vernier ; a better job than ever and that is saying something, because the old Mite was the finest small condenser made.

Its accuracy is of the highest possible order, its geared slow motion drive is as beautiful an action as you could wish for, and its price is no higher than many a cheaper and inferior job.

If your dealer cannot show you the range, write to us for full particulars.

PRICES

- W319 .0005 mfd. as illustrated, 6/6.
- Less vernier 4/- W320 .0003 mfd. 6/6.
- Less vernier 4/- W321 .0002 mfd. 6/-.
- Less vernier 3/6.

From your dealer or post free from the makers.

WILKINS & WRIGHT LTD.,
UTILITY WORKS, HOLYHEAD RD., BIRMINGHAM.

London Agents :
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"We're Fluxite and Solder—the reliable pair; Famous for Soldering—known everywhere!"

When fixing up Wireless—there's no need to fret; Just call US to help you—the perfect solution you'll get!"

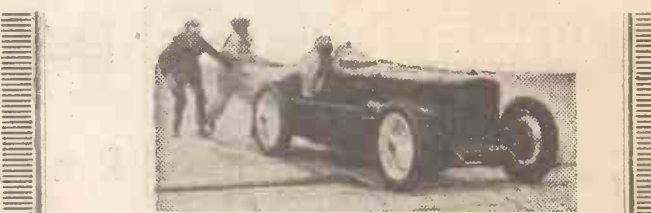
See that Fluxite and Solder are always by you—in the house—garage—workshop—anywhere where simple, speedy soldering is needed.

ALL MECHANICS WILL HAVE
FLUXITE
IT SIMPLIFIES ALL SOLDERING

All Ironmongers sell Fluxite in tins: 4d., 8d., 1s. 4d. and 2s. 8d. Ask to see the **FLUXITE POCKET SOLDERING SET**—complete with full instructions—7s. 6d. Ask also for our leaflet on **HARDENING STEEL** with Fluxite.
FLUXITE LTD. (Dept. 324), ROTHERHITHE, S.E.16.

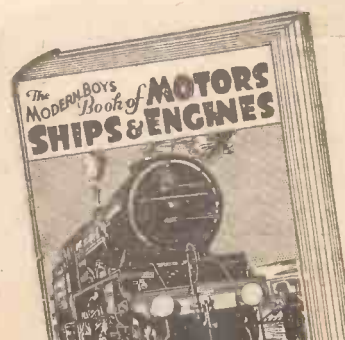
FOR ALL REPAIRS!





A Good Send-off!


Away goes Mr. Kaye Don, the world-famous racing motorist, in a 150 m.p.h. car tuned up for an attack on a speed record. Mr. Don is one of the team of experts who have written the intensely interesting articles, full of the romance of man's Mastery of Speed on Land and Water, which appear in the **MODERN BOY'S BOOK OF MOTORS, SHIPS and ENGINES**. This magnificent **NEW** book is crowded with hundreds of fascinating pictures, and well-written articles which tell of great achievements in things mechanical. It also contains four coloured plates.




NOW ON SALE

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At all
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 **W**ill your
old-style accumulator
last out the holiday?

 **T**reat yourself to
this wonderful new
kind—what a joy!

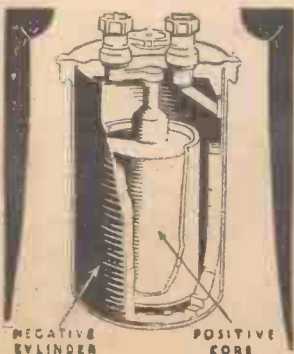


THE BLOCK PLATE-LESS ACCUMULATOR

lasts twice as long per charge — 80 amp. hrs. for 11/6.

Imagine this handsome cylinder of bakelite in beautiful colours! Then compare it with the crude glass box that to-day you call an accumulator. Remember that it gives you 80 amp. hours capacity at little more than a modern 40 amp. hours type would cost—and is

altogether neater, lighter. What a Christmas present—for yourself, or for someone else! The new accumulator has been coming ever since Faraday's collaborator, John Crisp Fuller, began to make his world-famous batteries—it is to Fuller's grandsons that the world owes the final achievement. No plates.—just a cylinder and a core, so that at last you have even, unimpeded action throughout the paste. Extraordinarily long life. Almost unbreakable. A revolution. Rid yourself this Christmas of the old-style accumulator's painful uncertainty. Buy "Block"—the new power-source for a new era.



BLOCK BATTERIES LTD ABBEY ROAD BARKING

FROM THE TECHNICAL EDITOR'S NOTE BOOK

TESTED AND FOUND?



A NEW ACCUMULATOR

I HAVE often wondered why batteries are not made more attractive in their appearances. They are frequently used externally to sets and must then be hidden if they are not to offend the eye.

That a somewhat ungainly and unimpressive presence is not an essential factor in at least an accumulator design is proved convincingly by the new Block.

THE BLOCK



The case is attractively moulded in bakelite.

This is built into a handsomely moulded container of bakelite which is made in various artistic colourings.

There is also a handle for easy carrying. A further good feature is that very bold plus and minus signs in deep relief are moulded in the unusually substantial terminals.

So far I have said nothing about the electrical characteristics of the cell, but the foregoing points are, in my opinion, almost as important and it is in regard to them that so many manufacturers have, in the past, failed.

The Block accumulator is a modern development of the Fuller Block which many readers will remember as giving such excellent service under trying war conditions.

Its construction differs entirely from the normal, for it has no interleaving plates.

The capacity rating is twice that of an ordinary accumulator of similar weight and it is stated, and we see no reason why it should not be so, that Block accumulators are practically unbreakable.

Plate buckling is obviously impossible and long periods of idleness do not cause sulphation.

We have a Block accumulator on test and it is giving every indication of fulfilling all its maker's claims to the letter.

As its prices at no more than existing batteries of lower capacity rating, and appears to have numerous advantages, its success would seem to be assured.

RECORD CORRECTION

The Multitone was, we believe, the first of the transformer tone-control schemes to be perfected. It is, as we have already reported, very effective and enables wide tone adjustments to be made in the set in which it is included.

We are now asked to draw our readers' attention to the indisputable fact that the Multitone tone control and its graded potentiometer can be used with great advantage between the set and any type of pick-up.

The user is then enabled to do the following as he turns the one knob:

- (a) to compensate for the deficiency of bass reproduction usual in records and common in most kinds of apparatus. This is achieved by a positive increase of bass response;

- (b) to control the predominance of bass or treble to suit the record, the room or the apparatus;
- (c) to correct booming tendencies in the apparatus or speaker by emphasising the treble;
- (d) to get bass in the reproduction of records made before the days of electrical recording, and give them some of the realism of modern records.

These are the words used by Multitone Electric and I am able to endorse them subsequent to tests.

HEYBERD TRANSFORMER

Of all components a mains transformer is the one thing a constructor *must not* attempt to economise in by purchasing a cheap, unbranded type.

Quite apart from the physical danger attaching to false economy of this kind,

SUBSTANTIAL CONSTRUCTION



The W.35 Heyberd Mains Transformer for powerful sets and amplifiers.

mains transformers cannot properly be made by those who have no specialised experience or by those who try to build down to a price.

I have in front of me as I write a W.35 Heyberd Mains Transformer which is a good example of how the job should be done.

It is for use with a Westinghouse H.T.11 metal rectifier and its secondary windings provide 300 volts at 550 milliamperes H.T. and 2 + 2 volts 5 amps and 2 + 2 volts 2 amps.

The price is 65s., but it is good value for money. Very robustly built, it works coolly and with close voltage regulation.

I have one minor criticism and that is that the terminal markings are on the removable terminal heads. But that is only a detail and cannot be said to detract to any real extent from the general excellence of the component.

A COMPLETE EQUIPMENT



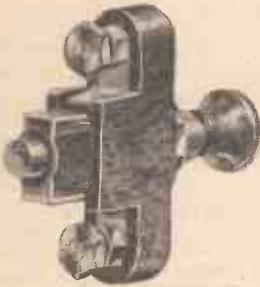
The Multitone Transformer and graded resistance.

TELSEN

H.F. CHOKES, PUSH-PULL SWITCHES & VALVE HOLDERS

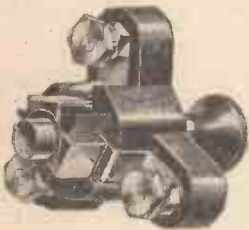
TELSEN TWO-POINT SWITCH

Particularly suitable for use as wave-change switch with the dual-range S.W. Coil unit. Employs electrical "knife" type self-cleaning contact with wedge shaped plunger, and a positive snap action, a series gap reducing self-capacity to a minimum... 1/-



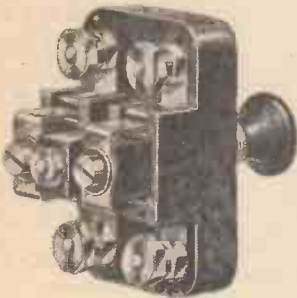
TELSEN THREE-POINT SWITCH

Soundly constructed on engineering principles, this is the perfect wave-change switch for use with a dual-range aerial coil or for breaking L.T. and H.T. currents simultaneously. Minimum self-capacity ... 1/3



TELSEN FOUR-POINT SWITCH

Highly suitable for use in wave-changing on two coils or an H.F. Transformer, or for switching pick-up leads or an additional speaker. No possibility of crackling. Minimum self-capacity ... 1/3



TELSEN VALVE HOLDERS

An improved range of valve holders in both solid and anti-microphonic types. Employ special contact sockets of one-piece design with neat soldering tag ends and terminals. Extremely low self-capacity.



Rigid type
4 pin 9d.

Anti-Microphonic
4 pin 1/-

Rigid type
5 pin 1/-

Anti-Microphonic
5 pin 1/3

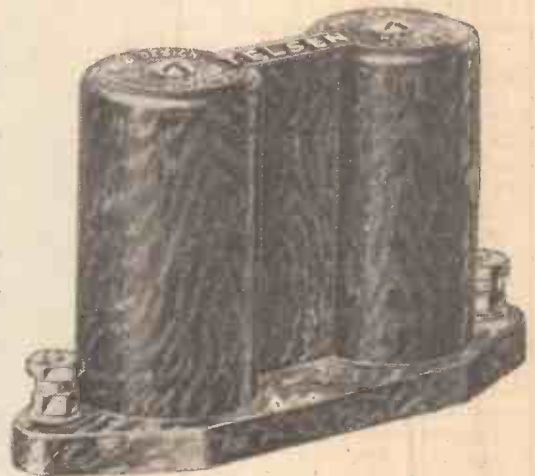


TELSEN STANDARD H.F. CHOKE

Covering the entire broadcast band, and occupying only the minimum of baseboard space, the Telsen Standard H.F. Choke has proved deservedly popular ever since its introduction. With an inductance of 150,000 microhenrys, a resistance of 400 ohms, and an extremely low self-capacity, it is highly suitable for use in reaction circuits, and is constantly being specified in this respect by the leading set designers 2/-

TELSEN BINOCULAR H.F. CHOKE

In H.F. amplification, the performance of a choke is of supreme importance. Where the very highest efficiency is the primary requisite, the Telsen Binocular H.F. Choke is the inevitable choice. It has a high inductance of 250,000 microhenrys, with a very low self-capacity and a practically negligible external field (due to its binocular formation). It is from every point of view the ideal choke—and where high-class circuits are concerned definitely the essential choke 5/-



TELSEN

RADIO COMPONENTS

TELSEN RADIO COMPONENTS ARE 100% BRITISH

ANNOUNCEMENT OF THE TELSEN ELECTRIC CO., LTD., ASTON, BIRMINGHAM

"ULTRA-SHORT" WIRELESS

Some details of the amazing success achieved by the Marchese Marconi, working on wavelengths of only about half a metre.
FROM A SPECIAL CORRESPONDENT.

MARCHESE MARCONI lately described the important results of his recent investigations into the properties and behaviour of very short electric waves in a lecture which he delivered at the Royal Institution of Great Britain.

"The problem of utilisation of very short waves for wireless communication is not a new one to me," said Marchese Marconi, "for I have devoted to it much thought and labour since the time of my earliest wireless experiments 38 years ago. In 1896 I was able to demonstrate to the engineers of the Post Office that waves of the order of 30 centimetres—corresponding to a frequency of approximately one million kilocycles, and now sometimes termed micro-waves—could be successfully used for telegraphic communication over a distance of $1\frac{1}{2}$ miles by employing suitable reflectors. Later this distance was increased to $2\frac{1}{2}$ miles

Did not Appear Promising.

"At that time, however, the use of these very short waves did not appear very promising, and for many years my investigations—like those of my contemporaries—were directed to the use of progressively longer waves which reached the length of ten thousand metres.

"The remarkable results which I obtained during the period 1919–1924 with the use of wavelengths from 100 to 6 metres—which led to the collapse of the long-wave imperial scheme and its substitution by high-speed short-wave Beam Marconi stations, and in fact brought about the present radio revolution of short-wave long-distance radio telegraph and telephone services—again distracted my attention from the study of micro-waves

"Electro-magnetic waves under one metre in length are usually referred to as quasi-optical waves, the general belief being that with them communication is possible only when the two ends of the radio circuit are within visual range of one another; and that consequently their usefulness is defined by that condition.

"Long experience has, however, taught me not always to believe in the limitations indicated by purely theoretical considerations or even by calculations, for these—as we well know—are often based on insufficient knowledge of all the relevant factors, but, in spite of adverse forecasts, to try out new lines of research, however unpromising they may seem at first sight.

Advantage of Small Dimensions.

"It was about 18 months ago that I decided again to take up the systematic investigation of the properties and characteristics of these very short waves in view of the palpable advantage which they seemed to offer—i.e., the small dimensions of the radiators, receivers and reflectors necessary for radiating and receiving a considerable amount of electrical energy—and in view also of the fact that they do not suffer interference from natural electrical disturbances such as atmospherics."

Marchese Marconi described in detail the apparatus, which had been specially developed for his experiments, and illustrated his description with a series of pictorial and diagrammatic lantern slides which made public for the first time all the special features of the design of his new micro-wave transmitting and receiving equipment.

Numerous distance tests and a few official demonstrations had been given from time to time, he said, and each had gone to prove the availability and practicability of these very short waves for the purposes of radio communications.

Soon after a duplex demonstration over a distance of 23 miles between Santa

of the Italo Radio Company at Terranuova.

"Following a series of experiments with waves of the order of 50 centimetres length conducted between his yacht 'Elettra' and the station at Rocca di Papa, near Rome," said Marchese Marconi, "the most outstanding result of all his tests was the successful establishment of communication from Rocca di Papa to Cape Figari, Sardinia, over a distance of 168 statute miles (275 kilometres) on a wavelength of 57 centimetres.

Greater than Optical Range.

"Not only were all previous distance records of communication by means of wavelengths below one metre thus far surpassed, but it was effectively demonstrated that these very short waves could overcome the supposed obstacle presented by the curvature of the earth, the distance between the two stations being considerably in excess of the optical range.

"I feel I may say," he added, "that some of the practical possibilities of a hitherto unexplored range of electrical waves have been investigated, and a new technique—which is bound to extend very considerably the already vast field of the applications of electric waves to radio communications—developed.

"The permanent and practical use of micro-waves, on the Vatican Castel Gandolfo link, provides the first example of what will be, in my opinion, a new and economical means of reliable radio-communication, free from electrical disturbances, eminently suitable for use between islands, and to and from islands and the mainland, and also between other places separated by moderate distances.

Directive Qualities.

"The new system is unaffected by fog, and offers a high degree of secrecy, by virtue, principally, of its sharp directive qualities.

"In regard to the limited range of propagation of these micro-waves, the last word has not yet been said. It has already been shown that they can travel round a portion of the earth's curvature, to distances greater than had been expected, and I cannot help reminding you that at the very time when I first succeeded in proving that electric waves could be sent and received across the Atlantic

Ocean in 1901, distinguished mathematicians were of the opinion that communication by means of electric waves, would be limited to about 170 miles.

"In any case, the new system is now available for advantageously replacing optical or light signalling in all its long-distance applications as, for example, between signalling stations along coasts, or between forts constructed along a frontier, and in general will be found advantageous in many cases where the erection and maintenance of an ordinary short-distance telephone or cable circuit is difficult.

EMISSARY OF EMPIRE



The B.B.C.'s "Ambassador to the Empire" Mr. Malcolm Frost, who is now visiting the various parts of the Empire with recorded programmes, is here shown starting out from Croydon. With him is Cecil Graves, the Empire Service Director.

Margherita and Sestri Levante, added Marchese Marconi, the Vatican authorities decided to adopt the new system for telephonic communication between the Vatican City and the Palace of His Holiness the Pope at Castel Gandolfo over a distance of 20 kilometres entirely over land, and screened by intervening trees. In connection with the establishment of this service, successful tests took place towards the end of April this year, and it was interesting to mention that during one of these tests waves had to pass through all the masts and aerials of the high-power radio station

DIRECT RADIO LTD

BUY DIRECT—DELIVERY GUARANTEED FOR CHRISTMAS

THE "P.W." ALL-IN THREE

	£ s. d.		£ s. d.
1 00015-mfd. differential reaction condenser Ready Radio ..	2 6	1 Terminal strip, 3½ ins. X 2 ins. ..	6
1 T.C.C. 2-mfd. fixed condenser ..	3 10	2 Belling Lee terminals ..	5
1 T.C.C. 25-mfd. fixed condenser ..	2 3	2 Belling Lee Spade accumulator tags ..	4
1 T.C.C. 0003-mfd. fixed condenser ..	1 3	8 Belling Lee battery plugs ..	1 4
1 Radiophone Radiopack triple unit and volume control and spare knob ..	3 0 6	3 Mullard Valves, P.M.12V., P.M.1H.L., P.M.2A ..	1 12 3
1 Ready Radio H.F. Choke ..	1 6	1 "159" Console Cabinet with baseboard and battery shelf fitted ..	2 5 0
1 Wearite three-pole change-over switch, type I:23 ..	4 6	Flex, screws, etc. ..	1 1
3 Four-pin valve holders ..	2 0		
1 Graham Farish 20,000 ohm Ohmite resistance ..	1 6		
1 Dubilier 2-meg. resistance with wire ends ..	1 0		
1 R.I. Hypermite L.F. Transformer ..	12 6		
1 Fuse holder ..	6		
1 Belling-Lee 60 m/a Scrufuse ..	6		
			£8 14 9

Kit Model No. 1	Kit Model No. 2	Kit Model No. 3
(less valves and cabinet) £4:17:6	(with valves less cabinet) £6:9:9	(with valves and "150" Console Cabinet with baseboard and battery shelf fitted) £8:14:9
or 12 monthly payments of 9/-	or 12 monthly payments of 12/-	or 12 monthly payments of 16

FIRESIDE CONSOLETTA

Kit Model No. 1	Kit Model No. 3	Kit Model No. 4
(less valves and cabinet) £5:14:6	(with valves and cabinet) £9:17:0	(with Epoch Super Junior Permanent Magnet Moving Coil Speaker) £11:4:6
or 12 monthly payments of 10/6	or 12 monthly payments of 18/6	or 12 monthly payments of £12:6

"1933" FOUR

KIT MODEL 1	KIT MODEL 2	KIT MODEL 3
(Less valves and cabinet) £4:0:2	(With valves less cabinet) £6:2:8	(with valves and cabinet) £7:2:8
or 12 monthly payments of 7/6	or 12 monthly payments of 11/6	or 12 monthly payments of 13/6

READY RADIO KITS

Meteor S.G.3 Kit (with valves) £5/7/6, or 10 monthly payments of 12/6, Cabinet Model (as above with Cabinet and Moving-coil Speaker) £8/17/6, or 12 monthly payments of 17/-	303 Kit (with valves) £3/10/0, or 7 monthly payments of 11/9. Cabinet Model, as above with Cabinet and Moving-Coil Speaker, £8/17/6, or 10 monthly payments of 16/-	
S.T.400 Complete Kit, £4:17:6 Or deposit of 9/6 and 11 monthly payments of 9/9.	MODEL A Complete Kit, with four specified valves and beautiful walnut cabinet fitted with moving coil speaker. £10:10:0 Or deposit of 20/- and 11 monthly payments of 21/-	MODEL B Complete Kit, with four specified valves. £6:16:9 Or deposit of 12/6 and 11 monthly payments of 13/9.

"S.T.400"

STANDARD MODEL
KIT Model 1 (less valves and cabinet) £4:19:6 Or 12 equal monthly payments of 9/3
KIT Model 2 (with valves less cabinet) £6:18:9 Or 12 equal monthly payments of 13/-
KIT Model 3 (with valves and cabinet) £7:19:9 Or 12 equal monthly payments of 15/-

ACCESSORIES

SPEAKERS.
Epoch Twentieth Century moving coil, 35/-
Epoch Super Junior .. 27/6
Epoch A.2. Dance Orchestra .. £3 3/-
Or 10 monthly payments of 7/-
W.B. P.M.2. £4/5/-
Or 12 monthly payments of 9/-
W.B. P.M.4 super permanent magnet moving coil chassis .. £2/2/-
R. & A. Victor permanent magnet moving coil chassis .. £3 10/-
Or 10 monthly payments of 7/9
R. & A. Challenger moving coil chassis, 35/-
R. & A. Bantam moving coil chassis, 27/6
Bluespot 100U inductor chassis .. 32/6
Bluespot 66R unit and major chassis 50/-
Bluespot 44R oak cabinet speaker, 52/6
R. & A. type 50 unit and cone .. 15/-

BATTERIES & ELIMINATORS
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Siemens 120-volt Power V8 .. 24/-
Siemens 9-volt G.B. 1/-
Siemens 16½-volt G.B. 1/9
Oldham 0-50 2-volt accumulator .. 9/-
Oldham 0-75 2-volt accumulator .. 12/6
Oldham 120-volt wet H.T. accumulator, 5,500 ma/hour capacity .. £4/1/-
Or 12 monthly payments of 7/6
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Atlas A.2 H.T. eliminator .. £2/12/6
Or 10 monthly payments of 6/-
Atlas A.C.244 H.T. eliminator .. £2 19 6
Or 10 monthly payments of 6/6
Atlas A.K.260 H.T. eliminator with triode charger .. £4/10/-
Or 12 monthly payments of 8/6
Atlas A.C.300 H.T. eliminator with G.B. and triode charger .. £6/10/-
Or 12 monthly payments of 12/-
Atlas DC/15/25 H.T. eliminator for D.C. mains .. £1/19/6
Or 12 monthly payments of 12/-

GRAMO PICK-UPS & MOTOR
Daptacon .. 10/6
A.E.D. Mark III .. £1 10/-
B.P.H. Minor, with volume control £1/5/-
Collaro double spring motor with automatic stop .. £1/13/-
Collaro A.C. induction .. £2/10/-
Collaro A.C. playing unit with pick-up, A.C. motor turntable and volume control in one assembly .. £4/1/-
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KIT No. 3 (with valves and cabinet) £9:2:0 or 12 equal monthly payments of 16/6
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XMAS GIFTS
SPECIAL SUGGESTIONS AND RECOMMENDATIONS.
Pico De Luxe Set Tester .. 2 2 0
Manley Electric Soldering Iron, very handy and reliable .. 7 6
Selectanet Aerial .. 2 6
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New Set Mullard Valves for any set ask for our expert advice, and prices.

DIRECT RADIO ALL-WAVE III
Kit with 3 Mullard valves and full instructions for construction and use.
2-7-6
Guaranteed Results, Ultra Short Medium and Long Waves.
LIMITED STOCK.
Spec a Cash offer
Order now before supplies are exhausted.

Even if the item you want is not listed WE HAVE IT! Write, phone or telegraph your order.
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CASH, C.O.D. AND EASY PAYMENT ORDER FORM.
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Please dispatch to me at once the following goods ..

(a) I enclose
for which (b) I will pay on delivery { Cross out line }
(c) I enclose first deposit of { not applicable }

NAME
ADDRESS
Pop. W. 17/12/32

FOR XMAS DELIVERY.

KIT KRITICISMS

THIS WEEK: The Lotus "Landmark" Three

By Mr. PETER SIMPLE.

MANY congratulations to Lotus Radio for having appreciated the most important essential in the preparation of a kit receiver—namely, making the kit so complete that the constructor has literally nothing to buy before starting on the building.

I have so often emphasised this point when dealing with low-priced kits, that it is a positive relief to find that Lotus have forestalled me, with their "Landmark" Three!

The constructor who wants, through necessity or choice, a low-priced receiver, is not likely to be too pleased when he finds that additional outlay (even though it be only a few shillings) is necessary on such things as screws and connecting wire.

That the "Landmark" Three kit contains *everything*, even down to a battery cord clip and a tiny screw for fixing it, is the first reason for my commending it to those home constructors who want a reliable receiver at a cost not exceeding £2.

Very Efficient Arrangement.

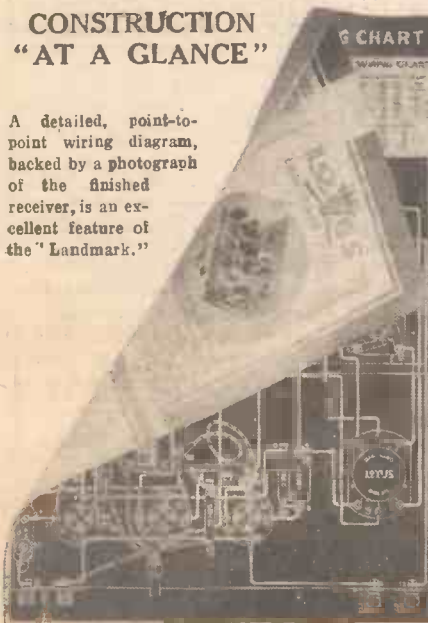
It is interesting to see how the detector and two L.F. circuit—which has practically disappeared from commercial receivers since the advent of the screened-grid valve—is so often made use of in kit sets. The "Landmark" Three makes use of this arrangement and very efficient it is, too.

Quite frankly, there is more opportunity for cutting down expense with this circuit than there is with the S.G., detector and L.F. And if constructors cannot pay more than that £2 I mentioned, then it is surely better to provide a good detector and two L.F. receiver than a mediocre S.G. one.

The first glance at the attractive blue print of the "Landmark" gives an impression of extreme simplicity, an impression

CONSTRUCTION "AT A GLANCE"

A detailed, point-to-point wiring diagram, backed by a photograph of the finished receiver, is an excellent feature of the "Landmark."



which is not belied when the actual construction is started.

It has been suggested to me more than once that the kit reviewer's opinion on building up the receiver he is describing counts for practically nothing, since the makers are sure to provide a specially built model for a test report.

This is so far from being the case, for I spend anything from one to three hours building each set before I start tests. The "Landmark" kit of parts was in a sealed box exactly as supplied to the public.

So when I say that the building of this receiver is simplicity itself, and a pleasant experience into the bargain, you can take it that I know what I am talking about!

A piece of newspaper on the dining-room table, a pair of pliers, a screwdriver and a penknife—and the job is done!

Incidentally the "Landmark" makes use of a metal panel (ready drilled, of course) which adds considerably to the finished appearance.

The extensive range of Lotus components means that every part of the receiver can be built of matched parts of equal efficiency, thus solving a problem which constructors are apt to worry about. In passing, I would add that the kit includes, for wave-changing, one of those intriguing rotary switches which can be made to do almost anything!

Strength and Purity.

I tested the "Landmark," of course, on my very inefficient London aerial. This aerial has become a standing joke in the offices of "P.W."

"Peter Simple is positively proud of his inefficient aerial" seems to be the general opinion.

Be that as it may, there is no denying that the very inefficiency of the system makes it almost impossible for me to overpraise the performance of any receiver.

Constructors have written to say that my results were a positive disgrace compared with the things they made the set do, but I have never heard of anyone whose results were in any way not so good as mine. Which must be very satisfactory for the manufacturers!

Anyhow, my tests were far from disappointing. Brookmans Park and Daventry came through with a strength and purity of tone which delighted my 1000 Blue Spot speaker in its new B.B.C. box baffle. Using the output valves specified by Lotus

I could not wish for better reproduction from any receiver with three valves.

But, at the same time, there was also quite a respectable bag of more distant stations—Rome, Fecamp and the rest—which came in with hardly any reaction.

Extraordinary results in the way of distant stations were not to be expected, but I did not suppose that the "Landmark" would, on my aerial, be capable of separating as many broadcasters as it succeeded in doing.

Choke-Filter Output.

From the technical aspect, too, the receiver provides more than just value for money.

To go into details, resistance-capacity coupling is employed for the first L.F. stage, with transformer coupling to the output valve. But, in addition, the manufacturers seem to have borne in mind the fact that the last ha'porth of tar may make all the difference to the "ship," and have provided a choke-filter output which helps in no small way the excellence of tone of reproduction.

BUILT ENTIRELY OF MATCHED COMPONENTS



A view showing the controls and pleasant panel appearance—with a glance at one or two of the sturdy components.

A .00015-mfd. solid dielectric condenser is introduced into the aerial circuit, giving that fine degree of selectivity which is so necessary for separating distant stations from one another and from the local.

The fact that the sensitivity of the receiver can be reduced with this control, thereby allowing the more distant stations to be brought up with reaction quite clear of the more powerful local, successfully overcomes any diffidence which the constructor might feel at building a receiver with no H.F. stage.

Full-Chested Power.

This same knob also provides a real control of volume from the "silent whisper" to the full-chested power which was such a joy to hear when tuned to Brookmans Park or Daventry!

The price of the Lotus "Landmark" Three is £1 19s. 6d. It is an easily-built receiver designed to include components which are of a quality proved by long experience. It includes everything necessary for the home constructor.

I have not the least hesitation about recommending it warmly to the man who wants the very best value for his money.

Chosen for the . . .

"P.W." ALL-IN THREE

THE "WHITE-HALL DE LUXE" cabinet was specially chosen by the "Popular Wireless" research department for their latest achievement, the "P.W." "ALL-IN" THREE receiver, on account of its most striking appearance and solidity.

Make certain that your "ALL-IN" THREE is housed in the cabinet that is specified by "Popular Wireless."



30/- complete with baseboard and battery shelf. Cash, C.O.D., Carriage paid to your door.

The "WHITEHALL DE LUXE" cabinet is a fine, solid piece of furniture, and is available in three finishes: NATURAL, GOLDEN AND JACOBAN. The use of solid wood does away with any troublesome boom effect, plywood only being used for decorative purposes, namely, the fret.

Obtainable at all good-class Radio Dealers, or direct from the sole manufacturers. State style of finish required when ordering. Money refunded if not completely satisfied.

THE MYERS-HUNT CABINET CO.

7, Austin Street, Shoreditch, London, E.2
Telephone: Bishopsgate 3037 & 4928.

THE MUSIC LOVER'S PICK-UP



30/-

A real music lover can never be satisfied with mediocre reproduction of his favourite records, but this new Pick-up by Bowyer-Lowe has been designed to realise an ideal hitherto unattainable. Every delicate nuance, every inflection, every transient change in volume, is as faithfully reproduced as though the actual players were in the room.

In your own interest ask your dealer for a demonstration.

BOWYER-LOWE & A.E.D. LTD.,
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Send for Catalogue.

LIBERAL EXCHANGE ALLOWANCE FOR OLD SETS

You must have an up-to-date receiver to hear the Home and Foreign stations really well. We give you the highest possible price for your old set as payment on a

NEW 1933 SET OF ANY MAKE FOR CASH OR BY INSTALMENTS

Our **FREE SERVICE** includes information and technical advice. You keep your old set until the NEW one is in your possession—no missed programmes, no disappointment.

SEND ENQUIRY TO-DAY—NO OBLIGATION

MESSRS. K. RAYMOND, Ltd. (Radio Exchange Dept.),
26/27, D'arblay St., Wardour St., London, W.1.

My present set is a
I would like a 1933 model
Please state terms without obligation for

1. Cash. 2. Instalments payment (Delete as required).

NAME
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Higher ampere-hour efficiency means
QUICKER CHARGING
SLOWER DISCHARGING
LONGER LIFE



Type E.L.S.7. 60 a/h capacity. Price **12/6**



Type E.L.M.4. 45 a/h capacity. Price **8/-**



Type E.L.9. 80 a/h capacity. Price **12/3**

"Balanced Capacity," the new principle utilised in Ediswan Extra-life Accumulators, means higher ampere-hour efficiency. The special design of the positive and negative plates ensures complete electrical "balance" and reduces the possibility of "shedding" to an absolute minimum. In addition to their high electrical efficiency, these accumulators embody many mechanical refinements—British-made clear glass containers, moulded ebonite lids, screwed vents, non-corrodible and non-interchangeable connectors and metal carrier which fits neatly round the container.

EDISWAN **EXTRA-LIFE** ACCUMULATORS



THE EDISON SWAN ELECTRIC CO. LTD.
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RADIO TUTORIAL

All Editorial communications should be addressed to the Editor, POPULAR WIRELESS, Tallis House, Tallis Street, London, E.C.4.

The Editor will be pleased to consider articles and photographs dealing with all subjects appertaining to wireless work. The Editor cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped and addressed envelope must be sent with every article. All inquiries concerning advertising rates, etc., to be addressed to the Sole Agents, Messrs. John H. Lile, Ltd., 4, Ludgate Circus, London, E.C.4.

The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialities described may be the subjects of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

After all, an S.G. is only a three-electrode valve with an extra electrode added, and "apparently" in "breaking" it you upset the fourth electrode and left three others in working order.

As an oscillator valve has a more or less easy job in the receiver the maimed valve is quite capable of doing this, even though it is unfit for its usual place in the set. But, of course, it does not always "come off" as well as this, depending upon the nature of the internal damage.

CARE OF THE GRID BIAS.

S. F. (Acton).—"Is it true that faulty grid bias causes noisy reproduction?"

When loudspeaker results are in question grid bias is always important, and a great many failures to get good reproduction arise from carelessness with the grid-bias battery or with its leads.

Bad contact at the plug and socket joints is a frequent source of trouble, and unless the grid-bias plugs fit snugly into their sockets reproduction is

(Continued on page 868.)

QUESTIONS AND ANSWERS

THE "BUSTED" S.G. THAT WORKS.

E. L. (Cambridge).—"When my A.C. S.G. valve was dropped it went out of action, and for some reason I did not break it to look inside, or throw it away, but I stored it with some old type valves and forgot it. To all intents and purposes it was a bust valve, I thought.

"That was months ago, and I recently had the misfortune to lose another valve by

accident—an M.H. this time, which was in use as an oscillator in a super-het. Going hopefully to my 'spares' cupboard (but knowing all the time that I had no A.C. valve) I came across the old S.G. And plugged it in the oscillator valveholder without the slightest expectation of doing any good.

"To my great surprise it worked. It was apparently just as good as the correct oscillator, although it truly is an S.G. valve that won't work as such, and is being used without any wire attached to the top terminal. How do you account for that?"

We have known that kind of thing happen before, so we are not as surprised as you about it. But it certainly is a bit of good luck.

DO YOU KNOW—

the Answers to the following Questions?

There is no "catch" in them, they are just interesting points that crop up in discussions on radio topics. If you like to try to answer them you can compare your own solutions with those that appear on a following page of this number of "P.W."

1. Which station has the higher wavelength—Cork, or Fécamp (Radio Normandie)?
2. What would be the total resistance of a 50,000-ohm spaghetti in series with one having a resistance of 100,000-ohms? And how is the value found?
3. Which valves have the better characteristics—the "battery" or the "mains" type?



**GIVE YOUR SET A LASTING GIFT
THIS CHRISTMAS**

Convert it to A.C. Mains operation, and give it a rectifier that will provide an un-ending and constant high- or low-tension supply. Give it a rectifier that will enable your set to give of its best throughout its whole life; one that will enable you to enjoy better reception and reproduction now and for years to come.

WESTINGHOUSE

METAL RECTIFIERS

Give it a Westinghouse Metal Rectifier and remove the worry of periodical renewal of the source of power to your receiver.

The Westinghouse Brake and Saxby Signal Co. Ltd.,
82, York Road, King's Cross, London, N.1.

POST COUPON TO-DAY!

Please send me a copy of "The All Metal Way, 1933," containing full particulars of Westinghouse Metal Rectifiers, and giving circuits for their use. I enclose 3d. in stamps.

NAME

ADDRESS

P.W. 17/12/32.





CROWDED OUT.

These holly leaves were intended for the Direct Radio advertisement. The page however is so crowded with Christmas Gift suggestions for your friends and yourself that no space is available. Read all about these exceptional bargains—

**TURN TO
PAGE 863**

SIMPLIFIED FREQUENCY COMPENSATION

**D.P.
35**



11/6

A NEW L.F. TRANSFORMER for Selective Circuits

COMPENSATES FOR HIGH-NOTE LOSS
INCIDENTAL TO SELECTIVE TUNING

GIVES THIS TREBLE COMPENSATION
WITHOUT ANY REDUCTION OF BASS

NOTHING FURTHER NEEDED—NO EXTRA
COMPONENTS—NO EXTRA L.F. VALVE

The L.F. Transformer is assuming new importance. To-day it must make good the losses due to selective tuning. A non-linear and not a straight-line type is what is needed.

Most modern ultra-selective receivers achieve their selectivity by cutting side-bands, with subsequent adjustable L.F. tone-correction. But the complications of variable tone-control are unnecessary for the simpler selective receiver where "muffled" reproduction follows the use of a highly efficient tuning coil with considerable reaction. Here satisfactory compensation can usually be obtained merely by using a transformer with a characteristic that rises suitably in the higher audio-frequencies.

Such is the new Varley Compensating Transformer DP.35, which is completely self-contained. It needs no extra L.F. stage, no external variable resistances or potentiometers—its rising treble response is carefully based on the amount of compensation required by the average simple selective set.

And it costs less than any other tone compensating transformer.

Varley

Proprietors:
OLIVER PELL CONTROL LTD.

Advt. of Oliver Pell Control Ltd., 103, Kingsway, W.C.2.

Tel.: Holborn 5303

A SUPER-SELECTIVE AERIAL



THE

SELECTANET

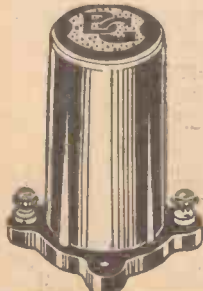
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Super-Selective Aerial has a collective surface area of over 800 ft. of pure copper ribbon wire, woven into a tubular net only 9 ft. long. No other aerial has such a ratio. It reduces interference to a minimum. Get one to-day and improve your set. Of all dealers, or direct, postage 3d. extra, from

**SPONG & Co., Ltd.,
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**2/6
EACH**

A UNIQUE PERFORMANCE CURVE



is given by this H.F. Choke. Highly finished, non-corrodible moulded case, mechanically strong, and dust and damp proof. Inductance, 128,000 micro-henries; self-capacity, 4.5 micro-microfarads; D.C. resistance, 400 ohms.

Price **5/9**

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1/9 From all dealers direct.

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BRITISH GENERAL H.F. CHOKE

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 866.)

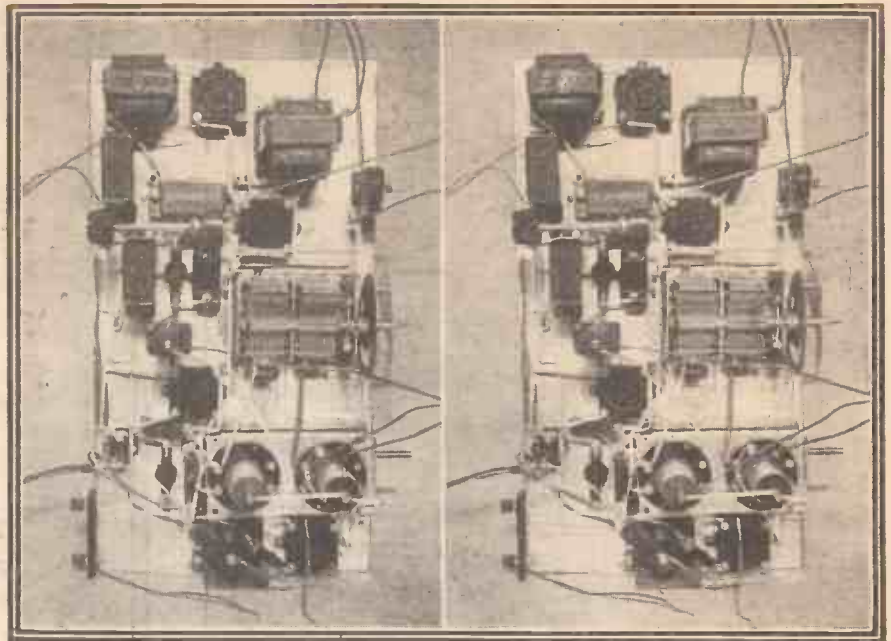
bound to suffer. This is particularly true if the leads to the plugs have been carelessly prepared and left with long whiskers of flex sticking out.

All sorts of crackling noises originate in this way and there is absolutely no need to have had contact; a few minutes work with a file will make a perfectly satisfactory job of this. To prevent the plugs from wobbling, the old trick of clipping an elastic band round the battery and the leads should be tried. It will hold these firmly, and is well worth while as a precaution.

Once the grid-bias battery is properly installed, with its leads kept as short as possible, it is one of the most trouble-free of radio components, but after a few months a watch should be kept upon it with a voltmeter to make sure that voltage is not dropping. Renewals can be effected with no trouble and with very little expense, and in view of their important effect upon high-tension consumption and the quality, it is better that they should be carried out too often than too infrequently.

USING TWO 2-MFD.'S INSTEAD OF A 4-MFD.

"FOUNDLING" (Guilford Street, W.C.1).— "Your set for D.C. mains ('P.W.,' October 22nd) was just what I had been looking for, and I ordered the parts wholesale through a man I know in the trade. The only snag is that instead of getting the exact parts named he put in six 2-mfd. condensers in place of the three 4-mfd., explaining I could use two, wired across one another, to equal a 4-mfd. Is that O.K.?"



THE "FIRESIDE CONSOLETTA"

Look at this stereoscopic picture through a "P.W." True-viewer to see it "in relief."

Well, from the purely theoretical point of view two 2-mfd. wired in parallel have a capacity of 4-mfd., so theoretically you are all right. But in practice there is a point worth noting about such a modification.

Where a 4-mfd. condenser is connected right across the full mains voltage (like the one standing near the differential) it must, obviously, be a really good one, free from suspicion of leakage.

But if you use two 2-mfd. instead of one 4-mfd. they must both be of irreproachable insulation, etc. Provided they are both tested to 500 volts, at least, you will be justified in joining them in parallel and treating them as one 4-mfd. But on no account be tempted to use one good 2-mfd. with one doubtful

(Continued on page 870.)

"P.W." PANELS, No. 102.—CORK.

Cork usually relays the Dublin programme, using a wavelength of 224.4 metres and a power of 1 kilowatt.

Male and female announcers are employed. The distance from London is 359 miles.

The best compliment of the Season



Five 20's Cartons of **PLAYER'S NAVY CUT CIGARETTES**

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A Gift Suggestion
Amazing Selectivity
—ALL stations clearly
and without overlapping



AND NO ATMOSPHERICS

Improve your radio beyond all recognition for Christmas! Hear all stations—even those you have never heard before—clearly and distinctly . . . with whatever degree of volume you please . . . without distortion of any kind . . . without annoying static noises. You can with a Cop. It is

7 ACCESSORIES IN ONE

—all combined in a well-made, super-efficient aerial lead-in and automatic cut-out which—even during the worst of storms—will enable you and yours to listen in safety (backed by a £100 FREE Insurance Policy against damage by lightning). What gift would be more appreciated by your radio friends? A Cop is just the thing you need, too! Get one TO-DAY—from your Radio Dealer, or post free direct from the makers:

PRESSLAND AERIAL CONTROL

CLIFFORD O. PRESSLAND (SALES) LTD.,
84, Eden Street,
KINGSTON-ON-THAMES.

PRICE **2/6**
POST FREE

COP



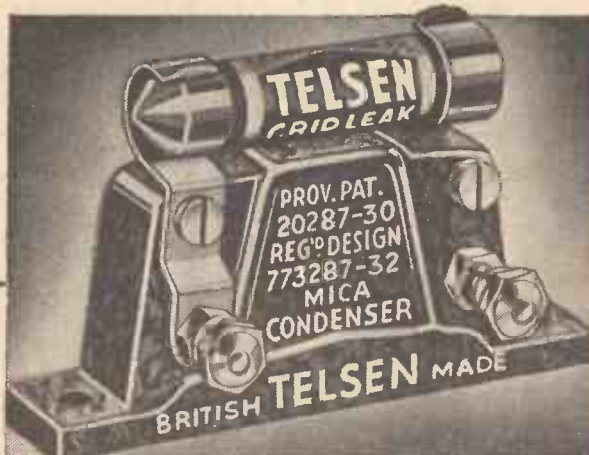
Prices:
6" 2/6
9" 3/-
12" 3/6

£100 FREE INSURANCE AGAINST LIGHTNING

Telsen

MICA CONDENSERS AND GRID LEAKS

MAKE ALL THE DIFFERENCE TO YOUR SET!



TELSEN MICA CONDENSERS
 Represent an important advance in technique resulting in the virtual elimination of H.F. losses, even in the larger sizes. In attractive moulded cases, adaptable to flat and vertical mounting. Grid leak clips (for mounting in series or in shunt) are supplied free with the smaller capacities. Made in capacities of from .0001 to **1/-** .002 mfd. **1/3**
 Also .006 mfd. **1/3**

FOLLOWING on the recent discovery that no less than 98% of "Kit" Sets and home constructor receivers are 'down' in efficiency through faulty Grid Leaks and Mica Condensers, Telsen Radio Engineers set to work to discover the cause of, and provide a remedy for, this rapid deterioration and consequent loss of efficiency. Their tests embraced every known make of these components in conjunction with every type of receiver and it is as a direct result of their successful investigation that the new Telsen Mica Condensers and Grid Leaks were introduced. They have been designed on entirely new lines, being made to a standard and not to a size, overcoming the numerous faults disclosed by the investigation and embodying the principles formulated to prevent deterioration. They give lasting efficiency.

TELSEN GRID LEAKS

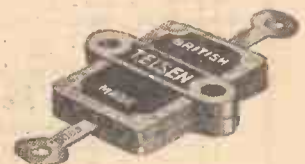
This new type of improved efficiency, is absolutely silent and practically unbreakable, the resistance being unaffected by the application of different voltages. They are guaranteed to be completely non-inductive and to produce no capacity effects. Made in capacities of from 5 to $\frac{1}{2}$ megs. **1/-**



TELSEN PRE-SET CONDENSERS
 The only pre-set condensers to give so wide a variation between maximum and minimum capacities, providing a correspondingly wide range of selectivity adjustment when used in the aerial circuit. Superbly constructed throughout, for high insulation with low loss. Easily adjusted and provided with locking ring. Made in mfd capacities of from .002 (max) and .00025 (min) to **1/6** .0001 (max) and .000005 (min)

TELSEN

RADIO COMPONENTS



TELSEN TAG CONDENSERS

Of extremely compact and sturdy construction. May be mounted on either insulated or metal panels by utilising the two base-board screw holes in the neatly designed moulded casing. The tags enable the condensers to be connected to any other components, either directly or by soldering. H.F. losses are negligible. In capacities of .0001 mfd. to .002 mfd. **6d**

IT'S THE 'LASTING EFFICIENCY' THAT COUNTS

ANNOUNCEMENT OF THE TELSEN ELECTRIC CO. LTD., ASTON BIRMINGHAM

New Times Sales Co.

EST. 1924



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P.W. 17/12/32

SAFEST FOR EASY TERMS

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 368.)

2-mfd., as the efficiency of the combination will only be that of the weaker half of it. In a word, as there will be twice as many separate condensers used for the smoothing, you will have twice as many possible breakdown-points to watch.

VALVEHOLDER CAUSES CRACKLING.

C. R. (Malta).—"I have cured the crackling accidentally. Having obtained a new spring valveholder, I changed this for the detector's,

THE ANSWERS

TO THE QUESTIONS ON PAGE 866 ARE GIVEN BELOW.

1. The respective wavelengths allotted to Cork and Fécamp are 224.4 and 223. Actually, however, Fécamp has 'bagged' a wavelength above Cork's, and has been working on 225.3.
2. Resistances in series are equal to the sum of the separate resistances. Therefore 50,000 + 100,000 = 150,000 ohms. All other values can be found similarly.
3. The mains types generally have far better characteristics than the corresponding battery valves.

DID YOU KNOW THEM ALL?

and to my surprise the crackling ceased, evidently being due to the old valveholder. "How can this cause crackling? It looks perfect."

Valveholders can and do cause crackling if there is any imperfect connection say between socket and terminal. Also they can cause a crackle by defective insulation, poor material, etc. But you cannot be sure it was the valveholder itself, as one of its old connections may have been faulty, the trouble clearing up because you have now put in another connection instead. On the whole, we should be inclined to suspect the valveholder and not use it again. But watch all your wiring and connections carefully, as any of these may give rise to similar trouble.

ATHLONE TESTING.

J. M. (Scarborough).—"I have never picked up Dublin before, but he came in quite strong on Friday, and said something about the next test. Why has he become so strong all of a sudden?"

The new high-power station built by Marconi's at Athlone will take over the full Dublin programme's soon, and it was a test from Athlone that you heard. As a matter of fact the engineers hooked it up temporarily for the Eucharistic Conference some months ago, and it was well received then; but now it is being properly finished off and should be very well received in this country.

IS YOUR SET BEHAVING ITSELF?

Perhaps your switching doesn't work properly? Or some mysterious noise has appeared and is spoiling your radio reception? Or one of the batteries seems to run down much faster than formerly? Whatever your radio problem may be remember that the Technical Query Department is thoroughly equipped to assist our readers, and offers its unrivalled service. Full details, including scale of charges, can be obtained direct from the Technical Query Dept., POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4. A post card will do. On receipt of this an Application Form will be sent to you post free immediately. This application will place you under no obligation whatever, but, having the form, you will know exactly what information we require to have before us in order to solve your problems.

LONDON READERS PLEASE NOTE: Inquiries should NOT be made by phone or in person at Fleetway House or Tallis House

TRADE JOTTINGS

(Continued from page 842.)

The Guv'nor told Joe he'd have to go. And they paid him off on Friday evening. On Saturday morning—to his surprise—the Guv'nor found Joe in his accustomed place, working diligently. "What does this mean, Kelly?" he said to Joe. "I thought you were paid off last night."

"Yeah, boss!" said Joe. "But you ought to 'ave seen what a devil of a row you got me into when I got 'ome. Don't you ever go and do such a thing as that again!"

I pass this on with acknowledgments to "Echoes," the Staff Magazine of our Southend friends, E. K. Cole, Ltd.

"Echoes" is one of those bright and breezy house organs which is a sure cure for "Monday-morning-ism" (and most of the other "isms," too!). Mr. "Echoes" Editor, kindly note that I have set aside an evening, thoroughly to digest the special Christmas and New Year number as and when it is published! (Private note for "P.W." readers: I'll pass 'em on if they publish any more like this one.)

And now back to business. Messrs. the Wego Condenser Co., Ltd., of Bideford Avenue (off Western Avenue), Perivale, Greenford, Middlesex, have asked me to pass on the news that they have recently appointed Messrs. Claude Lyons, Ltd., of

"P.W.'s" postcard literature scheme saves you time and money! Week by week in these columns reviews are given of all the latest catalogues and leaflets appertaining to every aspect of radio, and if you want any or all of the literature to which reference is made you need only send a postcard giving the numbers of those in which you are interested, and the required literature will be sent off to you free of charge except where otherwise stated. The reference numbers in each case are given at the end of the appropriate paragraph, and applications need not be limited to any one particular issue of "P.W." Postcards, on which your name and address should be printed in block capitals, should be sent to G. T. Kelsey, at Tallis House, Tallis Street, London, E.C.4.

Liverpool, to be the Northern distributors for Wego condensers. Will interested Northerners kindly note?

A new addition has just been made to the famous G.E.C. range of receivers, and I have got an idea that it is going to be a very popular one.

I think that most readers will be more or less familiar with the high standard of G.E.C. products, and the news that they are now to market an A. C. mains super-het. carries with it an expectation of something really good.

If you want to be "in" on the ground floor, let me have your postcards good and early, and I will see that you get full details just as soon as they (No. 13) are available.

Supplies of the new Mullard P.M.12V Battery Multi-mu valve (brief details of which were first announced at Radiolympia) are now available to the public.

The success of the Milnes H.T. battery has resulted in the manufacturers having to move to larger premises. The address to which all correspondence should now be addressed is Victoria Works, Church Street, Bingley, Yorks.

THE LISTENER'S NOTEBOOK

(Continued from page 838.)

A lot of us have read Mr. Waugh's books, and most of us have seen his picture in the illustrated papers and magazines. So the prospect of hearing his voice made one feel that one would soon know him pretty well.

The mere announcement that Mr. Waugh's talk would be read left one with a feeling of annoyance, and an idea that we had been treated in an off-hand manner.

And this need not have been. Just a word by the announcer intimating that Mr. Watkins was deputising for Mr. Waugh might have caused us a little disappointment, but certainly not annoyance, for it is characteristic of the public to accept the inevitable with good grace.

Mildly Amused.

I hadn't listened to Radio Paris of a Sunday afternoon for some time till last Sunday. How the number of "organisé par" concerts has grown! What a number of fresh firms, but what a paucity of fresh numbers!

I was mildly amused to hear from Radio Paris one breakfast time, during the course of the first Test Match, that Australia "were not all out yet." Needless to say, this information was imparted by the French announcer.

His English colleague, however, supplied the all-important omission—the number of wickets fallen—a moment later. Could anything better describe than these two reports certain of those characteristics that differentiate the two nations? *Vive le sport.*

What a glutton for work that young enthusiast John Watt is! He doesn't seem satisfied with doing a normal man's work. Witness, for instance, his recent activities.

Another of those popular "Songs from the Shows," dealing this time with the London Pavilion, and then that skit of his on that triumphant journey, "Tour of Broadcasting House" (for which he was also responsible), in a revue which he called "I Sketch Your World."

This ought to be enough for any man for some long time, but I shall be surprised if he isn't up and doing again almost immediately.

Not Convinced.

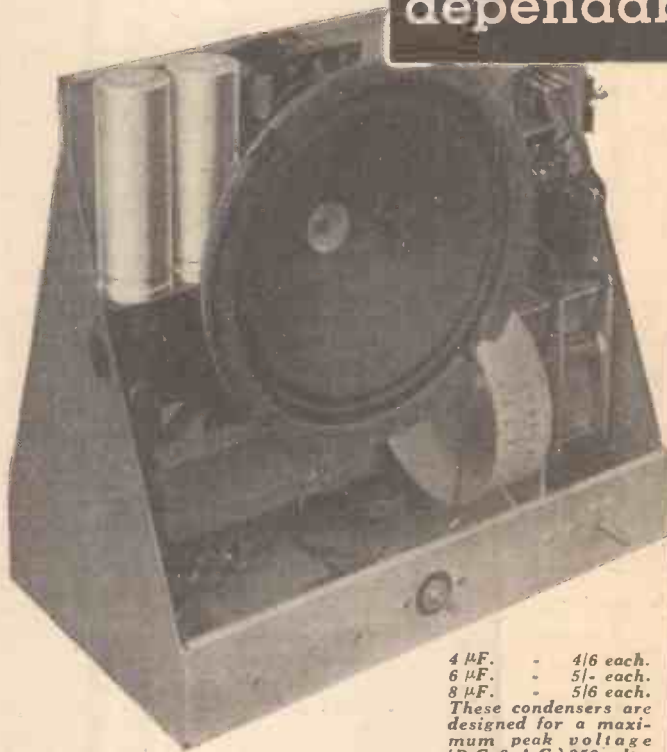
I am not so convinced as many of my friends that the series of twenty-four "lectures" by distinguished theologians, philosophers and scientists, led by the two Archbishops on January 1st and 15th, is going to be such an improvement on the present arrangement of the Sunday night religious broadcast. "God and the World through Christian Eyes" has also to come through the loudspeaker, and if the ordinary sermon lost some of its appeal, only because it was broadcast, the odds are that the archbishops and other distinguished theologians and scientists will have the same difficulties and will be no more successful than the preachers they are displacing.

VALVES FOR THE "BAND-PACK."

The H.F. valve for the "Band-Pack" should be of the battery variable- μ type, and not an ordinary S.G. valve, as stated on page 711 of our Dec. 3rd issue. The following are the recommended valves: Mullard P.M.12V., Cossor 220V.S.G., Mazda S.215 V.M., Marconi and Osram V.S.2, Lissen S.G.2V., and Six-Sixty 215V.S.G.



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Igranitic 100/230 volts, 100 m.a. 10/-, 4. Igranitic 220 volts /300-0-300- volts 60 m.a. 18/- 37 Igranitic E.H.I. Mains Rectifier Transformers 120 volts 20 m.a. output 8/6. H.M.V. Transformers, any A.C. Mains input, 350-0-350 volts 120 m.a. 4 volts 2 amps, and 4 volts 3 amps. 15/-, Model M.D. 809. 220 v/500 v. 120 m.a. 4 volts 1 amp. 4 volts 2 amps. 2/- 0-2 1/2 v. 3 amps. 20/-. Igranitic Transformer 200/250 v. input 6-8-11 v. 1 amp. output 10/-. Transformer Bobbins wound 220 volts/11 volts 1 1/2 amps. 7/6. 220 volts to 7 1/2 volts 1 1/2 amps. 6/6 unshrouded. Double output transformers 200/250 volts/ 180 volts and 30 volts, 30 m.a. 12/6. Parmeko Transformers 200v./100 volts 100 m.a. 20/-. Igranitic Transformers 100/220 volts input 500 volts 60 m.a. 7 1/2 volts 1 1/2 amps. 5 1/2 volts 2 1/2 amps. 20/-. Igranitic E.B.H. 100 v. or 240 volts input 250-0-250 volts 50 m.a. output 20/-. 220 volts / 25 volts 5 amps. 20/-. 220 volts / 2-0-2 volts 5 amps. 15/-. B.T.H. Power Transformers 200/250 volts, three secondaries 600 volts 250 m.a. 7 1/2 volts 1 1/2 amps. 6 volts 2 amps. 40/-. Fellows Transformers 200 volts/100 v. 20 m.a. 8/-. L.F. Transformers output 1/1 W.E. 3/6. Output 1/1 1/2 W.E. 3/6. Sifam L.F. power amplifier Transformers 3/1 new 4/6.

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MICROPHONES of maximum efficiency and minimum price. No. 11, Solo sensitive pendant in heavy brass case, 6/6 only. No. 7, Special Panel, with back nut, 12/6. No. 8, Marconi type W/T hand mike, 15/- No. 12, Ring Stand, 18/6. No. 10, P. Pedestal, 12/3. No. 4, Sensitive Solo, 17/-. Announcers No. 1, No. 3 or No. 5, 65/-. Scotland Yard uses two of these. Deaf Aid Sets, the cheapest possible, 18/6 per set. Special Transformers, 3/9, 5/6 and 7/6.

PARCELS.—For the Experimental Amateur who wants a useful junk-box of odds and orts, our famous Bargain Parcels of Electrical and Radio Sundries from dismantled W.D. sets—surplus stocks, etc., with Switches, Wire, Chokes, Condensers, and Coils, and a host of useful parts, post free, 10 lb., 7/-; 7 lb., 5/-.

ELECTRADIX RADIOS, 218, Upper Thames St., London, E.C.4

OUR TELEVISION COMPETITION

A selection from the extremely interesting entries submitted by "P.W." readers, giving their ideas of an ideal Television Broadcast. The judging of these and the many thousands of other entries is proceeding as rapidly as possible, and details will be announced in the near future.

"A girl demonstrating the use of cosmetics could go through various beauty treatments suitable for application by one's self, converting herself from a plain to a highly attractive young lady in a few minutes.
"The programme would interest ladies of all ages and would amuse the mere males if nothing else."
J. A. Lyne,
"Hallerott,"
Church Street,
Whittlesey,
Peterborough.

"An ideal television programme item.
"The President of the United States presenting to the King, the American Nation's agreement to the cancellation of War Debts.
"A television view of the king would always be popular, and those viewing the ceremony would see an action presaging the return of the world to sunny and prosperity."
Leonard Webb,
"Ingoldsby,"
Namton Drive,
Thornton Heath, Surrey.

"Vaudeville, the ideal television programme item, allows the comedian full scope. Unsupported verbal wit never appealed to British audiences and broadcasting alone cannot transmit to the listener the violent and irresistible appeal that such devices as the false nose, crushed hat, slipping trousers, etc., possess for the eye."
Mr. F. Elwell,
24, Vestris Road,
Forest Hill,
London, S.E.23.

"Television transmission of Will Hay, the schoolmaster comedian, in an episode at St. Michael's should prove an ideal item.
"Comparing their stage performance and wireless performance, one appreciates the detail and expression lacking in radio.
"The contrasting characters in this production would be suitable for television."
L. W. Hooke,
Experimental Station G 5 X H,
104, North End,
Croydon, Surrey.

"Where would George Robey be without his face, Lupino Lane without his legs or Leslie Henson without his curl?
"This is what the normal wireless does not give us, and I think television would add greatly to the enjoyment of humour.
"Variety, in my opinion, is the ideal television item."
J. F. Worrall,
10, Yew Avenue,
Yiewsley,
Middlesex.

"In perfect television the ideal must surely be the broadcasting of beauty and interest, whether these be either audible and visible or merely visible.
"Ideal items would therefore range from events of national importance to a beautiful stretch of countryside.
"But visible beauty and interest must always be the criterion."
W. G. Shepherd,
"Holbeck,"
Chestnut Avenue, York.

"Broadcasting for schools, in my case, has proved of little use. To teach, and keep children's attention, more than a voice is necessary. The ear alone is not sufficient to convey knowledge to children, but combined with the eye, broadcast lessons should be effective. Television might make school broadcasts useful."
Edwin Hendra (Headmaster),
C. of E. School,
Porthleven,
Cornwall.

"A weekly pictorial-news bulletin.
"Because: (a) The equivalent is one of the most popular items in the cinema.
(b) The most interesting happenings of the week could be filmed and the films subsequently televised with descriptive matter by a commentator.
(c) The difficulty of 'scanning' an outdoor scene would be obviated."
S. Brown, A.M.I.W.T.,
106, Nicolas Road,
Chorlton-cum-Hardy,
Manchester.

"Presence is such a vital factor in public performance that nothing less than television will serve to connect the studio with the stage. As a concert and

variety agent always on the look-out for new talent I constantly feel the need for 'sight' as well as 'sound.'"
Frederick Green,
14, Leamington Road Villas,
London, W.11.

"First Aid. Giving instructions and illustrating the best methods in dealing with street and home accidents, and to advise all motorists to carry a small First Aid outfit.
"I think the above would be of a great national service to the users of the road, general public and the housewife."
W. M. Page,
3, Balfour Road,
Southall,
Middlesex.

"Item of suggestion. That ventriloquist acts are ideal for television purposes.
"Reason. Because these acts depend absolutely upon being actually seen. Otherwise the act becomes merely an ordinary radio turn, and thereby loses its value as an act.
"The value of the act is that the viewer should see both ventriloquist and doll."
H. Mason,
581, Burnage Lane,
Didsbury,
Manchester.

"A charming feminine announcer should herald the programme with her sweet voice and charming smile, while during the intervals of the items, her personality would charm away my boredom. Her 'Good-night' with a kiss blown across the ether would send me happy to slumber. My reason? I'm a male."
Edward Smith,
9a, St. John Street,
Rose Lane,
Norwich.

"My ideal programme item, if it were possible, would be a television from the front of the Royal Scot, or similar express. To visualize the quickly changing scenery, to hear the roar of the train over the points. What a thrill!"
Norman Marsh,
30, Gorse Crescent,
Stretford,
Nr. Manchester.

"I suggest for a television item that a demonstration of the habits of some of the smaller animals should be given. A box of silkworms could be shown. "This would be of particular interest to animal lovers, and should be easy to transmit."
G. N. Brooky,
Ferox Hall,
Tonbridge,
Kent.

"WOT GOT THE LAFF."
"Tother neet ah listned to th' Argyle broadcast an it wotn't bad at all. When t'comic wor on, thier wor summat ah cudn't meek art. T'foaks in t'theater wor all laffin, but nowt cam out o' t' speaker t' laff at all.
"Ah look'd at t' owd woman. But she looked solem like and shuk er head.
"Nah if that television set hed been here, we cud hev laffed an all. An wot's more, ah cud fell yo all abart it, an yo cud laff as well.
"Is owt going to be dum abart it? We're missing t' best part o' t' show."
P. C. Wilson,
72, Campbell Street,
Gainsborough,
Lincs.

"A swinnyng exhibition in a glass tank including diving, life saving, etc., by experts. This, with a view to inaugurating a series of sport displays in a popular form. The exponents to be world-famous, so as to concentrate public attention on television, with all its possibilities."
Arthur Greenley,
"Broxa,"
Crabtree Lane,
Gt. Bookham,
Surrey.

"Give me a busy London street—the Strand, for instance: the purring of powerful limousines, the rattle of decrepit, horse-drawn carts, the kerb entertainer of early queues—strange tongues—dusky faces—humorous but everyday incidents—the new skyscraper—a sudden fire—unemployed processions.
"In short, bring life to the television."
L. Marre,
12, Oman Avenue,
Cricklewood,
N.W.2.

TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio technique.

By Dr. J. H. T. ROBERTS, F. Inst. P.

Transformer and Potentiometer.

I HAVE sometimes been asked whether it is possible to use a transformer which has an ordinary untapped secondary in the same way as though the secondary were tapped. Some people seem to think that it is possible to make a connection by guesswork to some point on the winding.

I should say right away that it is for practical purposes impossible to get any satisfactory result by fiddling about with the windings, trying to find the electrical centre. Not only will you damage the transformer, but it will be like looking for a needle in a haystack. Of course, there is always the alternative of unwinding the secondary and rewinding it with a centre tapping.

A much simpler way, however, is to connect a fairly high-resistance potentiometer across the secondary and to treat the slider of the potentiometer as your tapping. This, in fact, has the advantage that you can adjust the electrical position of the "tapping" to suit requirements.

Three-Pole Rectifier.

In a battery-charging system you can use a three-pole rectifier if you have a centre-tapped secondary to the transformer, whereas if you have an untapped secondary you have to use the Gratz arrangement of four rectifiers, arranged in the proper way—that is, if you desire full-wave rectification. Of course, if you only want half-wave rectification you can use an ordinary untapped secondary with a single rectifier.

A Question of Potential.

Well, if you use the potentiometer arrangement mentioned above, you are in very much the same position as though the secondary were, in fact, tapped; but you want to bear in mind that there is always the resistance of each half of the potentiometer in series with its own circuit.

For some purposes this is not very important, but for battery charging, if the current is at all heavy, this resistance becomes an important matter. What I want to make clear is that, although this potentiometer idea is often very convenient, it is *not* really the same thing as a centre-tapped secondary, because the total resistance of the potentiometer must be reasonably large (since it is shunted across the transformer secondary), whilst, on the other hand, it is desirable to have the resistance not too large, because, as I say, it carries the main working current. Therefore it becomes a question of a compromise between these two conflicting considerations.

Theoretical versus Practical Conditions.

Speaking about potentiometers, a lot of people overlook the fact that a potentiometer is strictly (as its name implies)

(Continued on next page)

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TECHNICAL NOTES

(Continued from previous page.)

a potential-dividing device, and is intended for the tapping-off of potentials.

This means that, theoretically, the current which is tapped off should be small compared to the current flowing in the potentiometer, so that the tapping-off does not appreciably affect the gradient of potential in the potentiometer itself. In the battery-charging arrangement referred to above—which, by the way, should only be used for small currents, such as trickle-charging—the potentiometer departs very sadly from the theoretical conditions.

The same sort of arrangement may sometimes be used in a mains set where a tapped transformer is used for the filaments, but the tapping is not exactly in the electrical centre, and so an A.C. hum is set up. If the potentiometer is substituted for the original centre tapping, adjustments can be made so that the electrical centre is found and the humming overcome.

Background.

Sometimes, when receiving long-wave stations, you may have trouble with the shorter waves—broadcast wavelengths and shorter still—coming through and interfering with the long-wave reception, or forming a background which cannot be got rid of.

A simple dodge in these cases is to introduce a choke into the aerial lead, this choke having such a value that it discriminates effectively between the short waves and the long ones. As you know, the impedance of the choke will depend upon the frequency of the current passing through it—that is, upon the wavelength of the signals—and will be much higher for the shorter wavelengths than for the long ones.

Of course, the choke will impede even the long-wave signals to some extent, so that there is an overall sacrifice in any case. But this will be worth while if the choke has the effect of cutting out the interference which was previously causing the trouble.

A Choke is Useful.

The best way is to start with a fairly small impedance, which can be made by winding a hundred or so turns of wire on to a small wooden former something less than an inch in diameter, and then gradually increasing the number of turns until you get the best results.

Take care not to overdo it, or else, as I say, you will cut down the strength of the long-wave signals. Having got this choke into the aerial lead, obviously it will not be required when you go over to the broadcast or lower wavelengths; therefore you need to introduce a switch, or some other arrangement for short-circuiting the choke, when you want to receive the shorter waves.

Have You Noticed This?

I have often been asked by readers how it is that the set sometimes stays "on" for a few seconds after it has been switched off, the reproduction gradually dying away. This is an effect which you often notice, especially using a mains receiver with indirectly-heated heavy-cathode valves. I have one mains receiver which I occasionally

use in which this effect is very marked, and it is possible to hear the reproduction, getting fainter and fainter, of course, for quite several seconds after switching off. I daresay a good many of you have noticed the same thing.

It is partly due to the large-capacity condensers associated with the high-tension supply, and partly to the delay in the loss of the emission of the valves. You can easily see that if the high tension has large condensers associated with it, which carry a good electrostatic charge, these will be able to keep up the H.T. supply for some time even after the proper H.T. supply is switched off.

At the same time, if the cathodes are fairly heavy, they will cool relatively slowly after the filament current or heating current is switched off, and so you get a persistence of the operating conditions. Incidentally, it indicates that the condensers are holding their charge well.

Microphones and Amplifiers.

It is only a very few years ago since the microphone and amplifying arrangement which we now call the public address system was quite a novelty. In fact, I remember giving a public lecture at one of the Northern universities when I used an arrangement of this sort, and we had to fit it up for ourselves, as it was not then possible to get hold of a commercial outfit.

Nowadays the design and layout of public address amplifying equipment is fairly well standardised and it can be adapted to meet most ordinary requirements.

A Special Case.

A curious and particularly notable example of special amplifying requirements, however, occurred recently in connection with the system required for the Swiss Federal Parliament House. The first problem was due to the fact that at the Swiss Parliament each delegate speaks from his own seat and not from a central tribune.

For a similar reason the usual arrangement of loudspeakers diffusing sound over the area could not be used and a good deal of careful thought had to be given to the whole problem before the final arrangement was decided upon.

Eventually it was decided to install 200 separate microphones, one on the desk of each delegate and immediately in front of his chair. Thus, no matter in which part of the House a delegate speaks his voice is picked up by his own microphone and taken to a special control panel.

About a hundred loudspeakers were then installed below the desks of the delegates, one loudspeaker being placed between each pair of chairs.

Control Panel.

The microphone control panel is one of the most ingenious features of the installation and since it has to deal with inputs from the 200 microphones, each of which is switched separately, it has the appearance of a small telephone exchange. The operator sits at this control panel and as the various delegates rise to address the House their microphones are brought into operation, since for obvious reasons it is not desirable that all microphones should be alive at the same time.

The loudspeakers are also switched in small groups, these switches being linked

(Continued on next page.)

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TECHNICAL NOTES

(Continued from previous page.)

with the microphone in such a manner that when any microphone is connected the group of loudspeakers in its immediate vicinity is switched off, thus obviating the danger of acoustic reaction between the various loudspeakers and microphones.

This control panel is also fitted with a master volume control, so that the operator may compensate for the variations in the strength of the speakers' voices and adjust the loudspeaker outputs accordingly.

Microphone Polarising Supply.

A notable feature of this installation is that no batteries at all are employed and even the microphone polarising supply is derived from a special rectifying equipment incorporated in the microphone amplifier. A very high degree of efficiency is necessary in smoothing the microphone current since, with the enormous amplification used, any trace of hum in the microphone circuit would be very unpleasantly reproduced in the loudspeakers.

The loudspeakers installed in the Council Hall are of the small permanent magnet moving-coil type, and are all in operation at the same time, with the exception of

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those in the immediate vicinity of the microphone which happens to be in use, as I mentioned above.

Of course, they work at comparatively low volume level, otherwise there would be an enormous blare of sound; the volume level, in fact, is just sufficient to augment the speaker's voice ever so slightly and in this way the effect is completely natural whilst at the same time perfect audibility is achieved.

This extremely interesting installation is to the credit of the Marconiphone Company Limited, and to their public-address engineers and specialists.

Output Filter Points.

I have a letter from a reader this week on the subject of output filter circuits. The point in question is that if you use a loudspeaker direct in the anode circuit of the output valve and then you decide to change over to an output choke filter circuit you may upset quite considerably the current passed through the last valve.

The net result is that the voltage actually applied to the anode of the valve may be appreciably greater when using the choke than when using the speaker. In one sense this will probably be all to the good, but in order to take advantage of the effective increase in anode voltage it will be necessary to readjust the grid bias.

The result of all this is that when you install an output choke filter circuit you should reconsider the whole question of anode and grid-bias voltages and should not just assume that these can be left as they were when using the speaker direct.

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MIRROR OF THE B.B.C.

(Continued from page 838.)

Some good Christmas stuff here, as only Grenadier Guardsmen can play it. After the religious service, a programme will be given by the London String Players.

A feature of the Boxing Day broadcasts is a relay from the Salle Smetana, Prague, of Slavonic Dances played by the Czech Philharmonic Orchestra. There is nearly an hour of this before Gordon McConnel's Popular Opera programme in which Stuart Robertson, Jan Van Der Gucht, Garda Hall, and the Wireless Chorus will take part. The items include excerpts from "Rigoletto," "Hansel and Gretel," and "Martha."

Light Music Relays.

I have purposely not mentioned the many relays of light music which are always an attraction of the London and Midland Regional programmes. Such programmes abound in the Christmas broadcasts, and on Tuesday, December 27th, will link up well with the repeat performance of the Longstaffe pantomime, "Jack and the Beanstalk," which comes on at 7.45 p.m. Later in the evening, Peter Dawson is taking part in a concert by the B.B.C. Orchestra, conducted by Joseph Lewis, which goes on until dance music is relayed from the Monseigneur Restaurant.

Wednesday has an hour's vaudeville entertainment and an orchestral concert as the evening features, and Thursday a brass band concert, a performance of the play, "The Green Goddess," and a programme by the Gershom Parkington Quintet. Billy Mayerl (the syncopated pianist) and Olive Groves (soprano) are taking part with Reginald King and his Orchestra in Friday's broadcasts, when at 8 p.m. there is a chamber music concert, followed by Military Band music conducted by B. Walton O'Donnell.

New Year's Eve has nothing special to the occasion until 11 p.m. when Regional stations will take the National programme, but previous to this, London and Midland listeners are to hear Herbert Thorpe and Foster Richardson in a programme of good hearty stuff conducted by Joseph Lewis. The Glasgow Orpheus Choir are also being relayed at 8 p.m., but the main attraction of the evening will undoubtedly be a vaudeville entertainment between 9.20 and 10.20 p.m.

Across the Border.

Since the beginning of broadcasting, Christmas has been given a more prominent place in Scotland than it formerly had. The New Year still takes precedence, but it is significant that the Festive Season is looked to as a time of good wireless programmes, and Scotland's contribution to its own seasonable broadcasts will take the form of a Nativity Play, "The Shepherds," relayed from Aberdeen, and David Cleghorn Thomson's Christmas play, "No Room at the Inn," both of which will be heard on Christmas Eve. For New Year's Eve, Scotland will put on its own Hogmanay programme—an entertainment with a wedding at Knockendock—and will also contribute to the National transmitters welcoming of 1933.

THE "P.W." "ALL-IN" THREE

(Continued from page 852.)

lated wires in the cases of those concerned wholly with baseboard connections. For the batteries (or mains unit) and for the switch and reaction flexible leads must, of course, be used.

Obviously it will not do for the reaction leads, for example to wander about, so their lengths should be arranged with short direct connections in mind. The switch leads, also, are easily arranged to run clearly to and from the desired points, without meandering to other parts of the receiver, so this length of lead business is one to bear in mind with some care.

As regards the cabinet, it may be supplied without a battery shelf and fillets, etc., but obviously they can be made and fitted by even the totally inexperienced if necessary. And if a big speaker were used it might be necessary to cut away the front of the battery shelf to fit round the frame, but this would be so easy that it is hardly worth explaining.

Grid Bias Voltages.

When the wiring is completed and checked carefully the variable-mu is plugged into V1 holder, detector in V2's and the output valve in V3's holder. The voltages for the various leads will depend upon the valves and H.T., etc., available, but will generally be of the following order: H.T. + 1,60/80 volts; H.T. + 2,100 volts; H.T. + 3, maximum, up to 150 volts.

G.B.1 needs 16 volts, G.B.3 needs whatever your power valve requires at the relevant H.T. voltage, and G.B.2 is for use with a pick-up, and generally takes 1½ volts.

Trimming of the main condenser sections is carried out, if necessary, by tuning in a weak middle-of-the-dial station, preferably in daylight, and giving just a touch to each trimmer in turn till all circuits seem exactly in tune.

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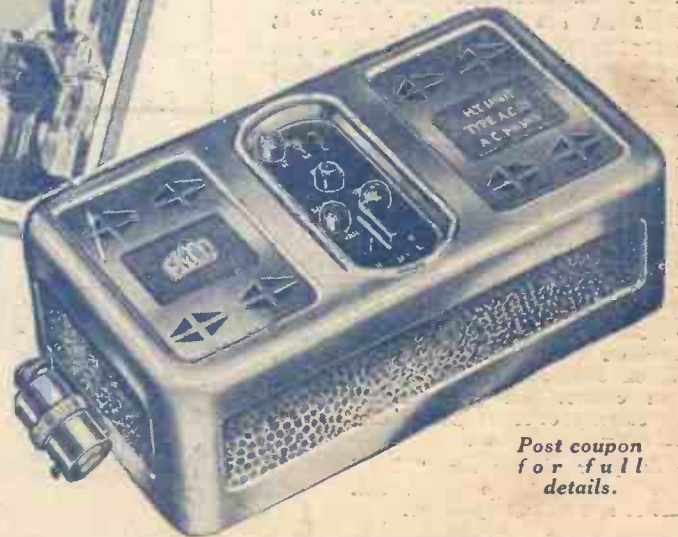
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