POPULAR WIRELESS, June 4th, 1932.

REGISTERED AT THE G.P.O. AS A NEWSPAPER.

LODGE—MARCONI—FLEMING CONGRATULATE "P.W." THIS WEEK

Popular Wireless

Every Thursday PRICE 3d.

No. 522. Vol. XXI. INCORPORATING "WIRELESS" June 4th, 1932.

P.W. BIRTHDAY NUMBER

TEN YEARS OF PROGRESS

EPITOMISED BY

The "DECADE" THREE

ALSO THIS WEEK:

"MANY HAPPY RETURNS"
a racy article by
CAPT. P. P. ECKERSLEY

And a long illustrated review of
TEN YEARS OF RADIO ACHIEVEMENT

Get all your radio from READY RADIO

Showrooms: 159, Borough High St., London Bridge, S.E.1

Eastnor House, Blackheath, S.E.3. Lee Green 5678. 'Grams: Readirad, Blackvil.

(Advt.)

ABOVE ALL

make sure that you get a

LEWCOS

(Regd)

SUPER H. F. CHOKE

Price 6/-

and

a Type "O"

LEWCODENSER

CAPACITY ·00015–·001 mfd.

Price 2/-

as specified

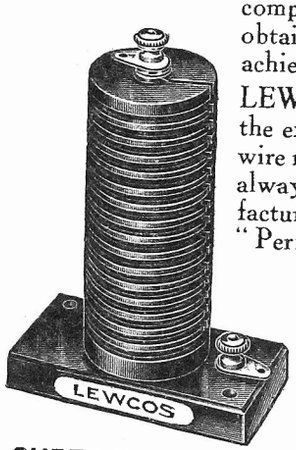
for the

"P.W. DECADE"

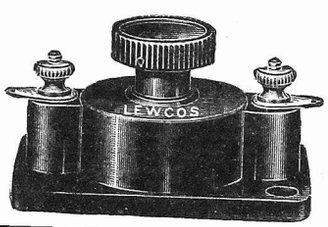
WHICH IS DESCRIBED IN THIS ISSUE

No matter how carefully your Set is wired, or cunningly constructed its Cabinet, unless your components are the finest obtainable you cannot hope to achieve the best results.

LEWCOS components, with the experience of fifty years of wire manufacturing behind them, always live up to their manufacturers' reputation for "Perfection in Every Detail."



SUPER H.F. CHOKE



LEWCOS RADIO PRODUCTS FOR BETTER RECEPTION

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED.
CHURCH ROAD, LEYTON, LONDON, E.10.

Specified for The "DECADE" THREE

10/- DOWN AND BALANCE IN EASY MONTHLY PAYMENTS

MODEL A.C. 244

59/6

Or with L.T. Trickle Charger MODEL A.K. 260.

90/-

. . . "ATLAS" is again the expert's first choice. The designer of the "DECADE" receiver described in this number specifies the famous "ATLAS" Unit, Model A.C.244, for the finest possible performance. This provides three H.T. Tappings : one 60/80 v. with max. and min. positions, one 50/90 v. with max., mid, and min. positions, and one 120/150 v. Output 20 m/a at 120 v.

A similar Model, A.K.260, includes in addition a L.T. Trickle Charger for 2-, 4-, and 6-volt Accumulators.

For A.C. Mains 100/125 v. and 200/250 v., 40/120 Cycles.

Westinghouse Metal Rectifiers, guaranteed for 12 months. Ask your dealer and insist on "ATLAS," winners of the Olympia Ballots, 1930 and 1931.

"CLARKE'S ATLAS"

MAINS UNITS

H. CLARKE & CO. (M/CR.) LTD., OLD TRAFFORD, MANCHESTER.
'Phones: Trafford Park 1744-5-6.
Southern Offices: BUSH HOUSE, W.C.2. *'Phones:* Temple Bar 3862 and 7130.

POST THIS COUPON NOW!

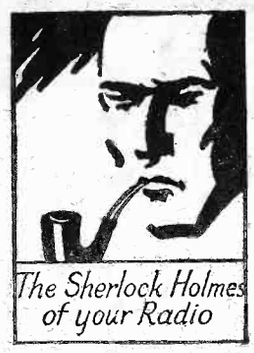
H. CLARKE & CO. (M/cr.) LTD., Old Trafford, Manchester.
Please send me FREE copy of your Booklet, "Power from the Mains."

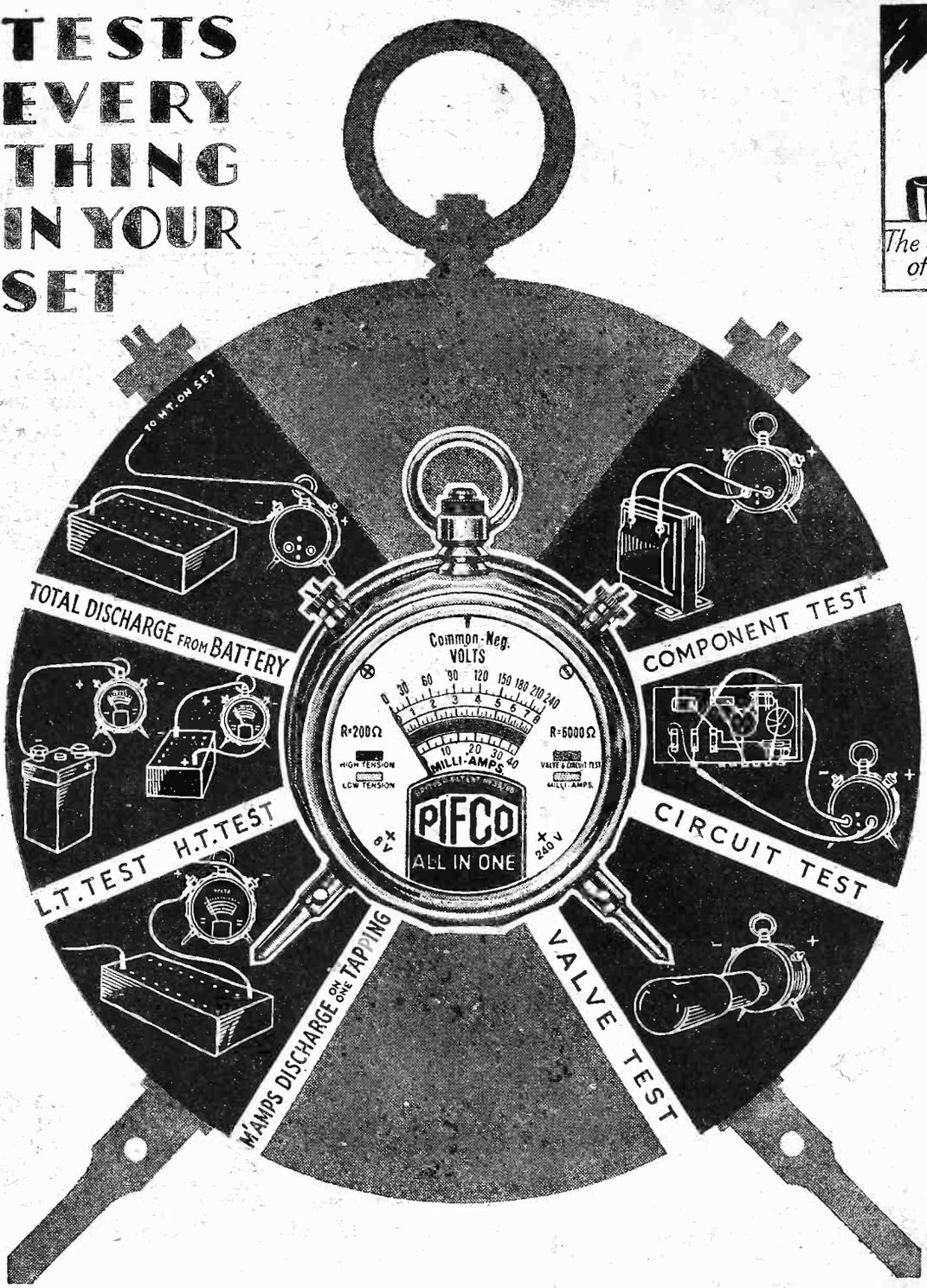
Name.....

Address.....

30/4/6 ..... P

TESTS EVERY THING IN YOUR SET





Standard Model—for Battery Receivers. Handsomely finished in octagonal bakelite case, complete with leads. Price

12/6

De Luxe Model 125,000 ohms Resistance, for Electric Receivers, Mains Units, and Battery-operated Sets. In maroon Bakelite case, complete with cables. Price

£2:2:0

℗ S2

Solve any radio problem with the Pifco "All-in-One" Radiometer. This marvellous instrument will locate any fault in a few minutes. As essential to the radio user as a stethoscope is to the doctor. Saves its first cost over and over again. Patented throughout the world, there is no other instrument like it.

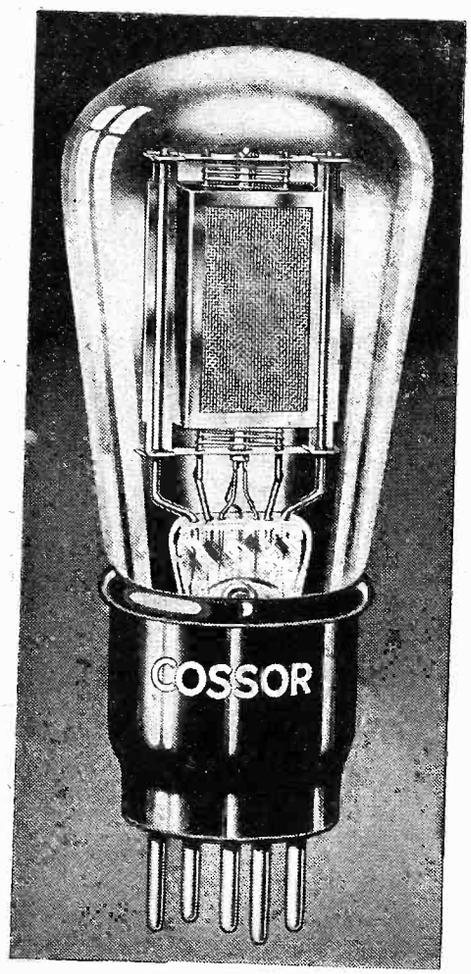
PIFCO ALL IN ONE RADIOMETER

Ask to see the "All-in-One" Radiometer at your radio or electrical dealers. Leaflet on request from Patentees: PIFCO LTD., HIGH STREET, MANCHESTER

THE efficiency and consistency of Cossor A.C. Mains Valves is made doubly sure. This is due to the use of two Mica Bridges. (Four are used in some types, e.g. Screened Grids). The elements are twice secured in life-long accuracy of alignment by a Mica Bridge at the top of the electrode assembly and another at the bottom.

This method of construction ensures a remarkable degree of accuracy in the spacing of the elements and therefore exceptional efficiency. For upon the spacing of the elements depends the efficiency of the valve. Uniformity of characteristics is also ensured since the Mica Bridge permits no variation in the disposition of the elements. And, finally, the Mica Bridges ensure complete dependability and maximum length of life due to the great mechanical strength which this method of construction imparts.

The Mica Bridge



—ensures maximum efficiency and lifelong consistency

A copy of the 72-page Cossor Wireless Book B 11 will be sent you free on application to A. C. Cossor Ltd., Melody Dept., Highbury Grove, London, N.5.

Get one of the new Cossor Station Charts price 2d. Ask your dealer for a copy of this useful novelty or write to us enclosing 2d. stamp.

IN

COSSOR

ALL-BRITISH

A.C. MAINS VALVES

A. C. Cossor Ltd., Highbury Grove, London, N.5. *Depots at Birmingham, Bristol, Glasgow, Leeds, Liverpool, Manchester, Newcastle, Sheffield and Dublin*

66 ♡ 566

Popular Wireless

LARGEST NET SALES

Scientific Adviser:
Sir OLIVER LODGE, F.R.S.
Chief Radio Consultant:
CAPT. P. P. ECKERSLEY, M.I.E.E.
Editor: NORMAN EDWARDS.
Technical Editor: G. V. DOWDING, Associate I.E.E.
Assistant Technical Editors:
K. D. ROGERS, P. R. BIRD,
A. JOHNSON RANDALL.

OUR BIRTHDAY
THANK YOU!
PURPLE PATCH
A FRIENDLY CRITIC

RADIO NOTES & NEWS

WIRELESS AND HISTORY
THE WEEKLY GEM
THOSE CHICKENS
NEWEST CRIME

Our Tenth Birthday.

WITH this issue of "P.W." we celebrate our tenth birthday. For ten years, or two lustrums, or one decade, we have brightened the bookstalls, popularised wireless, and edified, instructed, amused and contented an ever-growing number of people, till to-day we can, to our great satisfaction, say that we have the "largest radio circulation in the world."

It has been hard work but great fun, and we wouldn't have missed it for worlds.

A Decade of Achievement.

HERE are a few of the choicer blooms in the bouquet with which we present ourselves to-day. To begin with, we led the way in revealing to the great body of non-technical listeners the secrets of wireless broadcasting receivers and in rendering intelligible to them the difficulties of wireless theory. We gave the first impetus to the home construction of popular broadcast receivers.

By instructing a large public in these matters we have helped to make broadcasting "safe for democracy" and have assisted the radio trade to get squarely on its feet.

We Render Thanks.

AND so, as we begin our second decade, we do hereby offer our hearty thanks to all our readers and to the thousands of them who from time to time have written such appreciative and interesting letters to us; to the "trade" for its peculiar blessings and support; to the B.B.C. and radio authorities all over the world for their beautiful supply of information and data; and last, but not least, to Sir Oliver Lodge, the Grand Old Man of wireless, for his lively interest and valuable co-operation in our efforts to inculcate a sound appreciation of the principles of wireless communication.

"Good-bye to All That."

I OBSERVE that here and there in the Press there have appeared adverse criticisms of the B.B.C.'s farewell to Savoy Hill in the form of that broadcast panorama, "The End of Savoy Hill." Whilst I consider that it was the B.B.C.'s biggest auto-boost so far, I am of opinion that it was diabolically clever in construction and, so far as a listener could judge, a technical success.

But I failed to understand why the announcements of several events, such as the opening of a new station, were followed by noises exactly like a locomotive engine blowing off steam. What was the great idea?

A.B.C.—And Little More.

A FEW days before the great valedictory panorama was broadcast there was published a paper-covered, 96-page booklet, price one shilling, entitled "The A.B.C. of the B.B.C.," compiled by Sir Harry Brittain. It is dedicated to Marconi, but the largest portrait given is that of Sir John Reith, to whom, in a foreword, Lord Riddell "takes off his hat," though he includes the B.B.C. staff in that comprehensive gesture.

"A.B.C." is right. That state of knowledge appears to be the limit achieved in regard to radio, and some of even that elementary algebra has gone wrong.

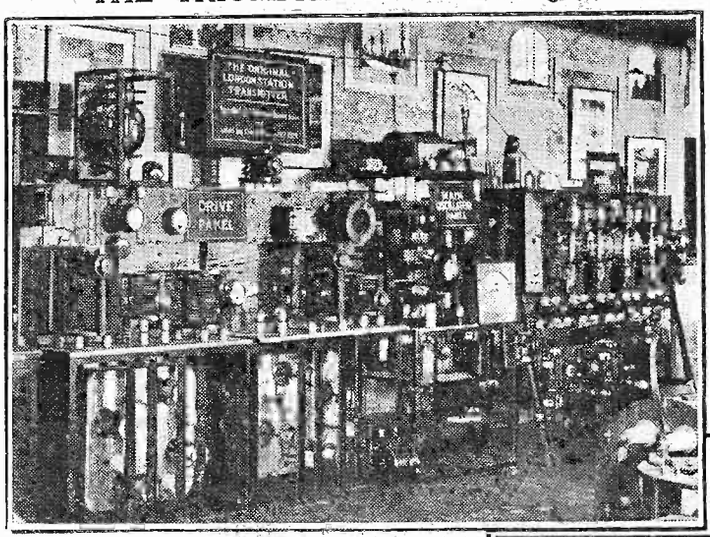
Why This Purple Patch?

A GOOD deal of information, doubtless authentic, is to be found here, but Sir Harry has knit the facts together into one large purple boost of the B.B.C. by means of a lingo which he has borrowed from the "cub" reporter: ". . . voices singing through the dynamos." "And ceaselessly the giant dynamos will sing their song of power . . ." "Long, white fingers are sensitively twitching knobs," and so forth.

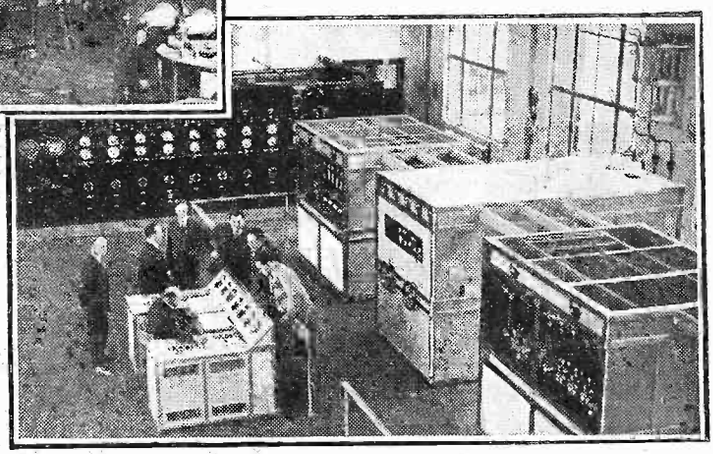
Dynamos, skinny white fingers and, over all, the D. G.! What a picture of the B.B.C.! I'd give a lot to hear the D. G.'s

(*Continued on next page.*)

THE TRIUMPHS OF TECHNIQUE



—FROM 1922 TO 1932



Did you ever hear it?—the old, old 2 L O, of Marconi House, in the Strand? The aerial was for long a familiar sight to Londoners, but the station quickly migrated, the studios and control-rooms going to Savoy Hill. Then the aerial was taken to a better site, on Selfridge's, in Oxford Street, and, finally, came Captain Eckersley's magnificent Regional scheme. The lower photograph shows one of the new Regional stations in all its glory of simplified efficiency.

"ARIEL'S" RUNNING COMMENTARY ON RADIO *(Continued)*

private, unswayed opinion of this piece of prose.

A Friendly Critic.

F. W. (Plymouth), with whom I have already had friendly converse, winds up a letter by the criticism that my Notes aren't so interesting as they were formerly, and naïvely asks *me* whether I have noticed it.

Jolly good, that! What does he expect me to say?

If that is his present view, I can ascribe it only to his loss of appetite for the new, the topical and the progressive. Probably he has a jaded radio liver. Our rising circulation affirms that we are (blessed amongst journalists!) continuing to please and instruct!

Wireless and History.

APROPOS Lt.-Commander Kenworthy's article in "P.W." for May 21st, and with particular reference to his remarks about the battle of Jutland, I have always understood that Admiral Jackson decided to send the fleet out for a "sweep" because our Wireless Intelligence discovered that the German flagship *had moved out* of the Jade River, his inference, which turned out to be right, being that the German fleet was "coming out."

I do not for a moment suggest that the gallant commander is mistaken, but my version, which I have read somewhere, is quite plausible—to a landlubber like "Ariel," who was on the Wireless Intelligence staff!

Influence of Radio on Animals.

I AM a disappointed man. I have heard and read of such extraordinary effects of radio music on our little brothers, from parrots to pugs, that I expected great things from our latest boarder, a pedigree fox-terrier. But our Bill, as the family call it, seems to be deaf to all sounds except those which make noises like grub or rats.

A clatter of a dish or so rouses Bill like a fire-alarm; a shout of "rats" brings him up to attention out of an, apparently, deep sleep. But when we bring him up against a prize brass band he just hooks his darling chin over my foot, sighs deeply and goes to bye-bye.

The Weekly Gem—Unpolished.

IN one of the technical electrical magazines I find this gem "of purest ray serene," published "without comment." Far be it from me to spoil a good joke by explaining it. The following is a bit of a broadcast message by an American company chairman:

"Any real understanding of electricity, like the germ of life itself, seems securely locked in the bosom of the unknown. A single generation brought forth the genius of Thomas Edison, George Westinghouse, and Charles P. Steinmetz, inventors and developers of this new force which has so greatly changed our lives."

Isn't it gorgeous? It ought to be engraved on both sides of the Faraday Medal.

Edison Can Stand Alone.

A BIOGRAPHY of Thomas Alva Edison, "benefactor of mankind," by F. T. Miller, LL.D., Litt.D., is now published, and it makes, I understand, a most readable book, being a full life of the immortal inventor.

"SHORT WAVES"

VERY UNKIND

The only things worse than the broadcasting programmes are those things which are written about them!

* * *

Householder (to burglar, who is about to make off with the wireless set): "Wait a minute; I'll give you a hand with that."

* * *

She was only a radio announcer's daughter, but she stopped singing for the love of mike. "Sunday Pictorial."

* * *

"Does it make any difference to the results a portable receiver gives whether it is outdoors or indoors with windows, etc. closed?" asks a correspondent.

We strongly advise that this query be put to the test in the garden—the neighbours will supply the answer.

* * *

OVERHEARD AT A CONCERT.

"You see that man with the stick? He's the conductor."

"Don't be funny; he's the insulator!"

* * *

SHAKESPEARE ON WIRELESS.

"Tune your instrument!"—Taming of the Shrew.

"My ingenious instrument. Hark, it sounds!"—Cymbeline.

"One fading moment's mirth, with twenty watchful, weary, tedious nights."—Two Gentlemen of Verona.

"A cunning instrument, cased up."—Richard III.

* * *

Oft in the stilly night
Ere slumber's chain has bound me,
The radio brings a blight
Of noise around me.

* * *

Enthusiastic Salesman: "This wireless set, sir, is genuine Chippendale!"

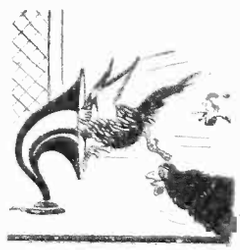
There is, however, one grave flaw in its construction, namely, the definite claim that Edison was the inventor of the electric lamp. I thought cold facts disproved that claim in favour of Swan, and, though one would not care to wrestle about the point, one feels that as Edison's work easily qualifies him for a niche in the Hall of Fame, his glory does not require to be burnished by any belittling of the work of others.

Advertising By Radio.

A FINAL shot! I read in a well-known review that the chairman of the Federal Radio Commission (U.S.A.) recently warned broadcasters that they would do well to abolish sales talk "over the air," and that both in the States and Canada many advertisers are returning to newspaper advertising. My view is that, although broadcasting may be a means of establishing contact with a huge public, it is a mistake to mix up advertising matter with entertainment.

Broadcasting and Chickens!

A MAN I know, who runs a poultry farm in Berkshire—his wife actually runs it, but allows him to believe that *he* does—tells me that instead of calling "Coopy, coopy!" when feeding time comes he plants his loud-speaker out in the runs, on the end of a long lead, and the chickens come for it at break-neck speed.



He says that it isn't much of a compliment to the B.B.C., but that it would be very much less complimentary if he kept pigs instead of fowls!

The Making of an Amateur.

TO the radio enthusiast who wishes to go further into his hobby and become a full-blown amateur with a complete receiving and sending station, I can recommend a new publication of the American Radio Relay League, namely, "How to Become a Radio Amateur." This booklet has twenty-nine fully illustrated pages covering the construction of receiver, transmitter and power supply unit, and advice about learning Morse.

Where Radio Seems to Fail.

YOU remember the "Hamlet" *à la* Henry Ainley which was broadcast last month? I stayed up in my study and heard it out, whilst the rest of us imbued themselves with tea and trifles.

A young visitor, aged seventeen, who declined "Hamlet" on that occasion, has recently seen the play at the Old Vic, where she waited for two hours to sit on a granite-hard seat. "Wherefore?" I asked. "Because," said she, "the killings on the stage are more real and squishy"!

The Very Newest Crime.

THERE is a very deep-dyed crime which is fundamentally known as "scrounging," but by the wit of men it has many variants, one of which is "tapping."

I confess that, as a choir-boy, I used to "tap" the small shot which weighted the organist's red baize curtains, to the advantage of my spring pistol! The Chinese tap the silver out of dollars, very cleverly, and on the proceeds buy magnificent coffins for themselves. But the very latest notion is to tap the radio relay wires with a safety-pin. A Clacton man thought of that! And the magistrate thought £1.

ARIEL.

OUR BIRTHDAY POST-BAG

Greetings to "P.W." from some of our famous friends.

From our Scientific Adviser, Sir OLIVER LODGE, F.R.S.

Dear Sir,—I should like to congratulate you and your paper on its continued success, and hope that the next decade will see still further advances both in the science of radio transmission and in the kind of information and entertainment which is broadcast.

Yours sincerely,
OLIVER LODGE.

From The MARCHESE MARCONI.

I heartily congratulate "Popular Wireless" upon the attainment of its tenth birthday.

Wireless broadcasting, with which "Popular Wireless" is particularly concerned, has passed through a decade of very rapid progress, and the Editor and his collaborators have earned the appreciation of a very wide circle of readers by the manner in which they have kept in touch with every new development, and have sustained enthusiasm and interest in the art and science of broadcasting.

CAPT. ECKERSLEY

As Chief Engineer of the B.B.C., he originated the Regional Scheme of twin-wave broadcasting.

From our Radio Consultant-in-Chief, Capt. P. P. ECKERSLEY.

Dear Sir,—A decade! Many congratulations. My attitude towards you has been the same both as a pioneer of broadcasting and, later, as a regular contributor to your journal. I have felt that a popular and informed technical press, keeping alive, as it does, an interest in technique, must be a considerable factor in the creation of technical progress.

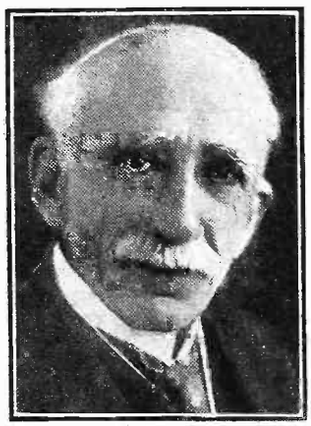
More than that, a regular and technical critique of a broadcasting service is essential to the growth and health of the transmission monopoly.

Alas! Even the press is insufficient in face of a growing rigidity and complacency of outlook in the B.B.C. to bring about that state of flux which, in the early days, made broadcasting an entertainment rather than an institution. The B.B.C. must not be allowed to subside into bureaucratic complacency. Technique must not be allowed to become too standardised.

Long may "Popular Wireless" counteract this vicious but all too obvious tendency, and long may it be a technical inspiration to those who find wireless the most fascinating of hobbies.

Yours sincerely,
P. P. ECKERSLEY.

SIR AMBROSE FLEMING



The inventor of the valve.

From SIR AMBROSE FLEMING, F.R.S.

Dear Sir,—A line to wish your journal many happy returns, and continued success and usefulness.

Yours truly,
AMBROSE FLEMING.

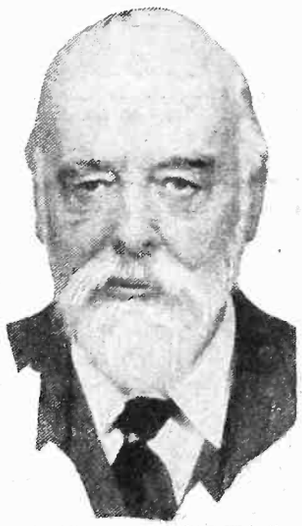
From SIR JOHN REITH, Director-General of the B.B.C.

Dear Sir,—Your tenth birthday should be an occasion of justifiable pride in steady progress and notable achievement. Wireless journals such as yours have been of material assistance to broadcasting, and it is pleasant to realise how you have prospered.

May you go forward to still greater success, incidentally developing that friendly, constructive criticism which is valuable not only because it helps the B.B.C., but also, I believe, because it is preferred by your readers to the kind of criticism that has little or no foundation in fact, and is animated by malice or caprice.

Yours sincerely,
J. C. W. REITH,
Director-General of the British Broadcasting Corporation.

SIR OLIVER LODGE



Sir Oliver, who is "P.W.'s" Scientific Adviser, celebrates the 81st anniversary of his birth on June 12th. He invented tuning.

From READY RADIO, LTD.

Dear Sir,—The tenth birthday of that enterprising youngster, "Popular Wireless," is an occasion which I feel calls for a special word of congratulation from all who have at heart the best interests of the home-construction movement in radio.

I myself have great faith in the future of that movement, for I believe that a determined forward policy and a refusal to be shackled by existing conventions on the part of those responsible for its development, can maintain it as the world's finest hobby.

I certainly regard "Popular Wireless" as one of the foremost exponents of that progressive policy.

Yours faithfully,
J. W. HUSTLER,
Managing-Director Ready Radio, Ltd.

From MESSRS. VARLEY.

Dear Sir,—May I, as a director of this firm, venture to congratulate you upon this your tenth birthday number. To add a cipher to one's age is a notable event. To have weathered a decade of radio journalism is an outstanding achievement.

Ten years of steady solid progress is something to be proud of.

Yours sincerely,
J.M.G. REES,
Director.

MARCHESE MARCONI

Marchese Marconi, whose name is imperishably linked with all the first steps in radio.

From The PETO-SCOTT CO., LTD.

Dear Sir,—It is with pleasurable recollection of a very long-standing association that I am happy to be able to offer my hearty congratulations upon "P.W.'s" tenth birthday.

As you are no doubt aware our association with "P.W." dates back almost to your very first issue ten years ago, and it is extremely gratifying to reflect upon the almost phenomenal growth of interest in radio that has taken place during those years.

To-day there are more than four million licensees, many of whom have joined the ever-increasing ranks through the medium of "P.W.," and you are to be congratulated upon the part that you have played in providing such a remarkable selection of first-class designs, a policy in which we have endeavoured to support you and your readers by the provision of Authors' Kits.

(Continued on next page.)

STATIONS WORTH HEARING

Some practical distant-programme notes compiled by a special contributor who nightly searches the ether in order to obtain really up-to-the-minute information for "P.W." readers.

WE are still passing through a very interesting period of change in long-distance reception conditions. I indicated some months ago that we might see, as the summer progressed and the sun-spot minimum drew nearer and nearer, a gradual tendency for the best "distance-getting" wavelengths on the medium-band to become shorter and shorter.

This forecast has been borne out in fact. With the exception of Brussels No. 1 (which at the moment of writing goes on from strength to strength!) stations above about 480 metres show a marked falling off—the higher you go the fewer, so to speak.

Budapest and Vienna have disappeared completely; you can't—or, at any rate, I can't—obtain so much as a whisper from Munich or Sundsvall and even the giant Prague has been reduced of late to a feeble little bleat on many nights.

Breaking the Rules.

Below the mark mentioned, though, there are some splendid transmissions. Possibly you have noticed that Sottèns and Beromünster, like Brussels No. 1, are breaking all the rules by showing a distinct increase in strength, instead of a falling off, as high summer draws nearer. Another remarkable station at times is Lille, from which I have had very good reception in the broadest of broad daylight.

On the long waves both Huizen and Motala seem a little tired and Zeesen has on several recent occasions not been quite up to the mark. The pick of the long-wavers are Radio-Paris, Kalundborg and Oslo.

Warsaw is varying a good deal; sometimes it is magnificent, but there are days when weakness is noticeable, and more than once a poisonous heterodyne has spoilt its programmes.

A Complete Eclipse.

The medium waves are full of surprises. Why, for instance, should the great Bordeaux station at comparatively short range (and separated from us mostly by sea water, one of the best of "conductors" for wireless waves) be so poor on most nights? Why should Göteborg, Brno and Breslau be often so wonderfully well heard? Why should Genoa come through on one or two nights a week at full loud-speaker strength and on other nights need the fullest measure of reaction to bring it up to audibility?

How is it that Kattowice, until recently one of the best of the Continentals, is at the moment suffering something very like a complete eclipse? Such things are wireless mysteries, and their occurrence adds enormously to the thrills and the interest of long-distance reception, particularly if one keeps a log.

As stand-by stations just now I would name Brussels No. 1, Langenberg, Beromünster, Sottens, Toulouse, the Poste Parisien, Hilversum and Heilsberg. These seem to be always there when required.

Good, but perhaps not so reliable as the aforementioned octet, are Gleiwitz, Leipzig, Turin, Trieste, Milan, Frankfurt, Stockholm, Rome and Florence.

In addition there are many stations that should not be neglected when you are conducting a tour round the medium waveband. On some nights they may not be there at all, or they may be only just audible; but on others you will find them coming in as if every kilowatt was pulling its weight!

Examples of such stations are Berlin, Witzleben, Lwów, Hamburg, Stuttgart, Barcelona, Brussels No. 2, Breslau, Göteborg, Bratislava, Lille, Hörby and Nürnberg.

Medium Waves in Daylight.

There is certainly no dearth of receivable foreign stations and quite a number of those on the medium-wave band are still to be heard in the day-time. Choose an afternoon when there is no atmospheric interference, and try a search over the band, even if the sun is shining brightly.

If you have at least one good H.F. stage, and provided that your aerial and earth are up to the mark, I should be surprised if you failed to log at least four or five Continentals.

OUR BIRTHDAY POST-BAG

(Continued from previous page.)

The way "Popular Wireless" maintains its position as one of the leading wireless journals in Great Britain can be gathered from the enterprise which has enabled it to include amongst its staff many eminent technical contributors to radio science.

It is with pleasure that I offer you my sincere congratulations on the tenth birthday of your journal, with the wish that it will continue to enjoy an even wider measure of success in the future.

Yours faithfully,
J. JOSEPH,
Chairman and Managing-Director.

W. Scott-Worthington, Managing Director of the Peto-Scott Co., Ltd.

In conclusion, may I express the hope that this old association may be continued and that it may be my pleasure to offer congratulations when you have reached your next Decade.

Yours faithfully,
For and on behalf of
THE PETO-SCOTT CO., LTD.,
W. SCOTT-WORTHINGTON.
Managing-Director.

Mr. J. M. G. Rees, Director of Messrs. Varley.

From RADIO INSTRUMENTS, LTD.

Dear Sir,—The tenth anniversary of "Popular Wireless" is of particular interest to me, as it almost coincides with the birth of this Company, of which I am Managing-Director.

During the past ten years the journal which you edit has come to be recognised as an institution for the radio-minded public. Its value to my Company is indicated by our record of continuous advertising in "Popular Wireless," as one of the most favourable channels for introducing our productions to radio readers and constructors.

From THE MARCONIPHONE CO., LTD.

Hearty congratulations, "Popular Wireless," on the occasion of your tenth birthday.

You have played a great part in laying the foundations of the enormous public interest which is centred on Radio to-day. We find pleasure in looking back with you to the earliest days of broadcasting. Carry on as you have so far and you cannot fail to keep pace with the hectic development of this virile industry of ours.

Mr. J. Joseph, Chairman and Managing Director of Radio Instruments, Ltd.

Hearty congratulations.

G. J. FRESHWATER,
Publicity Manager.

POPULAR RADIO MUSIC

BY DE GROOT

The world-famous violinist and conductor, who was one of the first musicians to give regular broadcasts in this country, and enjoyed a wonderful degree of popularity, tells "P.W." readers about his methods and aims in the selection of radio music.

A GOOD deal has been written lately on the subject of the more popular kind of radio music, and many musical authorities seem to have joined in a bitter complaint against it. Yet, in my opinion, it is both generally approved and necessary.

A Broadminded View.

I am myself the first to agree that the best works of the early composers still stand almost unequalled; but, on the other hand, I see no reason why the art of composing music should be considered to have stopped a hundred years or so ago.

Only the most bigoted and illogical supporter of the ancients can seriously argue that everything which is not a parallel to a Bach fugue or a Chopin nocturne should be destroyed; yet that is practically what we have been told recently.

This arbitrary way of deciding what the public shall or shall not be given is manifestly absurd. The world moves faster now than, say, in Handel's day; just as we have superseded travel on horseback by travel in aeroplanes, so do we find more modern temperaments needing quicker and simpler music than heretofore, and something of an altogether lighter style of composition.

When we have the leisure to enjoy them, riding and Handel give us intense pleasure still; but for everday use the flying-machine or the popular song and dance tune are more convenient and satisfactory to our hurrying, workaday, modern world.

Studying Public Taste.

I am a musician by profession, and it is as much my job to earn comforts (and luxuries when I can do so) for myself thereby as it is for a man to be a successful stockbroker or bank manager. Consequently, like these others, I have to study public taste, letting my musical capabilities serve the particular public which employs me, whether it be cinema audience, radio listeners, or what you will.

But, at least, the earning of money with my fiddle has helped me to be to this extent broadminded—that I recognise that genuine musical talent is to be found among modern work as well as among ancient, and that a capable conductor can avail himself of his orchestra's powers to get the maximum beauty and the greatest amount of musical effect when playing this more modern style of work, by artistic use of instruments and orchestrations not known hitherto.

Methods of Treatment.

Those who have heard my orchestra perform will probably realise that I do my best to make a popular number rise to its greatest possible height by novel orchestra-work, and a good deal of study or original methods of treatment.

In this way I endeavour, as far as is permissible, to demonstrate the *idea* which inspired the composer, and to develop his theme by obtaining all the effect possible from the whole range of my orchestra's instruments.

A CHARACTERISTIC POSE

De Groot, who has delighted the hearts of many listeners with his fiddle.

The Older Works.

I need hardly say that I do not abandon all the compositions of the older masters of music—that would be serving the public just as badly as if I omitted all the work of the moderns.

If I give a fair proporton of popular numbers, I also have constant recourse to the age-old favourites composed by the great men of the past, presenting such work in its most simplified form so that it may be acceptable to all tastes.

After all, the greatest task of music is to amuse and give pleasure to the greatest number, and not merely to tickle the educated ear of the brilliant minority.

Reached by Radio.

And, although there are comparatively few people who fully appreciate the complete technicalities of the great masters, there are a very great many to whom their melodies make an irresistible appeal, and perhaps I am right in saying that more of such people are reached by radio than by any other vehicle of music.

This being so, it would be merely foolish of me to stand like a Canute, resolutely shutting my eyes to the rising tide of appreciation for all forms of more popular music.

Apart, again, from the two extremes of technical classic and simpler modern music, we have the ever-welcome melodies from French and Italian operas, which, though definitely debarred from inclusion in the category of classical music, are none the less delightful to the listener-in, and are always a pleasure to the performer.

A Happy Medium.

To suggest that these should be deleted from our radio programmes altogether would certainly be to risk a very great falling off in the popularity of wireless as a form of entertainment.

I myself endeavour, by rendering all kinds of popular music with the utmost consideration, and by popularising the classic compositions as much as is possible, to create a happy medium within the ken of all listeners; and if I can do so; then I shall rest well content.

THE MIRROR OF THE B.B.C. By O.H.M.

A NOTABLE DEVELOPMENT

TRADE UNIONS ANGRY — WHERE WAS SIR JOHN ?—ACCIDENT TO B.B.C. OFFICIAL—"MUSIC HALL."

ON Sunday, June 26th, there is to be a long broadcast of the main religious service at the Eucharistic Congress in Dublin. It so happens that this feature programme takes place on the third Sunday after the introduction of lunch-time music on Sunday. I imagine there was some discussion as to whether an alternative entertainment programme would be provided.

The decision, wisely I think, is that there is to be an entertainment alternative on the other wave-length. If the decision had gone otherwise, there would have been considerable indignation among Protestant listeners generally, and also Ulster listeners in particular. On the immediate issue, the B.B.C. has acted wisely, but perhaps without realising that an important new precedent has been created in admitting an entertainment alternative to a religious broadcast.

Trade Unions Angry.

The Trades Union Congress and its subsidiary bodies are very upset about the references to the General Strike which were contained in Lance Sieveking's ten years' retrospect programme, which was billed as the "Farewell to Savoy Hill."

It will be recalled that when the Board of Governors was under review last year, strong representations were made to the Prime Minister to accept Mr. Citrine, General Secretary to the T.U.C., as a candidate for replacement of a retiring Governor. The feeling, then, was that something was needed to protect the "Left" view in the work of the B.B.C.

It is no secret that Mr. Citrine was the nominee of the T.U.C. The Prime Minister, however, turned down the suggestion, with the result that T.U.C. circles have been increasingly vigilant to discover signs of B.B.C. bias against them. Apparently, the first instance regarded as worthy of action was in Mr. Sieveking's programme at Savoy Hill.

I am told that the protest has been rendered in very strong terms, but loses a good deal of its "bite" by virtue of inaccuracy of quotation. It seems that the B.B.C. will have little difficulty in dealing with the situation, and that the T.U.C. will have to consider whether in future it might not be desirable to have shorthand notes taken of those broadcasts which might be expected to contain material offending to them.

Where Was Sir John ?

The Press view and opening of the B.B.C. transmitter for Scotland at Westerglen, described in this page a fortnight ago, has made a deep impression north of the Tweed. One point, however, still provides material for the gossip writers of the more popular newspapers.

This is the absence of Sir John Reith, who sent quite a squad of senior officials in his place. There is, of course, no great mystery. Sir John Reith, a Scotsman himself, has never made any secret of the fact that he is grateful not to have to live in Scotland any longer.

His speech at a Scottish society in London last year created a first-class sensation. He took occasion to condemn a lot that is happening in the land of his birth, and his audience agreed !

Accident to B.B.C. Official.

Mr. Percy W. Darnell is one of those B.B.C. officials whose work and usefulness are in direct disproportion to the publicity they receive. Mr. Darnell was captured by the B.B.C from Fleet Street about eight years ago, and has done very remarkable work, a good deal of which is of the confidential variety.

Mr. Darnell and his wife were returning from one of their missions for the B.B.C., when they encountered a motor accident for which, apparently, the responsibility was elsewhere. They were both seriously hurt, and all well-wishers of the B.B.C. will desire their early restoration to health.

"Music Hall."

José Collins, John Tilley, Terence McGoveran, Nosmo King and Partner, G. H. Elliott and Jenny Howard are among the artistes engaged for the third music-hall vaudeville programme arranged for Saturday, June 11th.

MUCH BETTER FOR THE SINGER NOW!

The soloist of to-day, when singing for a broadcast, is just as free to move as on a concert platform. But ten years ago, the mike had to be held close to the singer's mouth by the announcer, as depicted in the circle.

THE LISTENER'S NOTEBOOK

A rapid review of some of the recent radio programmes.

THANKS to the more ample accommodation of Broadcasting House, the studio audience becomes a more potent factor than ever. It was evident that Gracie Fields and those in support were playing to capacity on the occasion of Music-Hall No. 2.

In fact, some of them played so exclusively to capacity that we listeners were made to feel that either we were eavesdropping, or that we had got to find a convenient chink through which to peep while the bobby's back was turned.

The Cold Shoulder.

Jay Laurier cold-shouldered us to such an extent that by the end of his turn he had quite forgotten the existence of the microphone (a new acquaintance, too—Shame !). Why was he so secretive with his patter, and why weren't we invited to shout "George," or whatever it was ? Never have I been left so in the cold !

Such treatment by artistes will not make us love the studio audience any better. They must remember, too, that anything they do at Broadcasting House is primarily for us. Surely the studio audience ought to do the chink-peeping, but if this concourse of folk is allowed to become so big that the artiste cannot ignore it, then let the B.B.C. advertise Music-Hall No. 3 as being relayed from "Studio No. Something" as they do a Palladium relay. We should know what to expect then.

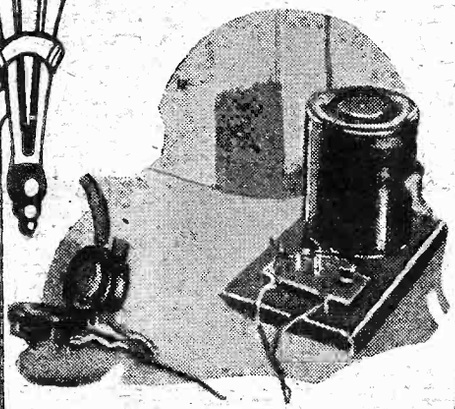
However, I didn't — or wouldn't — let this apparent slight mar my enjoyment of the hour. There was quality in every turn, I thought, every artiste seeming

(*Continued on page* 539.)

1922 1932
TEN YEARS OF PROGRESS

A peep at the past, designed as an introduction to the "Decade"—a loudspeaker receiver which epitomises the work accomplished by the Technical Staff of "Popular Wireless" during the preceding ten years.

By G. V. DOWDING, Associate I.E.E. (Technical Editor).



A CRYSTAL SET FOR 35/-.
This was the first set described in the very first number of "P.W." It made a great hit with the public despite the fact that in those days the parts cost 35/-.

THE daily broadcasting of news, talks, and concerts is now so much a part of our social structure that many readers will find it hard to visualise the radio conditions which existed when "P.W." first made its appearance ten years ago.

The only British broadcasting then available was one twenty-five-minute concert transmitted every Tuesday evening from an experimental station at Writtle by Capt. P. P. Eckersley, who was later to be Chief Engineer of the B.B.C., and, finally, Radio Consultant-in-Chief to POPULAR WIRELESS.

Our First Number.

But there was much talk of a national broadcasting system to arouse keen public interest, so that when Number One of "P.W." was published during the week ending June 3rd, 1922, it at once achieved a large circulation.

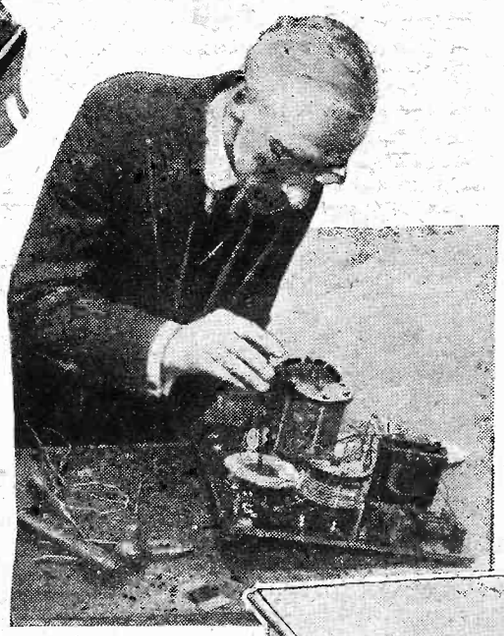
It would be wrong to say that "since then we have never looked back." We have, regularly, and with considerable satisfaction, but only because the history of "P.W." is one of steadily increasing circulation and widening powers!

Past and Present.

We don't shed maudlin tears for the "dear old days," and on this, the occasion of the completion of out first decade, we do not intend to ask readers to join with us in a profitless display of flag-wagging on account of our past successes.

They would probably be bored inasmuch as they obviously purchase

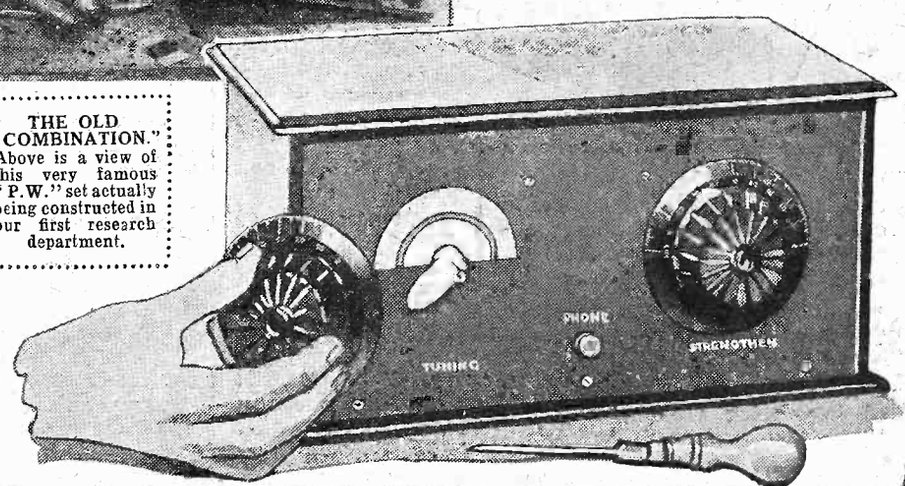
(*Continued on next page.*)



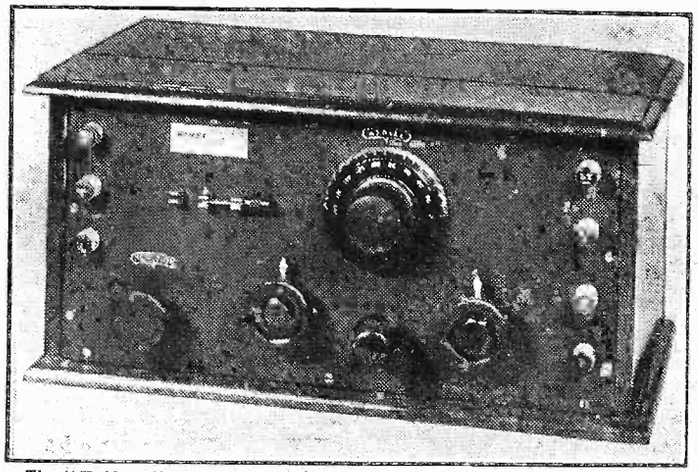
THE OLD "COMBINATION."
Above is a view of this very famous "P.W." set actually being constructed in our first research department.

AN EARLY "EXTENSER"

"P.W." gave the lead for simpler tuning with the "Simplicimus" Three (below), in which an early form of the Extenser appeared. If you compare this eight-year-old set with contemporary design you cannot but be amazed at its comparative simplicity.



NO H.T. WAS NEEDED!



The "Unidyne"—a "P.W." set which gave full loudspeaker results without H.T., and which created world-wide interest in 1924. Marconi took one of these sets on his yacht "Elettra" in order to give it a thorough test, and then reported most favourably on it.

"P.W." to read all about the latest broadcasting developments, the newest departures in receiver technique, and how to get the most out of the sets they possess.

Nevertheless, it is an indisputable fact that the history of "P.W." must to a considerable extent mirror the history of radio during the past ten years. And a brief reference to it will enable those tens of thousands of readers who enrolled in the "P.W." army in later years to appreciate something of the extraordinary progress that makes possible the modern, inexpensive, trouble-free, and easy-to-build set.

The Non-Stop Serial.

Indeed, this survey of the past is being given with the primary object of introducing the "Decade," a "P.W." receiver specially designed to epitomise present-day home-construction technique at its very best. Now, don't turn the pages and study the photos of this set before you have read these historically introductory notes, for the "Decade" has the duty of providing a climax to the first ten-year chapter of the story of "P.W."—a story which may, and probably will, continue as a non-stop serial through the centuries.

Some Set!

Number One of POPULAR WIRELESS contained the constructional details of a "35/- Crystal Set." This was the match which set fire to thousands of home-construction beacons all over the country. We introduced it as a "rag-and-bone" receiver, not apologetically, but with the deliberate object of drawing attention to its exceptional simplicity and cheapness.

Anybody could make it and anybody could work it and receive telephony on it. It provided tangible proof that radio was waiting on the doorstep of every home.

And, as we have said, it had the outstanding attraction that it was cheap. Yes, cheap! The word deserves repetition. (Six months later, when daily broadcasting had begun, after many alarms and excursions, an advertisement appeared in "P.W." "Mass Production Prices: Two-Valve Set, £15; Three-Valve Set, £25; Four-Valve Set, £35.")

In the third number of "P.W." we published an article entitled "Making a Simple Valve Set," and in it the following passage occurred: "It is advisable to purchase a variable condenser ready made. A good reliable instrument of a suitable capacity would cost between £1 16s. and £4 10s." (How much does a modern ·0005 cost? About 6s.?)

A complete set of parts for making a ·0005-mfd. variable condenser was listed at 18s. But we forget; there are no doubt many who are unaware that nearly all constructors assembled their variable condensers from sheaves of loose vanes and dozens of finnicking spacers and nuts in those early days!

The Good Old Combination.

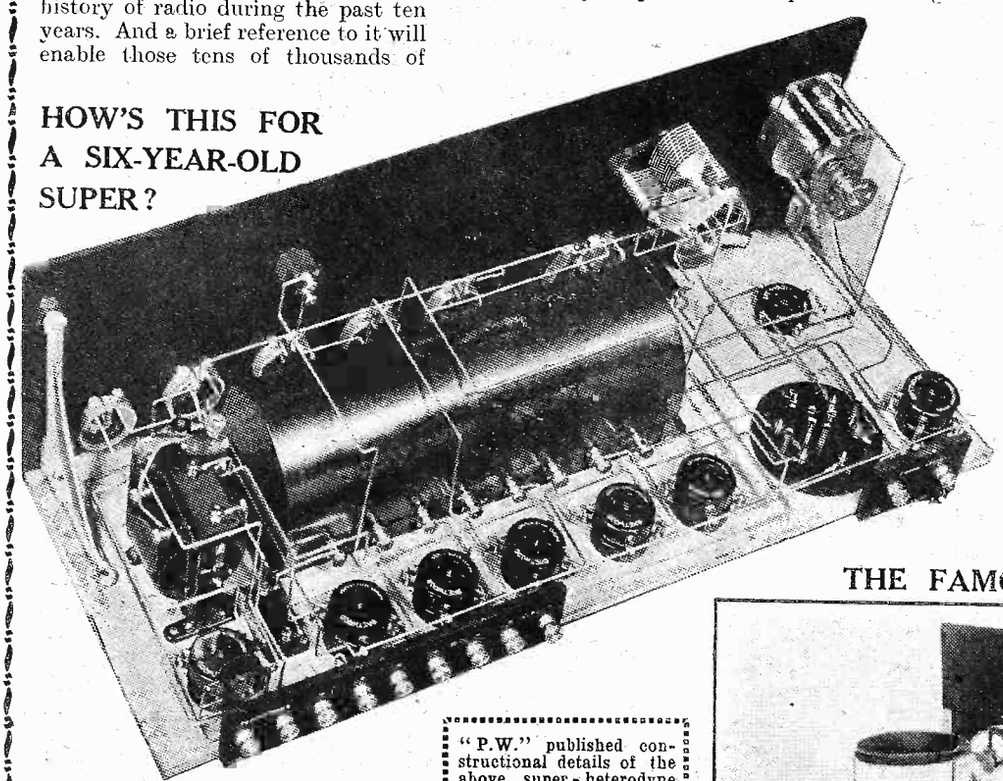
The vast majority of listeners employed crystal sets, and loudspeakers were indeed a rarity. But then valves were listed at 17s. 6d. each, and their lives were precarious to the extreme. And they would each take more L.T. current than seven or eight modern ones together. As much as 3 amperes L.T. would be required for a four-valve set in 1922.

It was in 1923 that the famous "P.W." Combination Set made its appearance, and it went over with a real bang. Again "P.W." achieved a success through paying primary attention to the economics of radio.

The "Old Combination," as it soon became affectionately termed by constructors, embodied a reflex circuit. There was a crystal detector and a valve which was made to act as

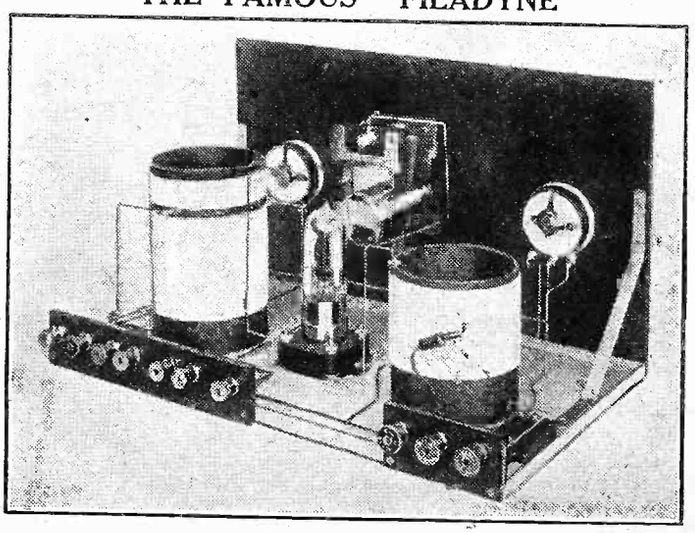
(Continued on next page.)

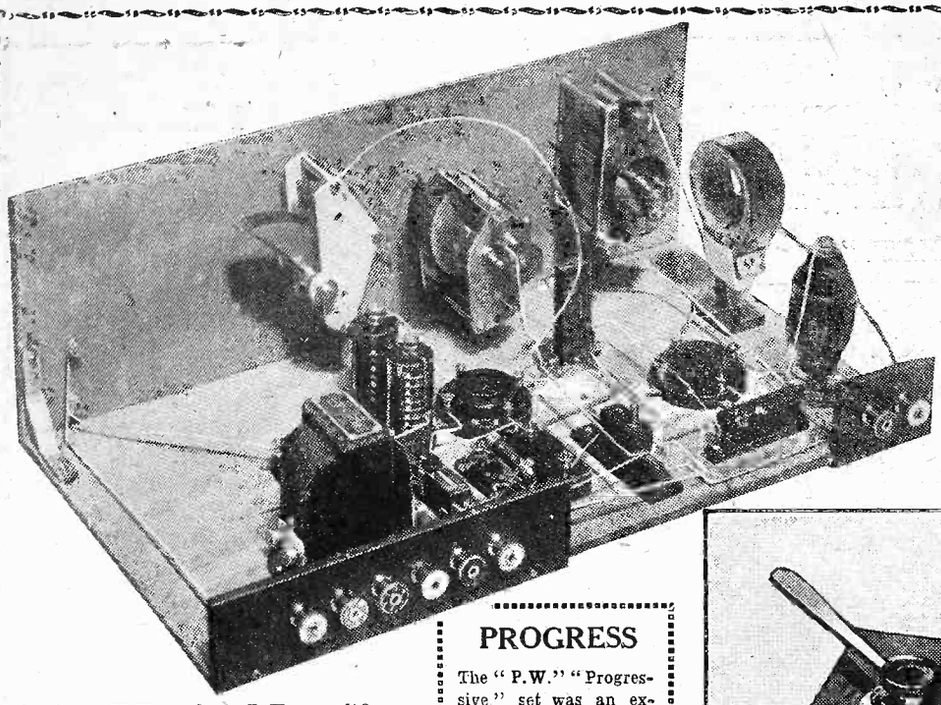
HOW'S THIS FOR A SIX-YEAR-OLD SUPER?



"P.W." published constructional details of the above super-heterodyne receiver in 1926. On the right you see the very first "P.W." "Filadyne" receiver. This set introduced an entirely new principle of thermionic valve operation—the electron flow being controlled by the incoming energy at the filament itself instead of by means of the grid. The principle, which was very successful, may yet be revived for use with modern valves.

THE FAMOUS "FILADYNE"

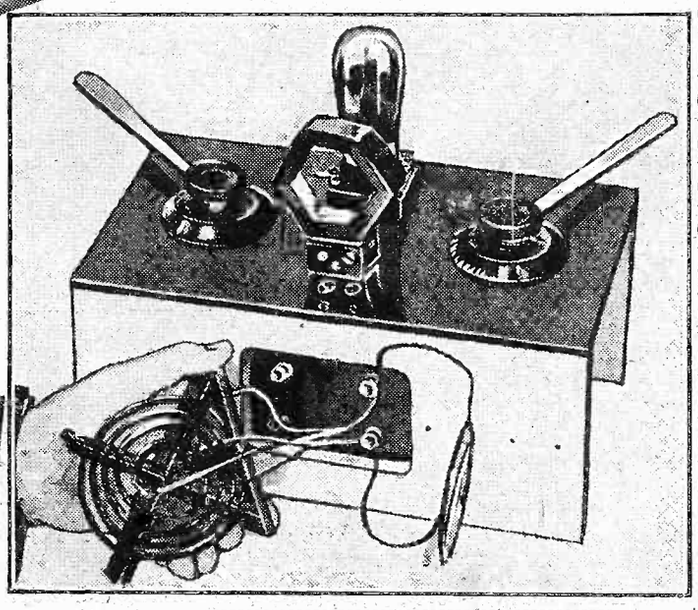


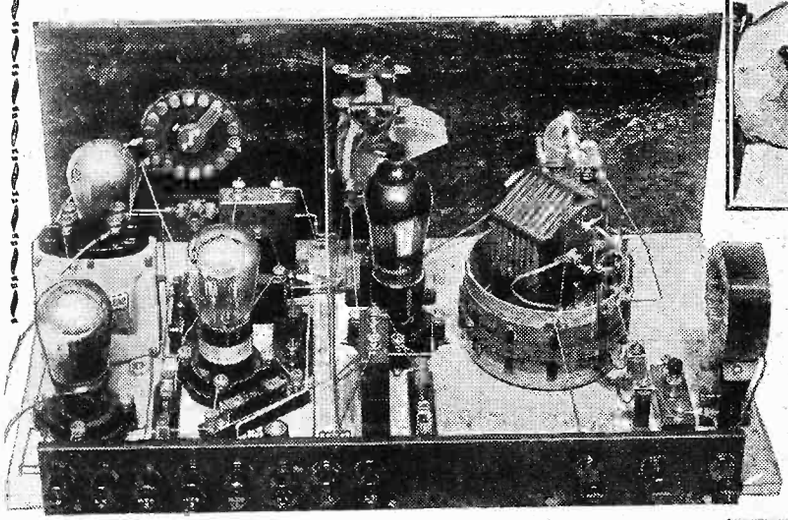


both an H.F. and an L.F. amplifier. Moreover, by means of switches the valve could be cut out of circuit and the set used as a crystal receiver. And remembering how much L.T. current the very precious and delicate "bright emitter" valve of 1922 took, it is easy to visualise the extremely attractive nature of that double-duty operation and of the switching in the eyes of all contemporary radio enthusiasts.

PROGRESS

The "P.W." "Progressive" set was an extremely popular design. It appeared in 1926, and the ideas it initiated are still to be found in modern "P.W." productions.



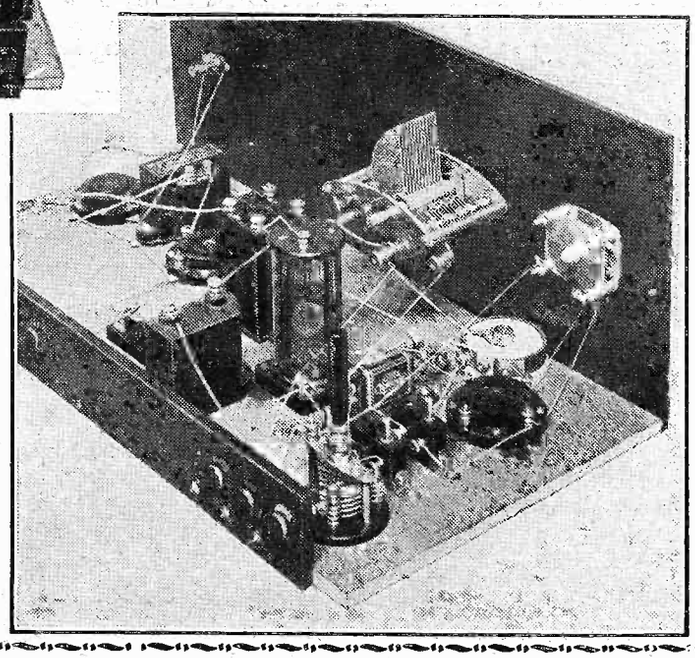


THE "ANTIPODES" ADAPTOR

THIS WAS THE FATHER OF ALL THE SHORT-WAVE ADAPTORS AND UNITS. "P.W." IS VERY PROUD OF THE FACT THAT THIS IDEA HAS BEEN EXPLOITED IN EVERY COUNTRY IN THE WORLD, AND THAT IT IS NOT ONLY STILL GOING STRONG, BUT IT IS EVEN TO-DAY EXPANDING ENORMOUSLY.

TWO OTHER STRIKING SUCCESSES

Above is the "P.W." "Titan," the set which popularised the S.G. valve, while on the right is the terrifically popular "P.W." "Magic" Three, which brought short-waves within the scope of the ordinary amateur, and which introduced differential reaction.



Loud Cheers!

Some time later we held a meeting in a large hall in London at which the original model of the "P.W." "Combination" set was introduced to an audience of some thousands.

The cheers which were given when a "P.W." technician entered bearing the instrument on a plush-covered tray were deafening in their unreserved sincerity!

Great progress was made during 1923 and 1924, and it was during that period that the "P.W." "Ultra" sets were described. These deserve a place in this review because they initiated the tapped plug-in coil which has since been employed by the million. It is curious, but historically accurate, that until we showed the way no one had thought of "tapping" plug-in coils!

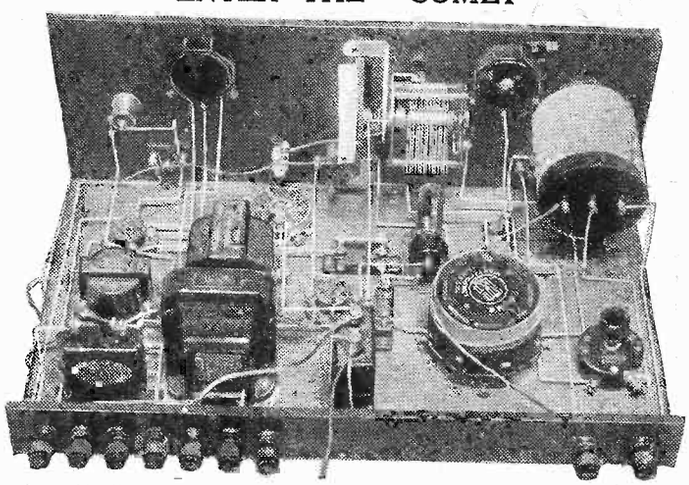
The "P.W." "Unidyne."

And then, in 1924, the "P.W." "Unidyne"! The circuit which would work and work well without H.T. What a furore the "Unidyne" caused. And how we enjoyed the controversy it created. The "leader of the opposition" was at first no less a personage than Marconi himself. But he had been ill-advised by his technical assistants, as he—great sportsman that he was and always has been—afterwards publicly admitted.

(Continued on next page.)

So he took a two-valve "Unidyne" set with him on a personal cruise on his research ship "Elettra," and when he returned he gave an account of his tests which for ever silenced the more active of our critics. After all, when Sir Oliver Lodge and Marconi had both given favourable "Unidyne" reports there was nothing more to be said about it, was there?

ENTER THE "COMET"



A combination of unique "P.W." features appeared in the "Comet." These were the "P.W." Dual-Range Coil, which later was to sell and be home-constructed by the hundred thousand; "Flexicoupling," a forerunner of the "Moderator"; and an up-to-date application of the "P.W." Progressive principle.

The "Unidyne" enjoyed quite a run, but it was killed by the dull-emitter valve, for it would work with full power only with the "bright emitter" types. Nevertheless, it left its stamp on radio in the shape of the five-pin valve, for "Unidyne" valves were the first to have five pins. Also the "Unidyne" valve was the first widely-sold bi-grid, and for that reason it is not exaggerating to say that it directly paved the way for the S.G. and Pentode.

Progressive Designs.

In case there are readers who may imagine that the "super-het" is a modern innovation, it may be as well to mention that the "P.W." "Super-Het." made its bow in 1926. It was not the first "P.W." super-het. circuit, but it is notable on account of the fact that it employed a special "super" unit which made it as easy to build as any that have followed it, though it was not particularly simple to operate as compared with a modern set.

For one thing, there was a whole row of filament rheostats; nearly all sets in those days had to have separate resistances for each of their valves in order to control the L.T. current!

Also in 1926 there was the "P.W." "Progressive" Set, which initiated the "Progressive" principle, which has so successfully been applied to many subsequent designs.

And so on to the "P.W." "Magic" Set, which is still remembered, and still used by a great army of constructors. The "Magic" was a vital stepping stone in the progress of home-radio technique, in that it popularised differential reaction and short-wave reception. But, above all, it proved beyond dispute that short-waves could be enjoyed by the ordinary man, and were not the cloistered preserves of only a highly-skilled few.

Around about the same time, the "P.W." "Antipodes" Adaptor appeared, the very first short-wave adaptor in the world. It was predestined to be a success because of its utter simplicity and inexpensiveness — these two qualities were always "P.W.'s" guiding principles.

And the fact that the "P.W." "Antipodes" Adaptor rendered it possible to transform any ordinary set into an efficient short-waver capable of receiving programmes from the far corners of the earth, created a great impression and was indeed regarded by many as something approaching miraculous.

Since then millions of short-wave adaptors have been made, and they are to be seen in every country—and they are still making new friends to this very day. Indeed, it is probable that they are more popular than ever, and that their popularity will even further extend.

"Titan" and "Comet."

We now jump two years and arrive at the "Titan," the set which indicated that the day of neutralisation was drawing to a close, and that the Screened Grid Valve would henceforth command the H.F. stage.

Twelve months later the "P.W." "Comet" swept across the country and consolidated the "P.W." "Progressive" principle. Also the "Comet" introduced "Flexi-coupling," the direct predecessor of the "Moderator," of which more anon.

And what of the tenth year of "P.W.," the final section of the decade? Is there a slowing down? Well, let the "P.W." sets of the past twelve months speak for themselves.

Enter the "Moderator."

(1) The "Pop-Vox"—in which the Extenser was a leading feature; (2) The "Super-Quad"—the first four-valve super-het using a bi-grid oscillator; (3) The "Eckersley" sets employing a new system of coupled tuning circuits invented by "P.W.'s" Radio Consultant-in-Chief; and, lastly, (4) the "Cosmic"—the first set to put three wave-bands (and the whole world of broadcasting!) on to one dial without coil-changing or switching between medium and long waves, and with only a simple transformation switch for short-waves, and the first set to employ the simple but vitally effective "P.W." "Moderator."

"P.W." started its history with a 35/- Crystal Set; what, after ten years of adventurous consolidation and with the vast resources of the modern industry and its mass-production of standardised, perfected products to aid us, are we now able to offer the home-constructor?

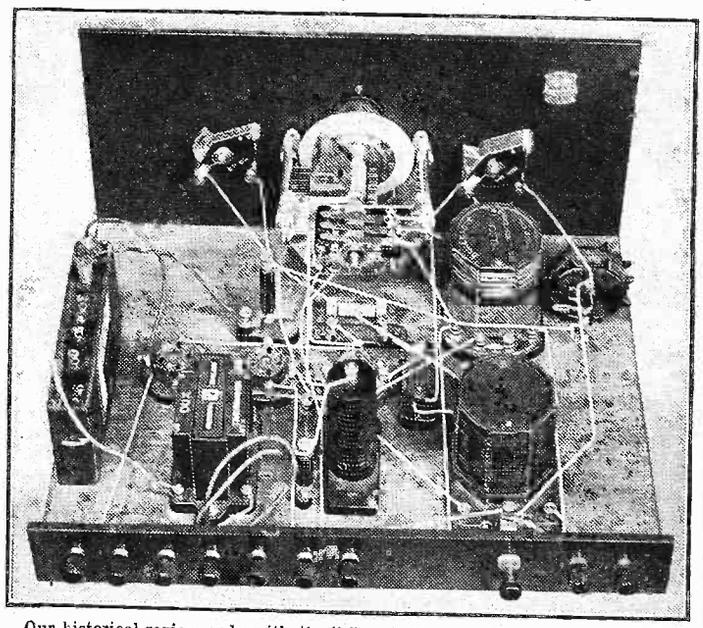
We can and shall give him an all-mains radio-gramophone, able to command ten times the number of programmes provided by a 1922 three-valve set, which cost nearly twice as much to build and which was five times as tricky and expensive to operate.

Keystones of Success.

But such a set could find no place in a tenth anniversary number of "P.W."—the journal with the largest radio circulation in the world. So, after considerable thought, we have produced the "Decade" Set as the symbol of progress in home-radio.

Simplicity and inexpensiveness are the keystones of its make-up: it is a set for the million. And in it you find the "Moderator," the latest and most popular of all "P.W." innovations.

AND, FINALLY, THE "COSMIC"



Our historical review ends with the "Cosmic," a set with which astounding reception records have been created (one reader received 257 stations on the loudspeaker with it). It can tune-in short, long and medium waves on the one dial without coil-changing.

The "DECADE"

A COMPACT, POWERFUL AND INEXPENSIVE LOUDSPEAKER RECEIVER WHICH REPRESENTS THE LAST WORD IN SIMPLIFIED EFFECTIVENESS

THE appearance of this set, its freedom from either internal or external complication, may lead many to think that it is "just another of those three-valve hook-ups."

Actually, of course, you cannot gauge the potentialities of a radio receiver by the absence or otherwise of intricacy in its construction.

On the other hand, simplicity is a quality that is strenuously worked for by all set designers, and the extent of their individual success can largely be measured by the degree to which they attain that end.

A Real Triumph.

And in this connection we believe the "Decade" is a real triumph, in that it possesses power and selectivity well above any ordinary receiver of such straightforward assembly.

The secret of its superiority is mainly to be found in the Moderator scheme which is included. The Moderator enables the user of the set to make his own compromises between selectivity and sensitivity, and he can do this quickly and with full success, even though he has had no previous experience of set handling.

In the average radio set considerable aerial energy is thrown away in order to obtain a "set" degree of selectivity of such proportions as are likely to meet the needs of all listeners, wherever they may be situated.

"Break-Through" Silenced.

Which means that all have to suffer power loss for the sake of the minority who are badly placed in regard to local conditions.

But the Moderator control on the "Decade" does not only give you a power-selectivity control on medium waves, but it also operates as a silencer of "break-through" on the long waves, in conjunction with a special long-wave selectivity adjustment.

And now, what is the "Decade" capable of doing in the way of programme collecting?

Well, first of all, it should be mentioned that the answer to this question depends to a great extent on the aerial used and the geographical position.

But, given a good indoor aerial or a moderate outdoor aerial, "logs" up to fifty stations at good loudspeaker strength ought to be well within the bounds of probability.

Anyway, all "Decade" builders will get full volume loudspeaker results from a number of stations, and we will go so far as to say that there is no other receiver with similarly inexpensive and simple qualities capable of extending it.

Also, it should be mentioned that stability and purity are two further qualities which accompany the considerable volume obtainable with the "Decade."

The "Decade" is, in short, the set for the million.

No Soldering.

As we have said before, its construction is superbly free from complexity, and we cannot see how any constructor can go wrong, providing he carefully follows the diagrams.

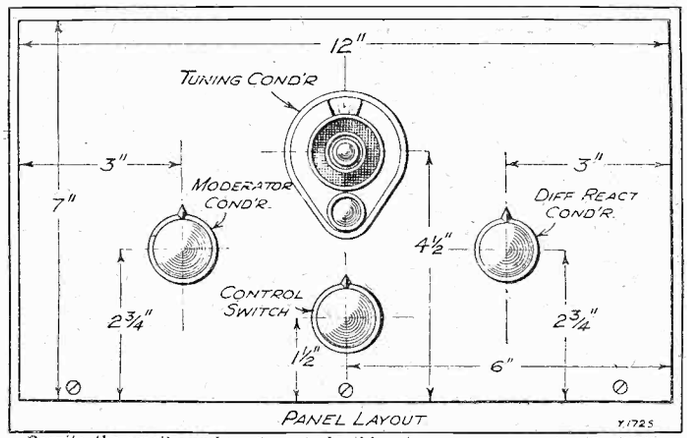
Even the switch presents no difficulties, for it has terminals. Indeed, there is no soldering to be done anywhere in the set.

It should be noted that the position of the Moderator coil is an important point in the assembly. It couples with the dual-range coil, and in order that the coupling should be fairly strong, it is advisable to raise the Moderator coil on a small block of wood $1\frac{7}{8}$ inches in height.

We will have more to say about this next week, for by altering the position of the Moderator coil it is possible to overcome the disabilities attending extremely bad local conditions.

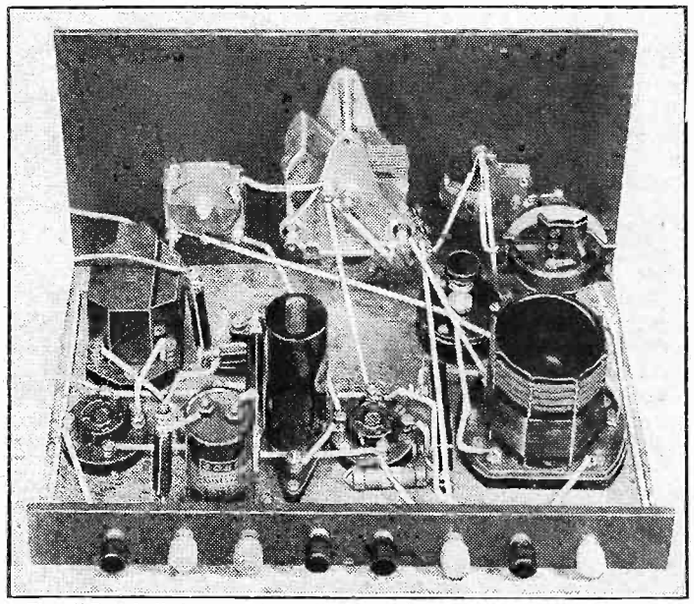
(*Cont'd on next page.*)

EXTREMELY FLEXIBLE CONTROL

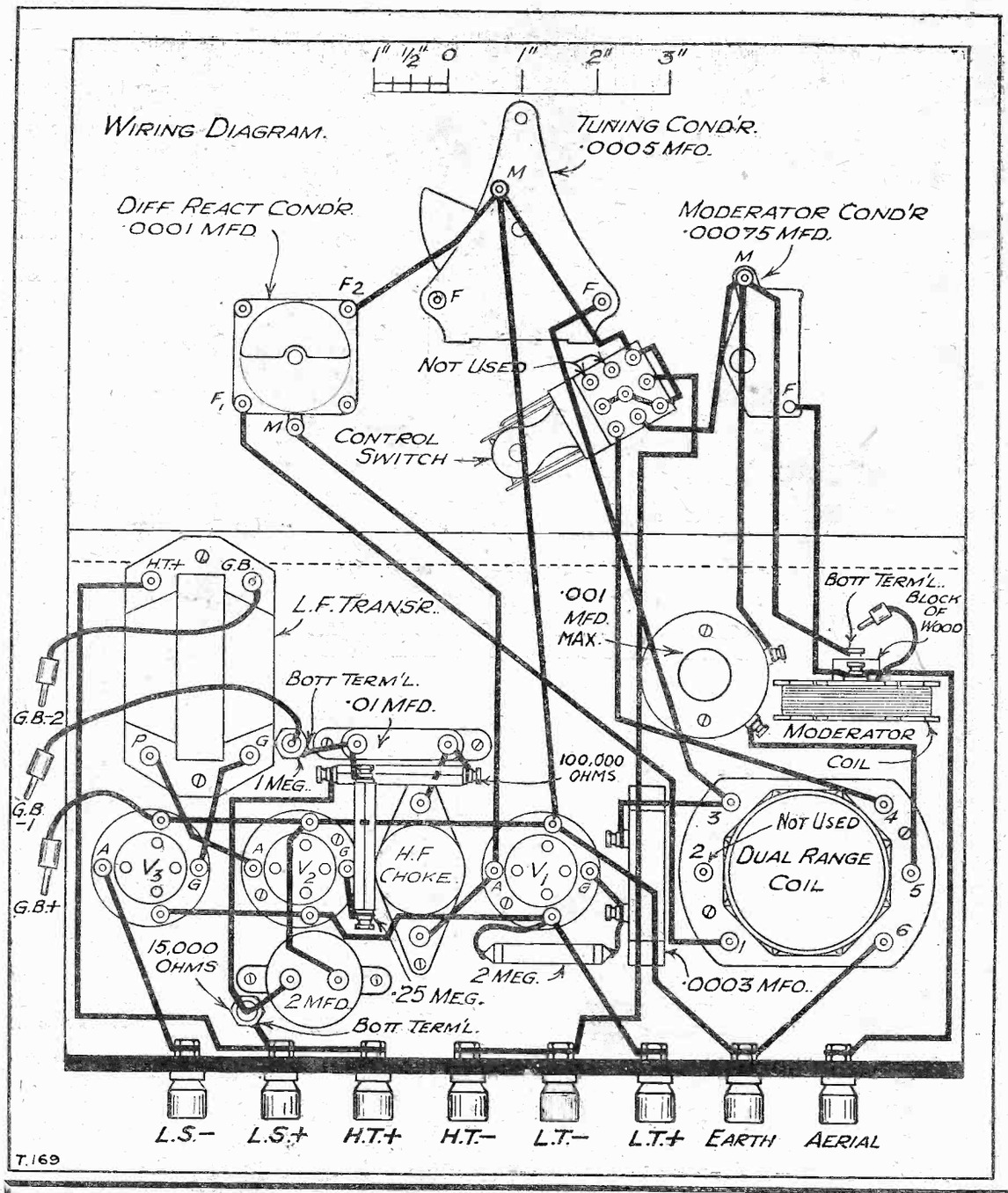


Despite the small number of controls, this set possesses a greater flexibility than any ordinary design, and can at once be adapted to any local conditions.

UNEQUALLED POWER AND PURITY



The "Decade" has great amplifying powers, but is absolutely stable and provides a high-grade quality output so that a moving-coil speaker can be operated to its best advantage if you are so fortunate as to possess a good instrument of this nature.



THE "DECADE"

(Continued from previous page.)

If you are not certain as to your own particular condition in this regard, we would advise you not to fix the coil for the time being, but just connect it up and leave it leaning against the dual-range coil.

The components for this set have been chosen with extreme care, both efficiency and price being taken into consideration. Therefore, constructors will be well advised to adhere closely to the list given below when collecting together their kits of parts.

NOTE THESE POINTS—
INEXPENSIVE PARTS. SIMPLE WIRING. NO SOLDERING. ANYONE CAN MAKE IT.

In the majority of cases we have been able to quote numerous alternative makes, and no doubt many constructors will already have quite a few suitable components on hand.

There is really little else to say about the actual assembly of the set, for the wiring diagram and our component list tells you the rest of the story.

YOUR COMPLETE SHOPPING LIST FOR THE P.W. "DECADE"

1 Panel 12 in. × 7 in. (Peto-Scott, Permcol, Ready Radio, Wearite, Lissen).
1 Baseboard 12 in. × 7 in. × ⅜ in.
1 Cabinet to fit (Peto-Scott).
1 ·0005-mfd. variable condenser (Lissen, Ormond, Telsen, Polar, Cyldon, J.B.).
1 Slow-motion dial (Formo).
1 ·0001-mfd. differential reaction condenser (Lotus, Ready Radio, Telsen, Cyldon, J.B., Polar, Wavemaster, Magnum).
1 ·00075-mfd. solid dielectric condenser (Magnum, Polar, Telsen, Ready Radio).
1 3-pole change-over switch (Wearite 123).
3 4-pin valve holders (Lotus, Lissen, Telsen, Graham Farish, W.B., Tunewell, Igranic, Clix, Benjamin, Bulgin).
1 Dual-range coil (Colvern R.M.3).
1 Moderator coil (Ready Radio, Peto-Scott, Sovereign).
1 ·001-mfd. max. compression condenser (Lewcos, Sovereign, Goltone, Graham Farish, Formo, Polar).
1 ·01-mfd. mica condenser (T.C.C., Dubilier, Telsen, Lissen, Graham Farish).
1 2-mfd. condenser (Dubilier type 9200, Telsen, Lissen, T.C.C., etc.).
1 ·0003-mfd. fixed condenser (Lissen, etc.).
1 H.F. choke (Lissen, Lewcos, Telsen, Atlas, Tunewell, Graham Farish, Ready Radio, Varley, R.I., Peto-Scott, Sovereign).
1 2-meg. leak, with holder if required (Igranic, Lissen, Telsen, Graham Farish, Ready Radio, Loewe, Dubilier).
1 15,000-ohm resistance (Graham Farish Ohmite, etc.).
1 100,000-ohm resistance (Graham Farish, etc.).
1 ½-meg. resistance (Graham Farish, etc.).
1 1-meg. resistance (Graham Farish, etc.).
1 L.F. transformer (Lissen Torex, R.I., Graham Farish, Telsen, Varley, Lotus, Igranic, Tunewell, Sleetun, Ferranti).
1 Terminal strip 12 in. × 1½ in. (Peto-Scott, etc.).
8 Indicating Terminals (Bulgin, Belling Lee, Eelex, Igranic, Clix).
1 Block of wood for mounting moderator coil 1¾ in. high.
18-gauge tinned copper wire and sleeving (Wearite, or Quickwyre, Jiffilinx, Lacoline).
Flex, screws, etc.
Battery plugs (Belling Lee, Eelex, Clix, Bulgin, Igranic).

ACCESSORIES.

LOUDSPEAKER.—Blue Spot, Celestion, H.M.V., Marconiphone, B.T.-H., Epoch, R. & A., Cossor, Graham Farish, W.B.

VALVES.—Detector: Mazda H.L.2, Mullard P.M.1H.L., Cossor 210H.L., Marconi and Osram H.L.2, Tungsram H.210, Eta B.Y.2020, Lissen H.L.2, Six-Sixty 210H.L., Triotron H.D.2, Dario H.F.
1st L.F.: Cossor 210 Det. or 210L.F., Mullard P.M.1L.F., Marconi L.2/B, Osram L.210, Mazda L.210, Tungsram L.210, Eta B.Y.1210, Lissen L.210, Six-Sixty 210L.F.
Power: Mullard P.M.202, Mazda P.220A, Marconi P.2, Osram P.2, Cossor 220P.A., Eta B.W.602, Tungsram P.220, Six-Sixty 220S.P., Lissen P.220A, Dario H.P., Triotron U.D.2.

BATTERIES.—H.T., 120 to 150 volts (Lissen, Pertrix, Ever Ready, Drydex, Siemens, Cossor). Super capacity should be used.
G.B., 16½ to 18 volts (Ever Ready, Etc.).

ACCUMULATOR.—2-volt (Exide, Pertrix, Lissen, Ever Ready, G.E.C., Ediswan).

MAINS UNIT.—To give 20 milliamps. at 120 volts (Atlas, Heayberd, R.I., Tunewell, Tannoy, Regentone, Formo, Lotus).

"THE BEST OF TWO WORLDS"

"One of the outstanding successes of 1932 radio-gramophone design" . . . . .

says "Popular Wireless."

"Came through test with flying colours . . . design, workmanship and finish of a very high standard indeed . . . capable of reproducing programmes with great fidelity and gratifying reserve of power . . . priced at a surprisingly low figure."

Popular Wireless 28/5/32.

"The best of two worlds . . . first-class radio programmes and good quality record reproduction. Fine value for money."

Amateur Wireless 23/4/32.

"The same excellent response with gramophone records as with broadcast . . . needle scratch noticeable by its absence . . . The extraordinary compactness does not detract in any way from its performance . . . while its excellent reproduction assures a full measure of enjoyment."

Wireless World 11/5/32.

"Compact, well made, good appearance, performance very satisfactory both on Radio and Gramophone . . . can be easily transported from room to room."

Wireless Trader.

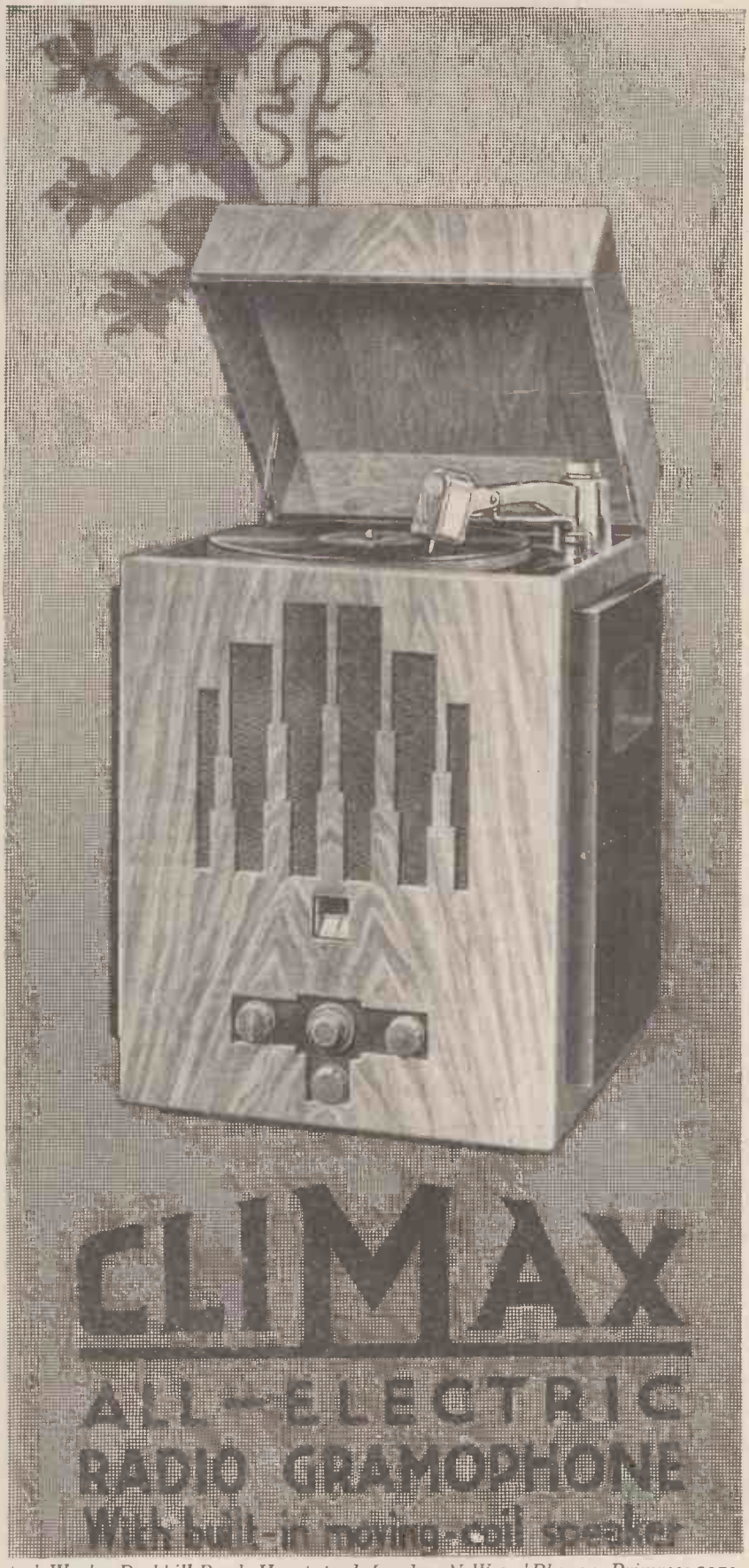
SPECIFICATION:

1. Screened-grid, Detector and Pentode Valves with Valve Rectifier of ample output.
2. Super-sensitive British Moving-coil Speaker.
3. Collaro Electric Motor *with fully automatic stop.*
4. Figured walnut cabinet.

22 GNS

or 42/- down and 11 monthly instalments of 43/6 each or 84/- down and 10 monthly payments of 42/-

BRITISH MADE



Write for FREE Colour Leaflet to CLIMAX RADIO ELECTRIC LTD., Haverstock Works, Parkhill Road, Hampstead, London, N.W.3. 'Phone: Primrose 1171.

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 Capt. Eckersley; a selection of those received by the Query Department in the ordinary way will be answered by him.

Removing a Whistle.

S. L. (Ilford).—"Mühlacker's spacing from London Regional is now eleven kilocycles, according to the published wavelengths. In spite of this, I can still hear a heterodyne whistle on the Regional.

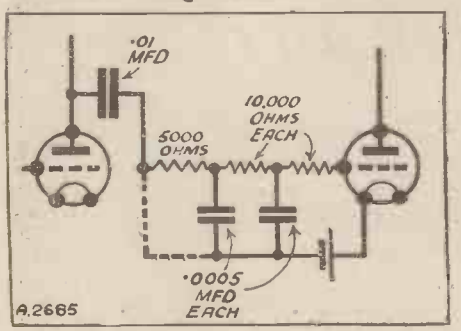
"Can you tell me how I could cut this out, because it is very irritating to hear this high-pitched whistle in the background all the time?"

There are many, many ways to do this; the best ways are complex and expensive. I think one of the easiest ways is to construct a low-frequency cut-off filter of simple design.

One of the very simplest is to connect a condenser across your loudspeaker unit, but you may remove too much other "top" in doing this.

You can use a connection like the one in my diagram, if you will, using the values

A LOW-FREQUENCY CUT-OFF



Here is the scheme outlined above, which Captain Eckersley recommends to S.L., of Ilford.

shown in Fig. 1. Then, again, you might try a tuned circuit in the loudspeaker lead with a *small* condenser shunt as in my second sketch.

* * *

Screened by a Gasometer.

L. C. N. (Camberwell).—"There is a big gasometer not far from where I live, and a friend tells me that this mass of metal may be having a serious effect upon my results. My set is a three-valver and works fairly well, but I am beginning to doubt whether the results I am getting are as good as they should be. Is it likely that the gasometer will make a difference to my results?"

It is really impossible for me to tell you—how far is "not far"? If it's a mile the gasometer will not affect signals, if it's twenty yards it will.

If it's 100 yards it might. If it's 500 yards it just might. And what is "big"?

No! It's almost impossible to say really. It's rather like saying: "I live in a very hilly district and not far from one of the biggest hills round here. My windmill works fairly well, but I am beginning to doubt whether the results I am getting are as good as they should be. Is it likely that the big hill will make a difference to my results?"

To which we would reply, does the windmill do the work you want it to?

* * *

Chromium Plating Possibilities.

F. Y. (Crouch End).—"Chromium plating is universally employed since it is practically impossible to mark or stain same. Why is it, therefore, that manufacturers do not chromium plate switch contacts and other parts of wireless gear, which it is essential should make good contact. Is it a bad conductor?"

I am not thoroughly informed. Switch contacts must rub and keep clean. The knife switch is the best switch in the world, and the blade is always cleaning the socket and the socket the blade by just using the switch.

If you had chromium plate you wouldn't gain anything that I can see and you would certainly put up the cost. Perhaps even chromium-plated surfaces do make bad electrical contact, but I repeat the present knife switch and/or rubbing contact arrangement is so good as not to want the sort of improvement a perfectly non-corrodible substance might give.

* * *

Joining Different Metal Screens.

T. S. (Greenhithe).—"I made a screening box for the H.F. stage in my set and ran short of metal. The four sides of the box are made from copper, but the top and bottom are aluminium. Is this likely to cause H.F. instability, which the set suffers from?"

I do not know for certain because I do not know what sort of a contact you have made between aluminium and copper. If the contact is *really* good and continuous, in fact your box would hold water indefinitely, then you have a perfectly good screen. I cannot help you farther than that.

ONLY IN "P.W."
can you read Capt. Eckersley's replies to listeners' own problems.
AND REMEMBER—
Captain Eckersley's technical articles appear only in
"POPULAR WIRELESS"
and **"MODERN WIRELESS."**

Using Thick Wire.

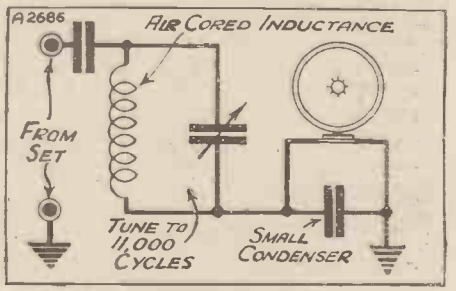
N. H. (Peckham).—"Would it be possible to detect any difference in the performance of a set wired with 14-gauge wire, and one wired with 22-gauge, assuming that the wire was covered and also uncovered, since 22-gauge is far easier to work with than 14-gauge?"

The only place where you might find an electrical difference is in the filament circuits where (very improbably) a 22 wire carrying a lot of current might introduce too much resistance.

Otherwise there would be no possible difference, and the possibility I refer to is remote in ordinary practice.

Mechanically the flabbiness of the 22 might let wires touch or play the fool.

FILTERING THE OUTPUT



A tuned circuit in the loudspeaker lead is an alternative scheme to that shown in the opposite diagram.

Tramway "Stoppers."

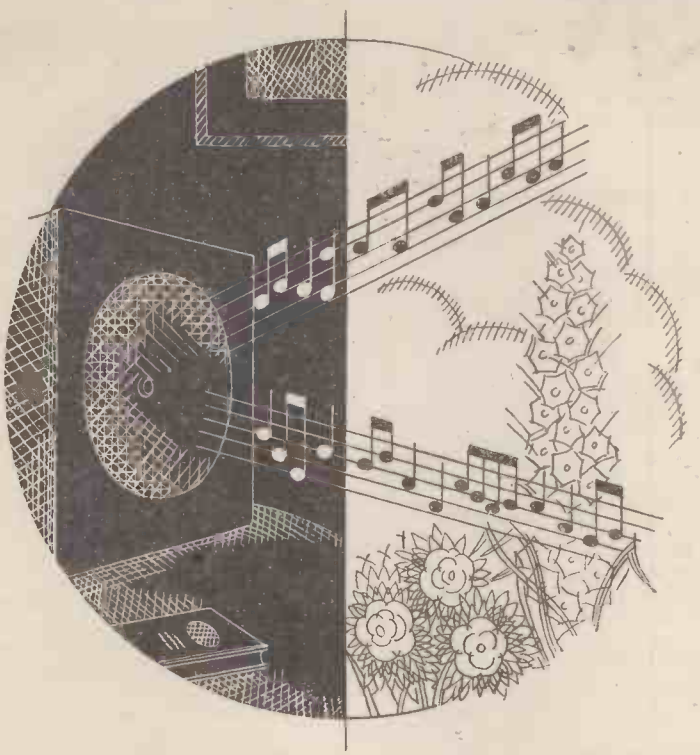
B. S. (Nottingham).—"I notice that in certain cases where tramway interference is very bad, 'stoppers' have been inserted in the trolley arm by the authorities. What do these 'stoppers' consist of?

"I always thought that this form of interference was caused by sparking between the trolley wheel and overhead wire. If so, how is it possible to stop this?"

The spark takes place, as you say, between collector and overhead conductor, but the spark is only one of the factors contributing to "tramway interference."

The spark sets up electric oscillations between earth and (aerial) overhead conductor. The aerial conductor and the tramway arm and the tramway wiring radiate the effects of these ocillations.

The idea of a stopper is to damp out, prevent, scotch, kill, these oscillations set up by the inevitable spark.



How does your wireless sound in the open air?

If you want to put your wireless set to the highest possible test, take it out into the garden or open the French windows and listen to it from the lawn. If there is any fault in reproduction — distortion, unsteadiness, blurred tone, thinness—the open air will find it out. Then is the time to fit the Ever Ready Battery made specially for your set; the battery that is neither under-powered nor unevenly-powered — but made to give exactly the right amount of unwavering power for the whole of its unusually long life. Clarity, fullness and richness and sweetness of tone, evenness of reproduction for the whole life of the battery — all this is your reward when an Ever Ready battery takes charge of your wireless. The better your set, the more it deserves this battery, made and guaranteed satisfactory by the makers of batteries for over 29 years.

EVER READY

BATTERIES

Longer Life — Unwavering Power

THE EVER READY COMPANY (*Great Britain*) LTD · HERCULES PLACE · HOLLOWAY · LONDON · N·7

WIRELESS in WAR TIME

Extracts from the diary of a wireless operator at sea 1916-1918

APRIL 12TH, 1917.—Went ashore early this morning to visit Pompey's pillar and the catacombs. In the latter place there are preserved the dried-up bodies of monks. In fact, they are so well preserved you can waggle their tongues.

As I was coming back to the Docks a funeral passed me. In front of the cortège were the relatives, all looking very cheerful. Next came the coffin, covered with a large and beautiful cloth, and carried on the shoulders of several men.

Abdulla Moses Again !

There were plenty of professional mourners, all weeping like small monsoons and earning their money twice over. They were barefooted, and relieved the monotony of the journey to the graveyard by pouring quantities of dust on each other's heads.

The procession ended with the usual ragtag and bobtail urchins who always appear to have nothing else to do in life but follow funerals.

APRIL 14TH.—Visited the Khedival Gardens to-day. As I came back in my carriage I was accosted by that old blackguard, Abdulla Moses. He hopped on the running board and demanded "Backsheesh." At last I got fed up, and did what I should have done at the very first, viz., knocked him off with a clout on the jaw. There was a bump, a cloud of dust, and I have not seen him since.

A Glorious Bathe.

APRIL 16TH.—To-day is a general holiday for the natives. It is called the "Shem el Nessim," and means "the day of cool breezes." In the afternoon I took a tram along the coast to Mex, and then walked round the bay for a mile or two. After leaving the village there was nothing but sand; but later on I had my reward in the shape of a glorious bathe. After a good rest I looked over some of the ruins where, buried in the sand, I found some muzzle-loaders which were used in the defence of Alexandria when bombarded by Charlie Beresford and Co.

APRIL 20TH.—Although Mr. Kipling tells us that Port Said is the wickedest place on earth, it certainly presents a very pretty picture from the sea. At two o'clock this afternoon a large Swedish vessel, "The Pekin," caught fire, and by six was a mass of flames. As it grew dark, it was a grand, though rather terrible sight, to see her blazing from stem to stern.

Dropping the Pilot.

APRIL 21ST.—We have anchored off Ishmalia to drop one of the canal pilots. All the afternoon, as we passed through the Canal, I have been watching the land of Egypt on one side and on the other, Syria. On the Egyptian side the banks are thick with shrubs and plants, but on the Syrian side nothing but the great desert of Tih.

Encamped along the banks of the canal were bronzed-looking soldiers who shouted to us eagerly for news from "Blighty." Egyptian chariots and Hosts of Pharaoh have given way to-day to an orderly camp and a string of prosaic telegraph poles.

APRIL 29TH.—On the 27th we passed Perim, well in sight of land, and on the following day we were forty miles east of Aden. Now we are well on our journey, and in the Indian Ocean. Have picked up a war warning reporting an armed raider in these waters. It's probably the "Woolf."

MAY 7TH.—After a very warm journey up the Persian Gulf, we steamed into the Shaat-el-Arab to-day, anchoring at 7 p.m. off Ashar, which is the port of Basra. The confluence of the rivers Tigris and Euphrates at Kurna, is known as the Shaat-el-Arab, which flows into the Persian Gulf near Koweit. As we steamed up the confluence of these two rivers, we passed Abadan, the island site of the Anglo-Persian Oil Co. It's a most desolate-looking place.

Merchant at Seventeen !

MAY 12TH.—Until this morning we have been at anchor opposite the big wireless station at Ashar. We are now proceeding some six miles up the river to a little settlement called Magil. It is only a military depot, and stands blistering in the full glare of the sun on the edge of the river.

MAY 15TH.—During the last three days I have managed to see a little of the surrounding country, but of Basra city itself I cannot say much. Fully three-quarters of the place is out of bounds to Europeans. In one of the bazaars I was pointed out a youth of about seventeen who was idly looking after a dirty shop. I was told he was the richest merchant in Basra. These chaps can live on a few pence a day and so, when they have made a fair amount of money, they shut up shop and lounge about for the rest of the time.

MAY 22ND.—The last eight days have been pretty much alike except for one outstanding incident, namely the execution of some rebel Arabs. V—— and I had gone swimming early one morning in our favourite creek, about a mile up stream. It is a fairly lonely spot, and as we arrived there I saw a little group of people gathered near a palm belt.

A Firing Squad.

We watched at a discreet distance. A squad of native soldiers under a white officer and an N.C.O. were lined up facing three ragged-looking men. An order brought the rifles to the present. We did not stay any longer. It is not a pretty sight to see defenceless men butchered like sheep, however guilty they may be.

THE WORK OF AN UNDERSEA RAIDER

An impressive photograph taken from a British aeroplane, showing the work of an enemy submarine. The victim was an Allied merchant vessel which broke right in half and became a total wreck.

"MANY HAPPY RETURNS—

CAPT: P.P.ECKERSLEY

Everybody enjoys reading our Radio Consultant's articles, and on this happy occasion he has wielded his pen with inimitable verve and wit. He is now on his way to Australia, and in the following review of radio progress made in the last decade, P.P.E. looks critically at the B.B.C. pundits—and finds they are upside down!

MANY Happy Returns to all birthday papers, particularly the following: POPULAR WIRELESS. Ten years old to-day, Pop! Ten years. People and papers are surprisingly different!

Ten years, and people are just learning to learn. Ten years, and papers are either dead or in full swing. And POPULAR WIRELESS has long ago learnt to learn. It is in no danger of death.

Here's Prosperity!

Here's prosperity and long life to it, and to its competent nurses who have brought it up, too; matron N. E. and sisters D. and B. and R. and—but a list is an invidious kind of a showing if one goes on. Even if one starts it, it's bad enough!

I cannot disguise from you the fact that when you read these words I shall be upside down to you. I shall be sailing southern hemispheres. Think of me then like the unconscious crayfish with magnetic dust in his semi-circular canals—feeling perfectly upright while the magnetic field pulls him, to us, cock-eyed.

But perhaps you do not know the experiment. Let me describe it to you. You know we all get our sense of balance by the position of fluid in "canals" (semi-circular canals) somewhere near the ears. As we bend forward the fluid moves and tells the brain what's happening, and our muscles react to keep our balance. It is gravity acting on the fluid in the canals that allows our heads to move relatively to the fluid and so gives us nerve messages.

In the crayfish, nature gives the canal a filling of sand, not fluid. And the sand is always kept up to stock by the crayfish burrowing about on the ocean's floor.

Swimming on His Head!

Some clever person caught a crayfish, and put him in a tank in which an iron filings bottom took the place of the natural sandy bottom. So the crayfish's balancing apparatus got filled with iron filings. These were attracted by gravity just as the sand had been, and Mr. C. swam about upright as before.

Then the experimenter got a magnet and brought it near the crayfish. The iron filings were pulled partly by gravity, partly by magnet, the crayfish started to swim cock-eyed, and his "angle" was always along the "resultant" of the forces of gravity and magnetic field.

A strong magnet suspended above Mr. C. made him swim upside down and apparently without noticeable vertigo.

I shall be upside down when you read this, the fluid in my canals being pulled in a direction different from yours.

But that's a long interlude in a birthday article, and apparently irrelevant. But one wonders how far the broadcasting crayfish is upright. One wonders if in ten years there have not been strange forces acting to make the business a bit cock-eyed.

Bureaucrats of the B.B.C.

I've been trying to keep right side up and at an upright angle, and it's uncanny sometimes to see the curious deflections which come about by new forces acting upon unnatural forms of balancing mechanisms.

The B.B.C. itself seems a bit tip-tilted to a sane observer. It is the most inflexibly bureaucratic institution in Britain.

People affect to laugh at the Post Office for its rigidity. All of us skipping spirits who revel in things doing and things done cannot point to the Post Office as ideally flexible perhaps, but a fair comparison between P.O. and B.B.C. would redound remarkably clearly to the credit of the former.

Except for providing the stations of the Regional scheme, the B.B.C. has done nothing whatsoever to make notable improvements in the service to the listener during the last five years. Any copy of the programme pages of a "Radio Times" five years old is to all intents and purposes the same as to-day's.

Independent of London.

The only change is that the same sort of programmes have to be printed twice instead of once because one must do something about this Regional scheme to "fill up" both wave-lengths.

While the B.B.C. have moved into new headquarters, and while the new studios may be better, I doubt if anyone will notice a marked difference.

The B.B.C. are impervious to suggestion, and stick to their "rulings" because they are rulings. It has been proposed to

(*Continued on next page.*)

A BUSY TIME COMING FOR P.P.E.!

Captain Eckersley has gone to Australia to advise the Government in the reorganisation of their broadcasting system. Their principal station is Melbourne, 3 L O—named after our 2 L O—this photograph being taken on the occasion of one of the regular community singing broadcasts from the Melbourne Town Hall. Note the pedestal microphones in the foreground.

"MANY HAPPY RETURNS"

(Continued from previous page.)

make the programmes truly alternative by (*a*) handing the Regional wave-lengths to competent Regional Directors largely independent of London; (*b*) putting *all* the more "plus-concentration" stuff on one and all the easier on the other; (*c*) using one wave-length for advertising programmes. The B.B.C. does not even condescend to reply to these suggestions.

A Cock-eyed World.

It's a cock-eyed world when you get a fanatically conservative people in charge of a rapidly developing idea like broadcasting. The forces of "gravity" seem mostly to win, however.

What is going to happen in the next ten years? If anybody had any "guts," and if democracy didn't elect the second-rate, and if bureaucracy was less watertight, I should expect to see large changes in the broadcasting world.

At the end of the B.B.C.'s ten years there should be a first-class inquiry determined to rout out the dictatorship of mediocrity, cant and conservatism that dominates the present service.

That Boring "Local."

In any case there is bound to be a recrudescence of activity in "commercially sponsored programmes," and stations like Radio Luxembourg will without doubt have a profound effect upon the future.

The stabilisation of the European plan of wave-lengths has resulted in a fourfold increase of average station power already.

If the bureaucrats and politicians continue to dominate the International Union, and if the 9-kilocycle separation therefore continues, receiving-set selectivity will increase enormously and quality will consequently suffer.

We shall, therefore, begin to forget quality, and a "good enough" result will satisfy us. This, and the increase of station power, and the growing boringness of the local station, and the fact of bright and interesting sponsored programmes will drive everyone to "listen foreign."

This may result in the B.B.C.'s greater complacency because the average listener will pay his 10s. to listen to foreign programmes.

Obstinate Officials.

Re-diffusion, in making multi-programme reception more and more acceptable, and in giving the listener service, may increase its power and scope enormously. This development is bound to be one inimical to the present B.B.C., whereas it should in fact be co-operative with the B.B.C.

All its sponsors desire it to be so, but are met so often by an obstinacy of official view which makes them despair of progress.

A Pathetic Sight!

It looks as if future development must be to make the listener more and more independent of the B.B.C. It looks as if foreign programme listening will increase enormously provided the manufacturer can learn to design sufficiently selective sets giving reasonable results, and provided the re-diffusion people can do the same.

It looks as if sponsored programmes must be tried, and if successful will profoundly influence development. It's all so terribly interesting.

It does seem pathetic to see the B.B.C. crayfish thinking he is swimming in a way entirely determined by his own free will, when really there are forces, unknown to him, which make his angle appear to the balanced observer quite cock-eyed.

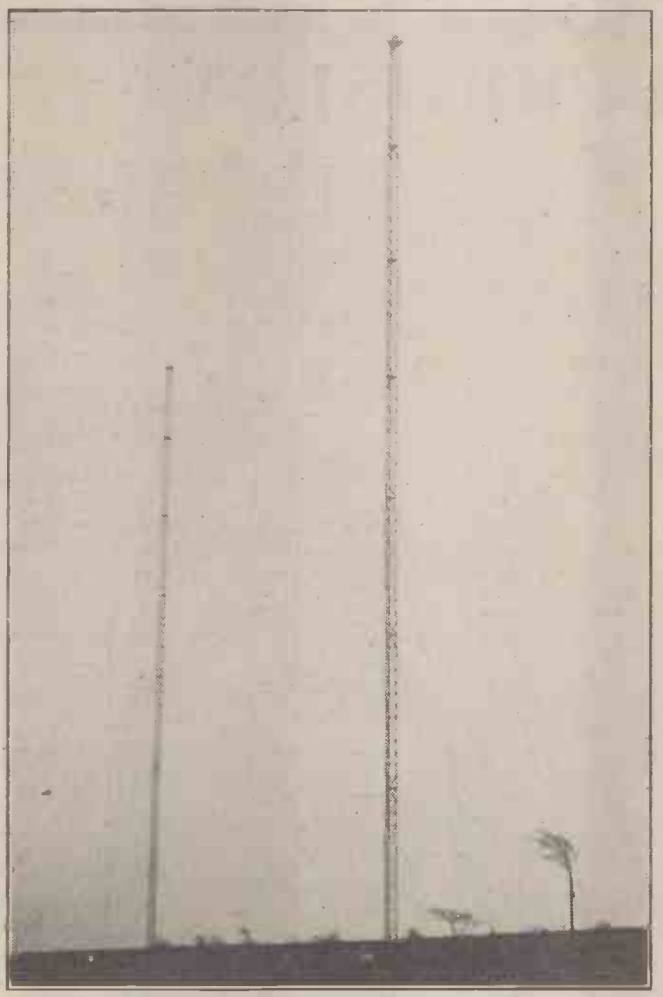
But I began by telling you that when you read this I should be upside down!

But one thing is good—we have POPULAR WIRELESS, independent of rings and politics and the B.B.C., circulating more widely than any wireless journal in the world. By this means there is always a possibility of fine healthy criticism and encouragement to all engaged in the great adventure.

I am as optimistic and enthusiastic as ever.

Broadcasting develops in spite of the bureaucrats and because of the (intelligent) technicians.

SCOTLAND'S NEW SUPER STATION



Probably many readers already know that Captain Eckersley, as Chief-Engineer of the B.B.C., was the originator of the Regional Scheme. It will be interesting to see what course he advises the Australian Government to take in their re-organisation of broadcasting, and no doubt he will have some interesting news for readers when he returns home. This photograph is of the masts of the new Scottish station, now testing at Falkirk.

CORRESPONDENCE

Blue Sparks!—A "Cosmic" Tribute—The "Eckersley" Three.

SPARKS PRODUCED BY RAIN.

The Editor, POPULAR WIRELESS.

Sir,—I wonder whether any of your readers have experienced the following? My wife suddenly gives a call that blue sparks are flying about my set. I gazed upon it, and began to wonder what was happening.

I immediately switched off and removed the H.T. + lead. Sparks were, however, still observed. I then suspected L.T. shorting. These I removed. I then tried grid bias. After removing all batteries I was surprised to find that my aerial tuning condenser was still sending forth brilliant blue electrical flashes.

It then dawned upon me that my aerial wire must be touching a live electric wire outside. Such, however, was not the case. I then had to admit that I was beaten. However, out of curiosity, I thought that I would take the aerial from the set. Lo and behold, I dropped it very quickly. I then picked up the aerial wire with two pieces of ebonite, and placed my finger near the covered part of the wire. I received another shock.

Can you or your readers say why suddenly this strange happening should manifest itself during the past eight days? Let me add that these disturbances only take place when it rains.

Yours faithfully,
T. J. HAWKIN.

High Street,
Bordon Camp, Hants.

[EDITORIAL NOTE.—The sparks are no doubt due to rain from charged clouds striking the aerial wire. They impart their charges to the wire, which eventually builds up a sufficiently large charge to spark to earth. The effect has been noted before when thundery conditions appertain and sudden heavy showers have fallen.]

"COSMIC"—YOU COULDN'T WISH FOR A BETTER!

The Editor, POPULAR WIRELESS.

Dear Sir,—As a regular reader of your paper I must write and congratulate your marvellous set "Cosmic" Three. I have built it, and it is all you have said about it. I don't think anyone could wish for a better set! Wishing your paper every success, I remain

A satisfied reader,
W. GOSS.

Bourne End,
Bucks.

DISTANCE AND QUALITY WITH THE "ECKERSLEY" THREE.

The Editor, POPULAR WIRELESS.

Dear Sir,—At last I'm writing to thank Captain P. P. Eckersley for his wonderful "three." I put it down just before Easter, and without doubt it's the best "three" I've handled, and I've built a few since the first!

I've altered the "Eckersley" Three slightly. The two L.F. stages are transformer coupled, with a choke output, with 75 volts on the detector and 120 volts on the last. The quality is grand.

The first Sunday after I finished it, which was a good night, I had 64 stations on the speaker on the medium waves, which with the usual eight on the long waves is pretty good going. I'm sure that can be beaten this next winter.

My speaker is a low-note speaker, 6 feet high, made by myself out of metal, not wood (my trade).

Here's wishing continued success to the "blue and gold."

Yours sincerely,
H. J. HARPHAM.

59, Sharrow Street, Sheffield.

LISSEN

Used in the beginning— and used 10 years after

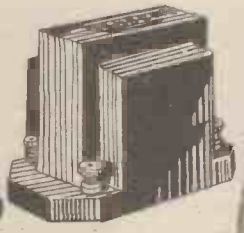
Unequalled for Power & Purity says P.W.

The "Decade"—the "Popular Wireless" 10th Birthday Set—is "unequalled for power and purity," the designers claim. As in the early days of radio Lissen parts were the basis of the best sets, so again 10 years later you find Lissen parts preponderating in the "Decade." There is a Lissen Torex Transformer in it—a Lissen Variable Condenser—a Lissen H.F. Choke.

IN THE 'DECADE'

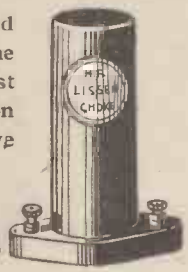
LISSEN TOREX L.F. TRANSFORMER

This Lissen Torex Transformer makes a big cut in the cost of any set without sacrifice of quality. It is a high-grade silicon steel core transformer, giving remarkably even amplification over the whole band of audible frequencies. A neat, compact component; its moulded bakelite case is hermetically sealed and completely insulates the windings. Proof against shorting, leakage, or moisture. PRICE **5/6**



LISSEN H.F. CHOKE

The Lissen H.F. Choke specified in this "Decade" set is one which will give the very finest results in any capacity reaction circuit, being equally effective over both wavelengths. Hermetically sealed. PRICE **5/6**



LISSEN VARIABLE CONDENSER

You have only to handle this improved Lissen Variable Condenser to desire to use it in all your set-building. See the die-cast frame, the one-piece spindles into which the vanes are solidly riveted, the unshakable rigidity of the whole construction, the clean-cut finish of the job. You have only seen this sort of condenser in the most expensive sets, but this Lissen Condenser is priced so that you *can* afford it. ·0005 mfd. **4/6**

LISSEN LIMITED, WORPLE ROAD, ISLEWORTH, MIDDLESEX

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found—?

CONCERNING CURVES.

IT is the opinion of many technicians that no great purpose can be served by the practice of firms publishing curves and other such technical descriptions of their products.

The argument is that curves, etc., can be misleading to those who are unable properly to interpret their real significance.

There is a lot to be said for this point of view, but when all is said and done the fact remains that an N.P.L. curve of, say, an L.F. transformer does tell an authentic story of the component's qualities.

From it the expert can immediately read the frequency characteristic and the general amplification efficiency of the transformer.

And so, when a firm includes an N.P.L. curve of its L.F. transformer in advertisements or in the packing cartons, you can be pretty sure they have no reason to fear knowledgeable criticism.

"Slektun" Products, Ltd., have adopted this course with their "Slektun" L.F. transformer (1-3 ratio), and, moreover,

A GOOD TRANSFORMER

The "Slektun" L.F. Transformer carries a 3-year guarantee.

they give a three-year guarantee against faults developing in it. This latter, in view of the notorious unreliability of not a few transformers, is a practical expression of confidence which constructors should welcome.

I have, personally, tested a "Slektun" L.F. transformer and I find it to be just as good as it should be, judging by the favourable N.P.L. curve issued for it. There is little falling off below 100 cycles (where most outfits don't function, anyway!), and a consistent and even rise from 500 to 5,000, free of peaks, which is, of course, just what most of us want.

A TELSEN VALVEHOLDER.

The word "universal" as applied to a radio component always strongly appeals to me, as no doubt it does to most other radio enthusiasts, especially in these days of trade depression and financial stress.

"Universal" implies the exact opposite of "specialised" and who wants to pay good money for a special article for a special job if the same job can be done by something with other uses?

UNIVERSAL

Telsen's new valveholder for either vertical or horizontal mounting.

The Telsen "Universal" Valve-holder retails at 9d. and it can be mounted either vertically or horizontally, so its applications are not restricted to normal constructions.

That is what I call an example of real value for money! It is a well-made component, too, and it takes a valve with just that right degree of firmness indicating good contacts and easy removals and insertions.

LANCHESTER "B.o.B" LOUDSPEAKER.

The chassis of the new Lanchester permanent magnet moving-coil loudspeaker costs only 20/-. An output transformer for use with it retails at 5/6; and the complete instrument fully assembled in a cabinet and all ready for use with any ordinary set costs 26/-.

Rather extraordinary figures, aren't they? To which you may well respond, "But is this a moving-coil speaker as we know such things to be, or is it merely a feeble travesty?"

A practical answer to that is to be found in the Free Trial Offer, for Lanchester's Laboratories will let you have one for 14 days in order to try it, and will refund your money without question if you do not find the instrument to your liking.

And the reason why they can sell the speaker at such low prices is because they deal direct with the public.

I should be failing in my duties to "P.W." readers if I said this "B.o.B" speaker was one of the best I have heard. It is not; but, remembering the price, I must say I consider it a sterling proposition and one which radio enthusiasts should investigate for themselves.

THE "GARD" LIGHTNING ARRESTER.

The risk of lightning striking a radio aerial and doing real harm is a small one, and during the whole of my two decades of radio, including four years in the East, where thunderstorms of great intensity frequently occur, I have not once encountered a single case of lightning damaging an unearthed radio set. And has any one of the world's one hundred million wireless listeners received injury by this means?

I don't remember a case, and yet . . .

Yes, that is just the point—we who do not earth our aerials during thunderstorms inevitably suffer from pangs of doubt. And it is certain that this doubt is shared by insurance companies!

But safety, complete safety, is so easy to assure. For but one shilling and sixpence Graham Farish sell the "Gard," a small article which, once connected in circuit, can be forgotten.

You join one of its terminals to the aerial wire, and the other to earth, and after that it remains a perfect safeguard.

There is no need to switch off during a thunderstorm, for a heavy charge in the aerial would jump the tiny gap in the "Gard" and thus be dissipated.

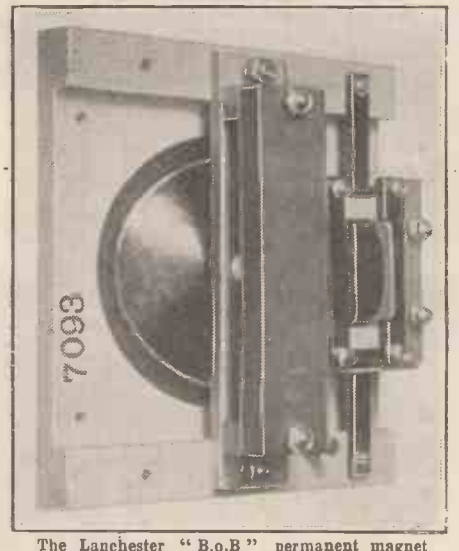
Who would want to risk the possibility of being the world's most unlucky listener and getting a real "packet" from the air when a simple precaution like this provides complete immunity?

Now, I should mention that I gave my sample "Gard" a good weather-resisting test; I had it connected to our Tallis House aerial where it encountered a good five weeks of London's sooty atmosphere and weather conditions. This test enabled me to judge that the "Gard" should be able to stand up to its work almost indefinitely.

APPARATUS IN HAND.

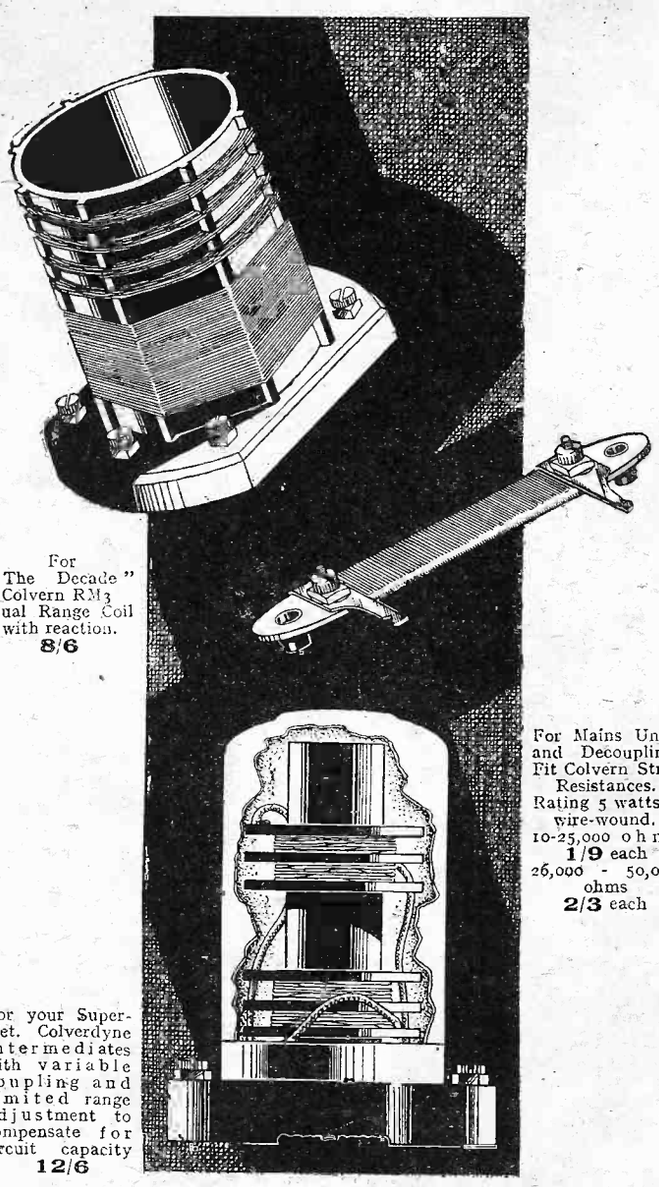
Among the interesting apparatus in hand for reviewing on this page are the New Lissen Triple-Range Short-Wave Coils, various novel and useful Wearite components, a Bulgin Potentiometer, a Wates Rotary Converter, and a Donophone Loudspeaker.

AN INEXPENSIVE SPEAKER



The Lanchester "B.o.B" permanent magnet moving-coil speaker chassis with transformer.

Colvern components for every receiver.



For "The Decade" Colvern RM3 Dual Range Coil with reaction. **8/6**

For Mains Units and Decoupling. Fit Colvern Strip Resistances. Rating 5 watts—wire-wound. 10-25,000 ohms **1/9** each 26,000 - 50,000 ohms **2/3** each

For your Super-Het. Colverdyne intermediates with variable coupling and limited range adjustment to compensate for circuit capacity **12/6**

● Colvern coils are available for every type of modern receiver. The leading designers specify Colvern components and the confidence they place in them is a sure guarantee of their excellence and reliability. Wherever the best is needed, the choice always falls on Colvern.

COLVERN LIMITED

MAWNEYS ROAD, ROMFORD, ESSEX.

"Never mind—come in and hear it on my set. I've just put in a new Drydex"

THE Exide DRY BATTERY

Made entirely in England, employing British Labour and Capital

Obtainable everywhere from all good dealers in sizes and types to suit every wireless set. Also for torches, cycle lamps and bells. For wireless low tension use Exide 'C' or 'D' Type Batteries.

Exide Batteries, Exide Works, Clifton Junction, near Manchester. Branches at London, Manchester, Birmingham, Bristol, Glasgow, Dublin and Belfast.

Dx 66

SHORT-WAVE NOTES

By W. L. S.

There seems to be so much interest in the short waves now—despite the dull conditions—that extra space has been allotted this week to our popular contributor for his survey of this fascinating branch of radio reception.

CONDITIONS undoubtedly are remaining on a very poor level this year for reception of anything but the more powerful broadcast stations. Real long-distance work by the "hams" has come to a stop since the series of tests during February and March, and has been replaced by a period of expectant waiting!

But there is no reason to worry; spells of bad conditions can be surmounted by the use of better transmitters and receivers, and from what I know of the short-wave man he never says "die"!

I was reading an article recently on the rather tender subject of our weather. The author put forward the novel point of view that we should regard the natural state of our climate as *rain*, and that anything more pleasant should be looked on as a heaven-sent and unexpected blessing.

Don't be a Pessimist!

If folk would only dress the part, he argued, rain need not be unpleasant, and we should appreciate what little fine weather we do get a hundred times more.

Surely this doctrine can be applied to short-wave radio? The conditions existing just now must be looked upon, not as bad, but as *normal*. A slight improvement will make them positively good, and a real improvement excellent. So let us get down to the job of improving our receivers right away.

Readers of "P.W." certainly don't seem to be of a pessimistic tendency, for I still receive stacks of letters from old hands, medium hands and raw novices. All are full of enthusiasm, and the only general complaint is that the bite of the "short-wave bug" is particularly venomous just now. The effects are acute and last for a very long time.

I. B. (Lincoln) has just succumbed to it, and appears to like it. He finds W 2 X A D and W 8 X K very good, like most of us. W 8 X K, by the way, on his 19·72-metre wave, usually announces in frequency only —15,210 kc.

The Twenty-Metre Yanks.

W 2 X A D's wave and frequency are 19·56 metres and 15,340 kc. Both stations, as I predicted in the face of strong opposition, come over very well until midnight.

Radio Roma's new setting on 42·9 metres appears to be very successful, but he has badly shaken the amateurs on their 41·2–42·8-metre band. Representations on behalf of the amateurs have been made to him by more than one government, as a result of which we shall probably notice a slight shift before long. He is also active again on 25·4, which may mean that 42·9 metres will be quiet by the time these notes appear.

A. L. M. (Bristol) reports an excellent and unusual bit of reception. On 49·43 metres he logged V E 9 C S (Vancouver, British Columbia) between 6.45 and 7.45 p.m. Signals were rather weak, but he followed the musical programme and talks for the full hour.

This seems a fine performance to me, for I know how difficult it is to find anything from the west coast of the United States, and Canada is a harder proposition still. Congrats to A. L. M. Who will follow him up? The station is, of course, just above U O R 2 (Vienna).

THE HAT TRICK!

Motor bandits will not approve of this new portable receiver which may be issued to London policemen. By means of a tiny set and cone speaker in the helmet, and a pocket battery, Scotland Yard could keep in touch with any officer on duty.

Two more readers qualify for "H.A.C.," in the persons of W. J. C. (Maidenhead) and E. S. W. (N. Finchley). The ranks are swelling fast, and we shall have to arrange a grand meeting of members "on the air" one of these days.

It is strange how this "single-valve" business grows on one. I am nearly snowed under by letters in praise of my own "one," which was surely the most ordinary and un-original short-wave set ever made! Readers really are beginning to find out for themselves that a quiet background is more useful than much fine noise.

One of the single-valve enthusiasts, W. T. (Hastings), reports a newcomer in the shape of W A J, on 13,480 kc. (about 22.26 metres). This must be the station that mystified me a few evenings ago. He is just above the 20-metre amateur band, and comes over at tremendous strength, but his programme time is irregular.

Those who are still inquiring about the Radio Amateur Call-Book, and "How to Become a Radio Amateur," should note that these publications can be obtained from Mr. F. T. Carter, Flat A, Gleneagle Mansions, Streatham, S.W., or from the R.S.G.B. Headquarters. The Call Book is published quarterly, and contains lists of short-wave stations, apart from the amateurs.

A Difficult Question.

G. S. (Halifax) wants me to tell him his tuning range, given the facts that W 3 X A L, Moscow ("Solanka"), and an Amsterdam station on 80 metres arrive near the top of his dial. At a very rough guess, G. S., I should say that you might be getting down to 32 metres or so, but unless you can give me more details I'm afraid the answer can't be much more than the proverbial lemon.

I mention this because it is a terribly difficult matter for me to try to put readers straight in this way without knowing the most intimate details about the set. The only thing to do is to find your own way about by logging everything you hear and comparing it with one of the published lists of short-wave stations.

Alf Mann (Middlesboro'), who is Ariel's particular friend-in-the-ether, writes me a nice long letter condemning "swank" by readers, and suggesting that they would be better employed identifying new stations and helping on those who aren't so clever! I quite agree with him!

Who Wants One?

He also wants a short-wave heterodyne wavemeter, since his own first attempt behaved "like Old Man River, and didn't say nothin'!" We will look into this. As a matter of fact, I know that I promised to describe one many months ago, but the demand appeared to be so small that I let the matter drop.

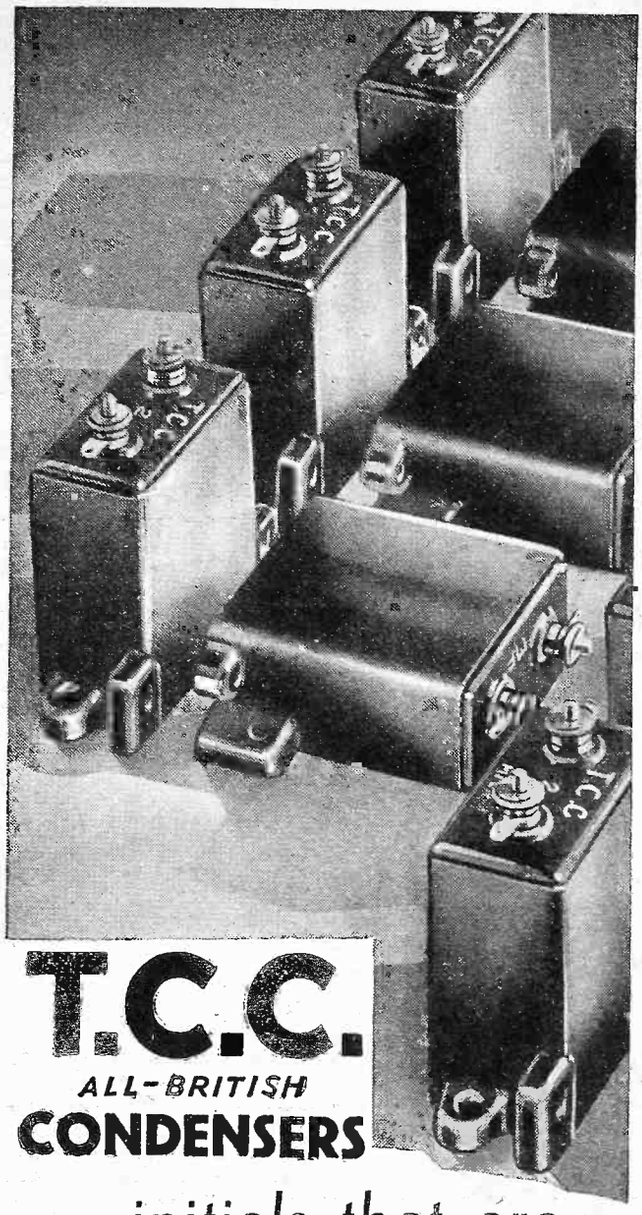
After all, a heterodyne wavemeter is simply another one-valve receiver, slightly modified and calibrated. Meanwhile, A. M. suggests that anyone in need of a job should try and identify all that he hears between 45 and 50 metres one evening. Right, A. M.! I'll do it myself.

Will readers please note that I cannot possibly undertake to act as an information bureau to the extent of identifying long lists of transmissions? The Call-Book does this for one very efficiently, and, much as I should love to write to every reader personally, the pile of letters usually confronting me makes such a proceeding quite impossible. Thank you!

For The Early "Birds"!

In concluding, I might mention that a short spell of fine, sunny weather may possibly have a beneficial effect on DX reception. I have always found that at this time of year fine weather goes with good conditions, particularly in the early mornings.

By the time you read this there is a chance that the period from 06.00 to 08.00 B.S.T. will be quite lively, even if the rest of the day is dead. One or two separate mornings have shown distinct promise already, and "freak" evenings for American broadcast are fairly frequent.



T.C.C.

ALL-BRITISH CONDENSERS

—initials that are your safeguard

YEARS of unfailing service have won for T.C.C. Condensers a reputation second to none. In every specification — in every set, where unquestioned reliability is demanded, there will you find T.C.C. Condensers. When you want a condenser—for any purpose — "by-passing," smoothing, decoupling etc., insist on "the condenser in the green case"—in the knowledge that T.C.C. stand 'four-square' behind their every product.

A group of 2 mfd. Non-inductive type 50 condensers are shown above. These condensers are particularly suitable for sub-chassis or base-board wiring by reason of their double-mounting brackets. Price 3/10 each—other capacities in this type from .005 to 2 mfd. Working Voltage - - 200 D.C.

The Telegraph Condenser Co., Ltd., Wales Farm Road, N. Acton

573

The DOOM of "BOOM"!

Flawless reception is impossible while undesirable resonance and "boominess" are present in your Loudspeaker.

The Howe Box Baffle definitely eliminates them and gives you perfect quality of reproduction.

The Howe Box Baffle is scientifically and acoustically perfect. It is bound to improve your reception.

The B.B.C. Year Book says "Actually, the results obtained from a Loudspeaker thus treated are . . . superior to those obtained using a flat baffle."

Any home constructor can fit a Howe Box Baffle. It requires no alteration to your set and no technical knowledge. The Kit contains full instructions and every single item required to construct it. Price, including royalty, **20/-** delivered free.

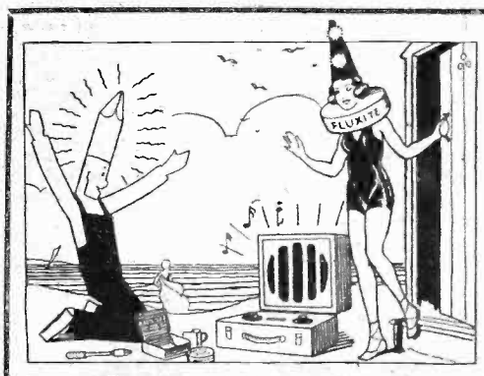
Don't put up with anything but the best any longer. Ask your dealer or post this coupon for full particulars to **F. McNeill & Co., Ltd., Radio (Dept. 2,) 16, Lamb's Passage, Bunhill Row, E.C.1.**

The Howe Box Baffle Kit

The Doom of "Boom"

Not suitable for Portables.

POST THIS FOR FREE BOOKLET
To F. McNEILL & Co., Ltd., Radio Dept. 2, 16, Lamb's Passage, Bunhill Row, E.C.1.
Please send me details of the Howe Box Baffle Kit.
Name.....
Address.....



"We're Fluxite and Solder, the reliable pair,
Famous for Soldering — known everywhere!
See that we're with you—when out on that trip,
Avoid disappointment—have that musical 'dip'!"

See that Fluxite and Solder are always by you—in the house, garage, workshop—anywhere where simple, speedy soldering is needed. They cost so little, but will make scores of everyday articles last years longer! For Pots, Pans, Silver, and Brassware; RADIO; odd jobs in the garage —there's always something useful for Fluxite and Solder to do.

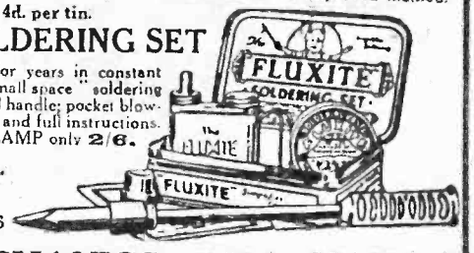
All Hardware and Ironmongery Stores sell Fluxite in tins, 8d., 1/4 and 2/8.

ANOTHER USE FOR FLUXITE
Hardening Tools and Case Hardening. Ask for Leaflet on improved method.

NEW "JUNIOR" SIZE, 4d. per tin.

FLUXITE SOLDERING SET

Simple to use and lasts for years in constant use. Contains special "small space" soldering iron with non-heating metal handle; pocket blow-lamp, Fluxite, Solder, etc., and full instructions. COMPLETE, **7/6**, or LAMP only **2/6**.

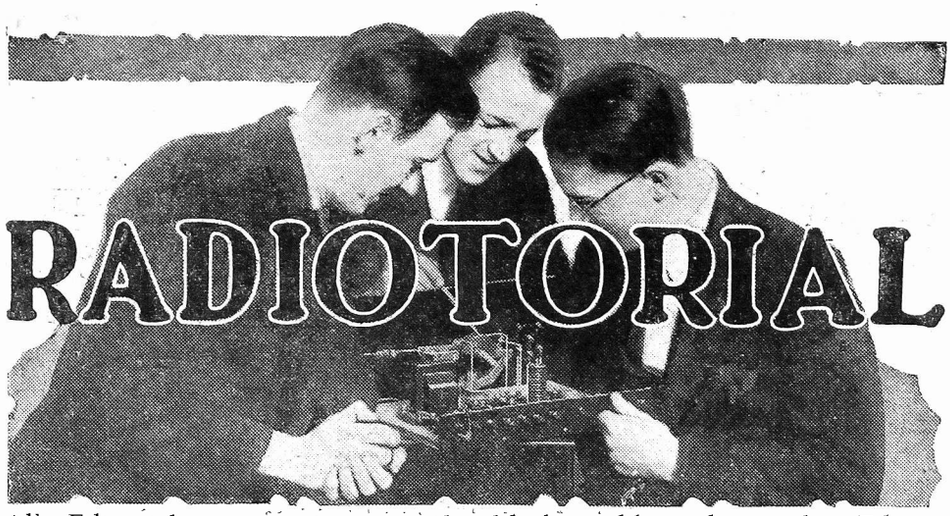


FLUXITE LTD.
(Dept. 324),
ROTHERHITHE, S.E.16

ALL MECHANICS *WILL* HAVE

FLUXITE

IT SIMPLIFIES *ALL* SOLDERING



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 specialties 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.

QUESTIONS AND ANSWERS

WAVE-CHANGE SWITCH WIRING FOR THE "COSMIC" THREE.

"REGULAR 'P.W.' READER" (Cleckheaton).—"Can you explain how to wire the 'Cosmic' Three with a change-over switch, to use ordinary ·0005 tuning condenser instead of Extenser? I know a few friends around here at Cleckheaton who would build it if they could use their old condensers."

An ordinary ·0005-mfd. tuning condenser can be used in place of the Extenser if a wave-change switch of the correct pattern is used in conjunction with the tuning condenser.

The pattern of switch in question is one commonly known as a "three-spring" switch. But sometimes it is known by other names, and on the other hand, a number of "wave-change" switches are useless for the purpose.

To make sure of getting the right kind of switch, all you have to do is to notice the action. What you need is a switch which has four leads going to it, and in one position—which we will call the "off" position—all these leads are separated from one another.

But when the switch is changed over to the "on" position all the four leads are in contact with each other. You can soon tell if you examine the switch carefully whether it fulfils these conditions, viz., one position all contacts together, other position all contacts separate.

Now to connect up. It is very easy indeed.

First you will need to mount the switch near where it is to be used. Remember the word near—the very long, straggly leads sometimes used are very inefficient.

A good place would be directly under the Moderator condenser. Or if it is a new panel you are drilling and you wish it to look balanced, you can move the on-off push-pull switch over to the right a couple of inches (looking at the front of the panel) and then put the wave-change switch over two inches to the left of the centre, to match.

The actual connections are: One contact on switch to moving vanes terminal of the tuning condenser. (The "fixed" terminal of this (F.), and also the other, "moving" terminal (M.) connections are just the same as in the blue print.)

A second contact on the switch goes to moving vanes of the Moderator condenser and to 1 on the dual-range coil.

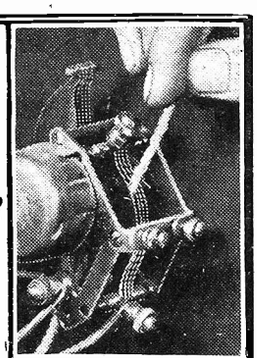
The third switch contact (it does not matter which one you call the third, so long as it is one of those remaining unoccupied) goes to No. 3 on the dual-range coil.

If you have proceeded right you will now have one empty terminal or connecting point on the switch and this goes to the bottom terminal of the Moderator coil. That completes the alteration.

It should be noted that when an ordinary "three-spring" switch is employed, the fourth contact is provided by a flex lead connected to the plunger of the switch, the other three contacts coming one from each spring.

WHAT'S WRONG?

IS IT THE VARIABLE CONDENSER?



Modern variable condensers are thoroughly sound jobs, but they have their little ailments sometimes.

* * *

Dust between the plates, for instance, will often cause crackling noises. A pipe-cleaner is handy in such cases, but the better plan is to keep the set covered and free from dust.

* * *

And sometimes a larger fixed condenser (say a ·001-mfd. fixed) will aid in cutting out reaction condenser noises, if joined in series with the variable reaction condenser (in either lead).

AERIALS NEAR THE PIGEON-LOFT.

A Manchester reader raises an interesting question in connection with pigeon fanciers and radio. He tells of the loss of valuable birds through flying into wires which they cannot see, and asks what can be done to protect the birds from this danger.

We must confess to some considerable surprise at this question being raised again, as there is a very simple and effective remedy which costs nothing. And we thought that all pigeon fanciers knew of it, as considerable prominence was given to it in their own as well as in wireless journals when the rapid increase of aerials some years ago shed light on the distressing frequency with which the birds could be damaged by flying into wires.

The remedy is simply to make the wires clearly visible by putting corks along at intervals. Just as they do on telegraph wires near game preserves.

The corks make no difference at all to reception, but the birds see them easily and will always avoid a wire so treated. So any set owner whose aerial is near a pigeon-loft should—even if not asked to by the pigeon owner—slip a few corks on the wire at intervals of 4 or 5 ft. before it is put up, or when it is down for overhaul.

And should it happen that the man who keeps the pigeons is an objectionable sort of person, who deserves all that's coming to him—well, put the corks on, just the same. Because it's the pigeons that fly into the wire and get hurt, and nobody wants to be party to injuring them, even if their owner isn't a particularly agreeable soul.

It is not necessary, of course, to thread the corks on. Drill a hole through their centre, and then cut through to it on one "side". The corks can then be sprung on.

WHAT IS A MILLIAMP?

L. J. A. (Berwick).—"Trying to work out a little calculation of voltage drop has reminded me that my schooldays are a long way back. And I do not know how I shall do it after all unless you explain to me the decimal point position which is equal to 1 milliamp.

"Is it ·01 or ·001 ampere?"

"Milli" means one-thousandth, so 1 milliamp is $\frac{1}{1000}$ amp., or expressed as a decimal, ·001 amp.

Just as a reminder we show below the value in fractions and in decimals of other commonly used quantities, namely ·5 m/a, 2·5 m/a, 10 m/a, 50 m/a and 100 m/a.:

·5 milliamps	=	$\frac{0.5}{1000}$ amps.	=	·0005 amp.
2·5	=	$\frac{2.5}{1000}$	=	·0025 amp.
10	=	$\frac{10}{1000}$	=	·01 amp.
50	=	$\frac{50}{1000}$	=	·05 amp.
100	=	$\frac{100}{1000}$	=	·1 amp.

These examples will serve to remind you that the *first* figure after the decimal point represents *tenths*, the *second* figure *hundredths*, the *third* figure *thousandths*, and so on.

THE "S.Q. STAR."

T. W. (Colchester).—"I am very taken with the 'S.Q. Star' in 'P.W.' Christmas Number, but I see there was an article preceding the description of the set that I should like to read also. What week was that, and where can I get the back issue?"

The article was in "P.W." No. 495, dated November 28th, 1931.

Back numbers of "P.W." which are still in print can be obtained direct from the publishers in cases of difficulty. The address is The Amalgamated Press, Ltd., Back No. Dept., Bear Alley, Farringdon Street, London, E.C.4. The price is 4d. per copy of "P.W.," post free.

(*Continued on page* 388.)

HOW ARE YOUR RESULTS NOW?

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.

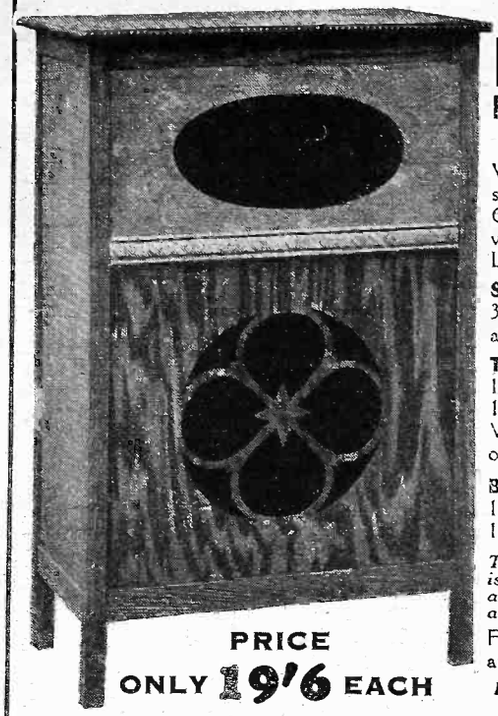
Full details, including scales of charges, can be obtained direct from the Technical Query Dept., POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

A postcard 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.

AN AMAZING OFFER

Available While Our Present Stock of Timber Lasts.



THE

LANGMORE RADIO CABINET

No. 8A.

Very strongly constructed of selected Oak and Plywood with the well-known Langmore Finish.

Size Overall: 33" high, 21" wide and 12½" deep.

Top Section: 10" high, 18" wide, 11" deep inside. Wooden panel with oval opening 12" × 5½"

Bottom Section: 16" high, 18" wide, 11" deep inside.

The whole of the back is removable so that all parts are easily accessible.

Fitted with hinged lid and baseboard.

Beautifully Finished Jacobean Oak.

PRICE ONLY 19/6 EACH

CARRIAGE PAID TO ANY ADDRESS IN GREAT BRITAIN

THE MISCELLANEOUS TRADING Co. Ltd.

13 & 17 NEW OXFORD STREET, LONDON, W.C.1

'Phone: Holborn 4894.

The Dubilier type 670 is designed expressly to fill the need for a high quality, low priced Condenser. Tested 500 volts A.C. Suitable for 250 volts D.C. working. Capacities .0001 mfd to .006. Prices from 1/-

DUBILIER ON A CONDENSER IS LIKE THE HALL-MARK ON GOLD

CB

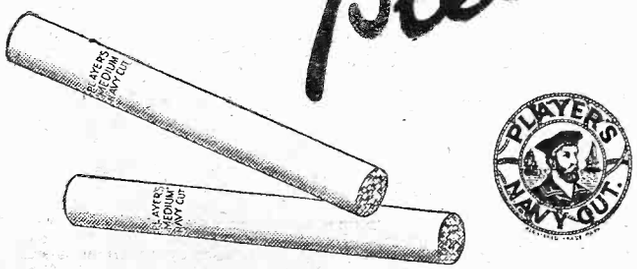
DUBILIER CONDENSER CO. (1925) LTD.

Ducon Works, Victoria Road, North Acton, W.3

THE MILLIONS WHO SMOKE THEM MUST BE RIGHT

They say

Player's Please



The Quality and Quantity Cigarette

NCC 104 B

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 386.)

A LEVIATHAN OF THE WAVELENGTHS.

Referring to a query sent in by "Jason," of Croydon, about the wavelengths used by the "Leviathan," a Streatham reader kindly gives the full range of wavelengths officially allotted to this vessel, numbering 24 in all!

These are given below, and our correspondent—Mr. F. L. Carter, Flat A, Gleneagle Mansions, Streatham, S.W.—obligingly says: "These are taken from the Berne Lists, and if your correspondent wants any more you can put him on my track."

"Leviathan's" wavelengths: 17·007, 18·007, 18·094, 22·71, 27, 27·15, 33·98, 36·01, 36·19, 54, 54·3, 71·8, 95·9, 600, 640, 705, 750, 800, 1,875, 1,885, 1,910, 1,960, 1,985, 2,100—all in metres.

MAKING THE "COSMIC" ONE SHORT-WAVE COIL.

For the short-wave coil unit, which is wound on a Goltone standard short-wave former with six-terminal base, you will require about a yard of No. 18 gauge tinned-copper wire and a quantity of No. 30 D.S.C. (If you get an ounce reel of the latter you will have sufficient left over for the Moderator coil as well.)

Commence the winding of the short-wave coil with two turns of the 30 D.S.C. wire, which should be positioned approximately half an inch from the top of the former. By the way, with regard to the fixing of the ends of the windings on this former, the ideal way, of course, is to drill small holes in the ribs. But bakelite mouldings are very brittle, and unless you are very careful in the drilling process the chances are that the ribs will break.

For this reason you may find it best to secure the ends simply by giving them a single twist round the appropriate rib.

The main grid winding of the short-wave coil is done with the No. 18 gauge tinned copper wire, and it consists of four turns with an eighth of an inch spacing between each turn. The start of the winding should be commenced at a distance of three-quarters of an inch from the two-turn winding already on.

The third and last winding of this former consists of five turns of the number 30 D.S.C. closely wound, and at a distance of three sixteenths of an inch from the lower end of the grid winding. All three windings should be in the same direction.

When all these windings have been done, the next thing is to connect the various ends to the appropriate terminals on the coil base, and for this purpose you cannot do better than to refer to the accompanying diagram, in which the correct procedure is shown.

It would perhaps be as well for us to tell you how this particular short-wave unit should

(*Continued on page* 390.)

DO YOU KNOW—

—the answers to these questions?

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

(1) Why are the masts of the London Regional station at Brookmans Park only about 200 ft. high, whilst those at the North Regional and Falkirk are 500 ft. high?

* * *

(2) What is the characteristically Australian interval signal of the Sydney short-wave station, VK2ME, which works on 31·28 metres?

* * *

(3) Which station is Europe's most powerful transmitter on the medium waveband?

* * *

(4) In what order the electrodes inside a screened-grid valve are arranged?

* * *

(5) The wavelengths of the Pope's transmitting station, "Vatican City"?

The answers are given on page 390.

"P.W." PANEL No. 74. ABOUT THE VALVE.—D.C. RESISTANCE.

When a valve's filament is heated and a voltage is applied between this point and its anode, a current flows from filament to anode inside the valve.

* * *

The higher the applied anode voltage the greater the current (within limits), so the valve can be considered as having a resistance equal to the steady voltage applied divided by the current.

* * *

This is known as the valve's "D.C. Resistance." (It is *not* the "impedance.") For instance, a valve which passes one milliamp ('001 amp.) at 100 volts has a D.C. Resistance of $\frac{100}{.001}$ = 100,000 ohms.

THE MAGNADENSER

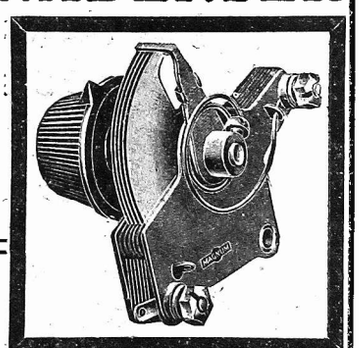
Specified for the

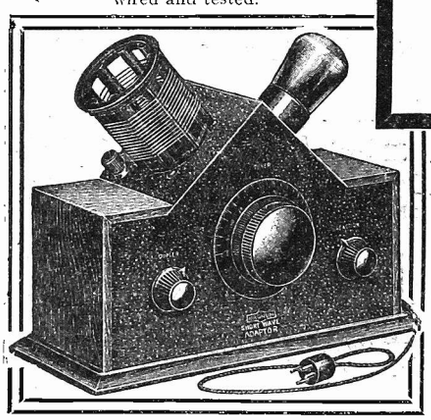
"DECADE" THREE

A solid dielectric variable condenser with a beautifully smooth movement, free of back-lash. One-hole fixing. Complete with knob and terminals.

·00075 3/-

The "Decade" Three is available ready wired and tested.





SHORT WAVES on A.C. MAINS or BATTERY SETS...

An entirely new design of amazing efficiency.

This Short-Wave Adaptor can be used with any type of receiver (excluding D.C.) whether A.C. Mains, battery operated or super-het. irrespective of the circuit or the number of valves. Price complete with 40/80 metres coil, cord and plug **39/6**

Extra Coil 18/40 metres, **3/-**

Send for lists, including particulars of the latest "Stenode," and a list of Short-Wave Stations, Free on request.

BURNE-JONES & Co., Ltd., "Magnum" House, 296, Borough High Street, London, S.E.1. *Telephone: Hop 6257 and 6258.*

Scottish Agent: Mr. Ross Wallace, 54, Gordon Street, Glasgow, C.1.

ARE YOU QUITE SATISFIED

With the results from your Radio? Six-Sixty Valve Service Stations give straight advice without obligation on all valve problems.

Let them tell you what modern valves would suit your set or show you if new or later types would improve your reception.

If you build your own sets use Six-Sixty valves and your local Service Station will help you to obtain maximum results.

Write to us for the address of your nearest Six-Sixty Valve Service Station and consult them on all your radio requirements

SIX-SIXTY

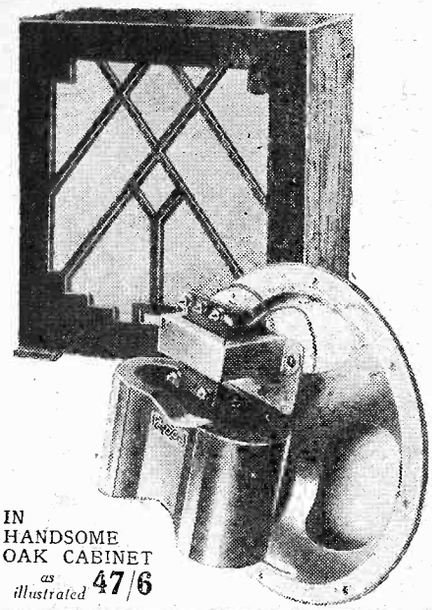
RVA RADIO VALVES & EQUIPMENT

Advt. Six-Sixty Radio Company Ltd., Six-Sixty House, 17/18, Rathbone Place, W.1

EPOCH

NEW 20th CENTURY MODEL (TYPE "20c")

P.M. MOVING COIL LOUD SPEAKER



IN HANDSOME OAK CABINET as illustrated **47/6**

FOR the past four or five years EPOCH MOVING COIL LOUD SPEAKERS have led the World for quality. Epoch developed Speakers which proved that it was possible to obtain all the brilliancy of the original performance with, at the same time, the exact amount of middle and bass response and with the crispness and life of the original. EPOCH SPEAKERS have hitherto been made chiefly in the highest and most expensive grades, but in response to a large number of inquiries for a high quality EPOCH SPEAKER at a lower price to suit the new popular-priced sets, the "20th CENTURY" model, described herein, has been developed.

The Speaker, in spite of its low price, can be highly recommended as a first-class article. The quality of reproduction is finer than many loud speakers selling at considerably higher prices, and will appeal to the most exacting. The sensitivity, too, is in excess of many energised moving coil speakers. It is a Speaker that will bring the joys of magnificent EPOCH REPRODUCTION into the homes of thousands where "EPOCH" was formerly only a name.

Ask your Dealer for it and don't be put off with a "Just-as-Good!"

If your Dealer does not stock it yet, send his name to the manufacturers.

Write for the interesting Epoch Booklet PS5a. It is *free*.

Daily comparative demonstrations at Exmouth House.

EPOCH RADIO MANUFACTURING CO. LTD.
Exmouth House, Exmouth St. London, E.C.1
At the Junction of Rosebery Avenue and Farringdon Road
'Phone: CLERKENWELL 6666 (4 lines).

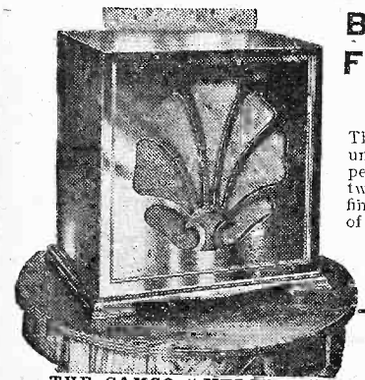
WORTH 35/- MORE
With 3-Ratio Input Transformer READY FOR USE

Model Aeroplane Chat

IF you are interested in model aeroplanes and wish to keep right up to date in all acroplane matters, you must write to MODERN BOY about it. Full particulars of what you have to do are given in this week's fine issue. Make sure of your copy *Now*.

MODERN BOY

Buy a copy TO-DAY. - **2d.**



THE CAMCO "MELODEE" CABINET.

BETTER RESULTS FROM YOUR SPEAKER

The Camco "Melodee" Speaker Cabinet under test, does definitely improve the performance of any unit housed in it. In two sizes, in Oak, Mahogany and Walnut finish from **22/-**. Write for FREE copy of the 24-page Camco Catalogue.

CARRINGTON MFG. CO., LTD.,
Showrooms: 24, Hatton Garden, London, E.C.1. *Phone: HOLborn 8202.*
Works: S. Croydon.

NAME.....

ADDRESS.....

.....P.W.36

Every CAMCO Cabinet bears the CAMCO Seal

Shave with PARKE-DAVIS Shaving Cream

and enjoy comfort

Use it for one week and you will always shave thus! That is why we gladly give you a seven-day tube of Parke-Davis Shaving Cream.

Wherever it is used it makes friends and customers; and the more you have tried different shaving soaps, sticks, powders and creams, the more you will be delighted with the comfort and efficiency of the newest perfect beard softener. Large tube 1/6. From Chemists only.

Made in England by the makers of Euthymol Tooth Paste.

7 days FREE Sample Tube

COUPON. *(Use block letters please)*
EUTHYMOL (125E), 50 Beak Street, London, W.1
Please send FREE sample tube Shaving Cream
Name.....
Address.....

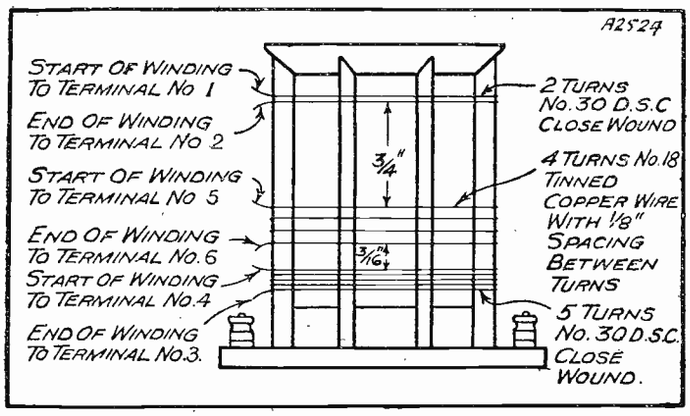
RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 388.)

be connected up, since the terminal markings are not quite the same as those shown in the original wiring diagram.

The beginning of the 2-turn (aerial) coil (terminal 1) is joined to the set's aerial terminal. The end of this winding (terminal 2) goes to one side of the Moderator coil and to one side of the ·00075 mfd., and to the plunger of the short-wave switch.

THE "COSMIC ONE" SHORT-WAVE COIL



Here are all the necessary winding and "connecting-up" details.

The beginning of the main grid coil (terminal 5) to the ·0003 grid condenser.

The end of this coil (terminal 6) to another contact of the short-wave switch and to 8 on the dual-range coil.

The beginning of the 5-turn reaction winding (terminal 4) goes to the ·0003-mfd. reaction condenser; and the end of this coil (terminal 3) to the H.F. choke and plate of the valve holder.

MAKING A MODERATOR COIL.

In the instructions for building the "Cosmic One" last week it was stated that brief details of the construction of the Moderator coil would appear in the "Radiotorial" columns in this issue. These details are given below:

The basis of the coil unit is one of our old friends, namely a "P.W." "Coil Quoit"—such as can be obtained for a few pence at almost every radio dealer's. And the wire of which the coil itself is composed is No. 30 D.S.C., of which only a few pennyworth will be needed, as there are to be only 35 turns in the complete coil.

To make the coil, fix the wire to the former by passing it a couple of times through a small hole provided near the end of the coil quoit; and be sure to leave 8 or 10 inches of wire.

What you want to make is a 35-turn coil with tappings at the 21st and 27th turns. Assuming you have fixed your wire to the former, as mentioned, you first wind on 21 turns, neatly and side by side. Do not break the wire at this point, but, holding it firmly in tension, twist a fairly large loop in it, to serve as a tapping point. And leaving this loop sticking out from the coil, carry on the winding, in the same direction, for another six turns.

Again do not break the wire, but make a second tapping loop, like the first. And then complete the coil by winding in the same direction another eight turns.

That makes 35 turns in all, so you finish off the coil by keeping it tightly in tension while you snip off the wire about a foot from the last turn, subsequently passing this end through the little holes in the former, and drawing tight, to fix the turns in position.

Now with a penknife, carefully scrape off the insulation from the wire at the tapping loops.

When these are bared so that a clip can easily make contact, the coil is completed and ready for mounting.

MODERN MAINS VALVES.

In a recent reference to this subject and to full-mains-voltage valves it was inferred that the Ostar-Ganz high-voltage types were not available to the public. This is incorrect, as large stocks are held by the sole representative for Gt. Britain, Eugen Forbat, c/o Nivalight (1928) Ltd., 1, Rosebery Avenue, London, E.C.1.

THE ANSWERS

—to the questions asked on page 388 are given below.

(1) **The Air Ministry regulations do not permit of masts higher than 200 ft. in the London area, but they do not apply to the other areas.**

(2) **The call of the kookaburra or "laughing jackass."**

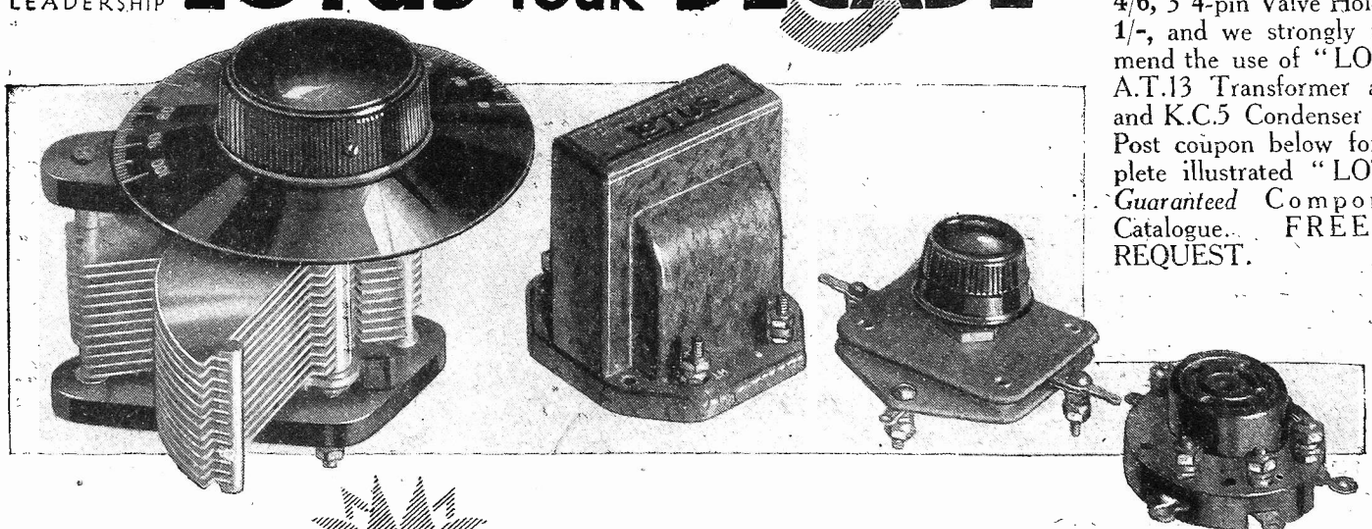
(3) **Prague, with 120 kilowatts, on 488.6 metres.**

(4) **Next to the filament is the control grid, then the screening grid, then the anode.**

(5) **19·84 and 50·26 metres.**

DID YOU KNOW THEM ALL?

You will be pleased you used LOTUS FOR YOUR 'DECADE'



The following *Guaranteed* "LOTUS" Components are specified for the "Decade 3": ·0001 Differential Condenser at 4/6, 3 4-pin Valve Holders at 1/-, and we strongly recommend the use of "LOTUS" A.T.13 Transformer at 5/6, and K.C.5 Condenser at 3/6. Post coupon below for complete illustrated "LOTUS" *Guaranteed* Components Catalogue. FREE ON REQUEST.

LOTUS *Guaranteed Components*

TO LOTUS RADIO LTD., MILL LANE, LIVERPOOL.

Please send me fully illustrated Catalogue of LOTUS GUARANTEED COMPONENTS.

Name: _____

Address: _____

Safety First

Protect your set, your home, your family from injury by lightning.

Fit a **"GARD"** between your aerial and earth. It only takes a minute and protects for all time. No interference with your reception of radio entertainment. Fit a **"GARD"** now and forget to switch off when lightning plays. **"GARD"** keeps it outside.

From all Dealers, or Post Free for 1/6.

TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio reception.

By Dr. J. H. T. ROBERTS, F. Inst. P.

Electric Clocks.

SOME little time back I mentioned the new synchronous A.C. electric clocks which are rapidly gaining popularity, and several readers have asked me whether these clocks are suitable for various types of electric supply, whether they are difficult to operate, and various other questions as to their timekeeping qualities, and so on.

With regard to the type of electric supply, the synchronous clocks naturally only operate on *alternating* current—they are not intended at all for *direct* current—and the clocks sold in each district by the Electric Supply Company's and also by the various stores and jewellers will all be of the proper voltage and periodicity for the electric mains of the district.

Time-keeping Capabilities.

As regards accuracy, this is absolutely the same as that of the frequency of the alternating-current supply, and as this is capable of being continually averaged up at the generating station in accordance with Greenwich time it means that the synchronous electric clock (provided it does not stop) will always keep Greenwich time. This, indeed, is the fundamental advantage of the whole scheme.

Of course, if the electric supply should fail at any time the clock will stop, and unless it is of the special self-starting type it will not restart when the current is resumed. But you are not likely to be misled by this, because when you look at the time on the clock you will at once notice if it is more than a very few minutes out.

Personally, I favour the *non*-self-starting type in preference to the self-starting, because if the supply fails for, say, five minutes, with the self-starting type the clock will go on and be five minutes wrong, whereas if the supply fails at all with the non-self-starting type the clock will remain stopped, and there is scarcely any likelihood of a mistake being made by the user.

Generally speaking, the self-starting type works on the synchronous induction motor principle, whilst the non-self-starting type incorporates a very simple form of tiny phonic wheel, having a fairly large number of teeth on the rotor, this rotating between the field windings excited by the alternating-current supply.

Theoretically, there is a possibility of the clock being started at twice or three times or half the normal speed, but in practice this is very unlikely to happen, and if it did happen the effect would be very quickly noticed, because, of course, the rate of movement of the hands of the clock would be multiplied or divided in the same way.

Photo-electric Cells.

Photo-electric cells have been greatly simplified and cheapened during the past few years. Originally, of course, these

(*Continued on next page.*)

PILOT AUTHOR'S KITS

Exact to Specification

CASH—C.O.D.—H.P.— *Immediate Delivery.*

The DECADE

Described in this week's issue.

KIT "A" Author's Kit less valves and cabinet

CASH or C.O.D. **£3-9-5**

or **12** monthly payments of **6/5**.

KIT "B" Author's Kit with valves less cabinet. CASH or C.O.D. **£4-15-5** or **12** monthly payments of **8/9**.

KIT "C" Author's Kit complete with valves and cabinet. CASH or C.O.D. **£5/10/5** or **12** monthly payments of **10/1**.

KIT-BITS *Selected Lines—Post Charges Paid on C.O.D. Orders value over 10/-.*

Set of Specified Valves	£1 6 0
Specified Peto-Scott Cabinet	15 0
Colvern Dual Range Coil, R.M.3	8 6
Lissen 0005 Variable Condenser with Formo Slow-motion Dial	9 0
Moderator Coil	2 6
Wearite 3-pole Change-over Switch (123)	4 0

EASIWAY ITEMS

COSSOR ALL-ELECTRIC MELODY MAKER, TYPE 235, Complete with Valves and Cabinet. Cash Price **£9/9/6.** Balance in **11** monthly payments of **17/4.** — Send **17/4** only

PILOT SELECTIVE FAMILY 3. An amazing 60-station set described by Maxamp in "Tit-Bits," May 7th, 1932. Less Valves and Cabinet. Cash Price **£3/5/0.** Balance in **11** monthly payments of **6/-.** — Send **6/-** Only

BLUE SPOT SPEAKER UNIT AND CHASSIS, TYPE 100U. Cash Price **£1/19/6.** Balance in **7** monthly payments of **5/5.** — Send **5/5** Only

EPOCH J.1 PERMANENT MAGNET MOVING-COIL SPEAKER with 3-ratio input transformer. Cash Price **£2/5/0.** Balance in **11** monthly payments of **4/2.** — Send **4/2** Only

ULTRA IMP PERMANENT MAGNET MOVING-COIL SPEAKER, with input transformer. Cash Price **£2/15/0.** Balance in **11** monthly payments of **5/-.** — Send **5/-** only

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

W.B. PERMANENT MAGNET MOVING-COIL SPEAKER P.M.3. Complete with 3-ratio input transformer. Cash Price **£2/12/6.** Balance in **11** monthly payments of **4/10.** — Send **4/10** Only

W.B. PERMANENT MAGNET MOVING-COIL SPEAKER. Type P.M.4 Complete with Transformer. Cash Price **£2/2/0.** Balance in **7** monthly payments of **5/9.** — Send **5/9** Only

R & A "100" PERMANENT MAGNET MOVING-COIL SPEAKER. Complete with multi-ratio input transformer. Cash Price **£2/17/6.** Balance in **11** monthly payments of **5/4.** — Send **5/4** Only

SEND 1/- ONLY PILOT ENVELOPE, SELECTIVE FAMILY 3 containing FULL SIZE BLUEPRINT, 5 PHOTOGRAMS, and List of parts with details of newly invented Simplified System of Home Construction for an AMAZING 60-STATION 3-VALVE RECEIVER.

PETO-SCOTT CO. LTD.

77, CITY ROAD, LONDON, E.C.1.

Dear Sirs, Please send me CASH/C.O.D./H.P.

.....

.....

for which I enclose £.....s.....d.

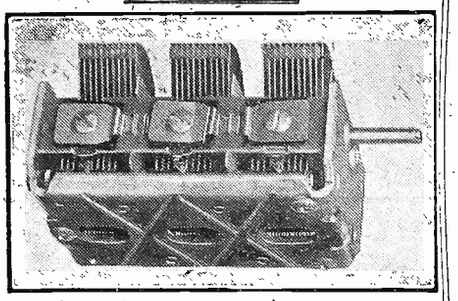
CASH/H.P. Deposit.

NAME.....

ADDRESS.....

P.W.4/6/32.....

DENOTES B.A.T. "QUALITY"
Regd. "BEST AFTER TEST" Regd.



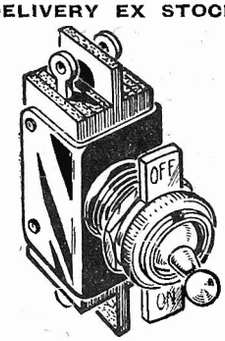
PRECISION GANGED CONDENSERS

OUR New "B.A.T." "TUB" (GANGED) CONDENSERS are precision built to the highest possible engineering standards. They are vastly superior to any other Tub-Condenser on the market. Their electrical efficiency is definitely stated and rigorously guaranteed, and "matching" is better than 0·3%. Girder Construction; Ball-bearing; extra bearing between each section; bonded rotor and stator sections; engined-turned one-piece rotor-shafting; shaft ¼" dia. × 1¼" extension; slotted end vanes; L.M.L. plates; jig-spaced plates (no "spacing washers," etc.), and VERY SMALL.

THESE unique Condensers are the result of over two years' patient laboratory research. Send to-day for **Free Illustrated Engineering Treatise. You are most strongly urged not to purchase any other make of ganged-condenser until you have thoroughly digested this most informative bulletin.** Also note that despite our "better," unique design, **our prices are below all existing competition:**

2-GANG, ·0005 mF - - only 14/6
3-GANG, ·0005 mF - - only 19/6
4-GANG, ·0005 mF - - only 28/6

DELIVERY EX STOCK.

3-AMP.  250-V.

"B.A.T." No. 2728 DOUBLE POLE SWITCH

A new D.P. Switch of usual "B.A.T." general "snappiness," and electrically perfect.

"INDICATING" as shown - - 3/6
No. 728. S.P. "ON-OFF" - - 1/6
No. 730. S.P. Terminals - - 1/9
No. 729. S.P. 2-Way - - 2/3
No. 161. SEMI-ROTARY (as in D.C. "W.W.3") - - - 2/6

12 pp. Booklet, numerous illustrations, with 24 exceptionally useful circuits, by return, or from all good dealers. BEWARE OF IMITATIONS OF OUR SWITCHES—THERE ARE MANY.

DOES YOUR SET SUFFER FROM HUM-M-M-M?

HUM in A.C.-Operated Radios, Amplifiers, etc., can immediately be either entirely eliminated or very seriously reduced by employing our well-known "ClarOstat" type H.D.-30, 30-Ohm "HUMDINGER"—and the cost is so moderate. ONLY 2/6.

CLAUDE LYONS LTD.

76, OLDHALL STREET, LIVERPOOL.
LONDON: 40, BUCKINGHAM GATE.

TECHNICAL NOTES

(*Continued from previous page.*)

cells were mainly used for television and talking-picture purposes, and most people had the idea that they were very "scientific" and not likely to be of much use for ordinary every-day purposes. They have been, as I say, so greatly simplified that now they can be obtained very cheaply in really robust units and used, one might almost say, with the same facility as a radio valve.

In case any of you who are new to radio may not be familiar with what is meant by a photo-electric cell, it is simply a device which is sensitive to light in such a way that the electrical output from the cell varies in accordance with the intensity or character of the light which falls on it.

Speaking broadly, the photo-electric cell may be described as a device for "converting" light energy into electrical energy. This popular description is not strictly correct, but it is sufficient for the present purpose.

No Auxiliary Amplifier Required.

Readers have several times asked me what sort of output can be obtained from a photo-electric cell as compared with the output from a radio valve, for instance. Perhaps it may help if I tell you that a modern inexpensive unit for home use, which I have recently been examining, gives about one microampere per foot-candle of light intensity. When this unit is exposed to direct sunlight the output is about 5 milliamps.

The resistance of the cell varies from about 1,500 ohms at 10 foot-candles light intensity to about 300 ohms at 240 foot-candles intensity. The unit is enclosed in a moulded bakelite case about 2 in. diameter and is fitted with a pair of valve pins for ready connection.

This particular cell requires no polarising or exciting voltage, and it will operate the relay directly without any auxiliary amplifier.

This last is a very important point, as most of the earlier types of photo-electric cell delivered such an extremely small output that some form of auxiliary amplifier was absolutely essential.

A Cheap Experimental Unit.

In addition to their use for talking pictures and television, photo-electric cells are now becoming increasingly used in connection with light-ray-operated devices (such as burglar-alarms and other protective devices, automatic street-lighting, and so on), the counting of various objects such as the product of a factory, the timing of objects such as motor-cars or aeroplanes in a race and a hundred-and-one other purposes.

There are several very useful photo-electric cells on the American market, and I notice that Messrs. Electradix Radio, of 218, Upper Thames Street, E.C.4, have a supply of special cells as used for cinema work which they are offering at a very low price, so that any of you who feel inclined to experiment in this direction can do so quite easily.

Nickel-Iron Transformers.

The nickel-iron core transformers, which are so popular to-day, have been on the

(*Continued on next page.*)

EASY PAYMENTS

"There's no place like HOLMES."

The first firm to supply Wireless parts on easy payments. Seven years' advertiser in "Popular Wireless." Thousands of satisfied customers.

		Deposit	Monthly Payments
TELSEN VICTOR 3 KIT	39/6	5/5	7 of 5/5
COSSOR KIT - - -	£6/8/6	10/-	11 of 11/11
OSRAM KIT - - -	£10/15	19/6	11 of 19/8
METEOR 3 KIT - -	£3/15	6/10	11 of 6/10
EXIDE H.T. Accum., 120v.	£3	6/-	9 of 6/8
BLUE SPOT 66R & CHASSIS - - - -	£2/2/6	5/6	9 of 4/5
BLUE SPOT 100 U - -	39/6	5/8	7 of 5/4
AMPLION M.C.6 - -	67/6	7/5	9 of 7/5
CELESTION M.C. - -	47/6	5/3	9 of 5/3
EKCO Eliminator A.C.18	67/-	7/5	9 of 7/5

New Goods Obtained for Every Order.

Send us a list of the parts you require and the payments that will suit your convenience, and we will send you a definite quotation. Anything Wireless.

H. W. HOLMES, 29, FOLEY STREET, Great Portland Street, London, W.1.
'Phone Museum 1414.

"ENGINEERING OPPORTUNITIES." This is a book you must not miss. It contains brilliant articles by Prof. A. M. LOW, our Employment Supdt., etc., shows how to pass A.M.I.Mech.E., A.M.I.C.E., A.M.I.A.E., I.E.E., M.I.M.T., Matric., G.P.O., and all other Exams, and outlines over 100 Home-Study Courses in all branches of Engineering. Send for your copy to-day. FREE and without obligation. We alone guarantee—"NO PASS—NO FEE." **BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY, 401, Shakespeare House, 29, Oxford Street, London, W.1.**

FREE A Luxury Wireless Set
or components of equivalent value

Wonderful offer to introduce the **Radialaddin Club.** Write for particulars.

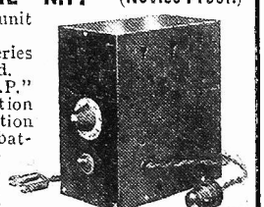
Radialaddin Club (Dept. P.W.), 47/48 Berners Street, London, W.1. Museum 1821.

BRAND NEW MANUFACTURERS' TYPE SURPLUS.—Magnavox X Core Moving-Coil Speakers (U.S.A.), D.C. Field, Resistance 2,500 ohms, Speech Coil 8 ohms, Transformer 35-1, list £6, **26/-** each; Pick-up Heads, Websters 50/-, each **15/-**; Igranic Phonovox, **15/-** each; Condensers: G.E.C., Siemens, Standard Telephones, etc., 800 D.C. test, 1-mfd., **10d.** each, **9/-** doz.; 2-mfd., **1/10** each; 4-mfd., Bakelite, **2/9** each; ·1—·0005, etc., all values, **1/-** each; Polar 3-gang Condensers, with slow-motion drive, **9/6**; Claude Lyons 4-gang, Carr. paid, C.O.D., or call.—**NEWTHS RADIO SERVICE, 32, Wardour Street, London, W.1.**

LOW-TENSION CHARGER for A.C. MAINS

55/- Complete. THE "N.P." (Novice Proof.)

The most efficient unit yet produced. Will do 4 small batteries at once if required. The NEW "N.P." SENIOR 3-amp. Station Charger is a revelation and will do up to 8 batteries at once. **75/-** Wall or Table. Ammeter and Sliding Resistance. (A very powerful outfit.)



55/-

Cost of running negligible. Trial 7 days given.

Mfrs.] *Send for Lists. State Mains Voltage.*

NASH PRODUCTS LTD. 93 Victoria Road, Stechford, Birmingham.

Advertisements

As far as possible all advertisements appearing in "Popular Wireless" are subject to careful scrutiny before publication, but should any reader experience delay or difficulty in getting orders fulfilled, or should the goods supplied not be as advertised, information should be sent to the Advertisement Manager, "Popular Wireless," 4, Ludgate Circus, London, E.C.4.

TECHNICAL NOTES

(Continued from previous page.)

market long enough for us to form a good judgment of their qualities, and they are frequently referred to in letters which I receive from readers. The transformer in question is, of course, particularly designed for the parallel-fed circuit arrangement, and the inductance is remarkably constant, even if the transformer is subjected to very rough handling.

Owing to the high permeability of the nickel-iron core, the amplification obtainable by means of a transformer of this kind is not only high but also relatively uniform. These transformers are now being made by several manufacturers.

In using the transformer a condenser of about one microfarad may be introduced between the primary and the anode, the anode being fed from the H.T. source through a resistance. Owing to the interposition of the condenser the direct current is cut off from the transformer, and so does not interfere with its inductance value, which remains high. This condenser also helps to give good amplification of the bass frequencies and, as I say, the net result is that not only a good but also a uniform amplification is obtained over the whole of the ordinary audio-frequency range.

Gramo-Motor Developments.

I was talking a little earlier about synchronous electric clocks, and that reminds me that the same principle is now being quite extensively applied to gramophone motors for working on alternating current. There are several motors on the market in which the principle of the simple synchronous motor or phonic wheel is utilised.

The phonic wheel, by the way, was first invented by Lord Rayleigh, a former Cavendish Professor of Experimental Physics at Cambridge and successor to the famous James Clerk Maxwell and predecessor to Sir J. J. Thomson and Lord Rutherford. The original phonic wheel is still at the Cavendish Laboratory, and if I remember rightly, it had four poles on the rotor and two pole-pieces on the stator.

In consequence of the small number of poles it was quite a work of art getting it going, and often took quite a long time. It was used for rotating a stroboscopic disc, and the phonic wheel was driven by interrupted current from an electrically-operated tuning fork. When everything was working properly the poles of the rotor passed the field poles in synchronism with the vibrations of the tuning fork.

Obtaining Smooth Running.

Since those days great improvements in this type of motor have been made, particularly in the direction of increasing the

(Continued on next page.)

NEXT WEEK

In next Thursday's issue of "P.W." there will be

MORE ABOUT THE 'DECADE'

ORDER IT NOW. THREEPENCE.

There is only one BEST!

And in the case of really modern terminals, Bulgin Vibration-proof, are placed first by reason of the many exclusive features enumerated in this illustration.

"Popular Wireless" now selects them for "The New Decade Three" confirming the choice made previously by **Mr. John Scott-Taggart F.Inst.P.** for his "S.T. 300" Receiver and **Mr. Percy W. Harris M.I.R.E.** for the "Mascot" Receiver.

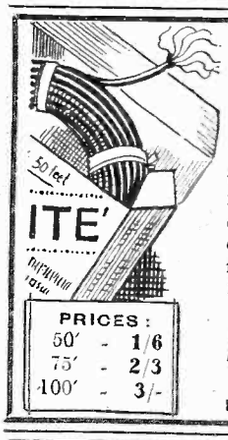
Send 2d. postage for 75 pp. Illustrated Catalogue and full details.

BULGIN
The Choice of Critics

A. F. BULGIN & CO. LTD., Abbey Rd., Barking, Essex.

Telephones: Grangewood 3266 & 7.
London Showrooms: 9, 10 & 11, Cursitor St., E.C 4.
Telephone: Holborn 2072.

RED: Aerial, Aerial 2, L.T.+, H.T.+1, H.T.+2, L.S.+, Mains+, Plain.
BLACK: Earth, L.T.—, H.T.—, L.S.—, Pick-up, Mains—, Plain.



7 COPPER STRANDS for BIG VOLUME!

You cannot possibly realise the capabilities of your set until you have tried "Aerialite," the new weather-proof, insulated all-copper Aerial. Subjected to the most exacting tests by experts throughout the country, "Aerialite" has yielded amazing results over the now obsolete steel and bare copper type. Fit "Aerialite" to your set and notice the difference. Made and guaranteed by "AERIALITE" Co., 10, Amber Street, Manchester. Pioneers of copper insulated aerial.

AERIALITE

PROV. PAT. 8532.
Factors please enquire. Refuse Imitations.

WEATHERPROOF INSULATED ALL-COPPER AERIAL.

★ PLEASE be sure to mention "Popular Wireless" when communicating with Advertisers. Thanks! ★

All Applications for Advertising Space in "POPULAR WIRELESS" must be made to the Sole Advertising Agents, JOHN H. LILF, Ltd., 4, Ludgate Circus, London, E.C.4. 'Phone: City 7261

THE MOST POPULAR RADIO-GRAM CABINET ON THE MARKET

REDUCED TO **39/6** *Carriage Paid!!!*

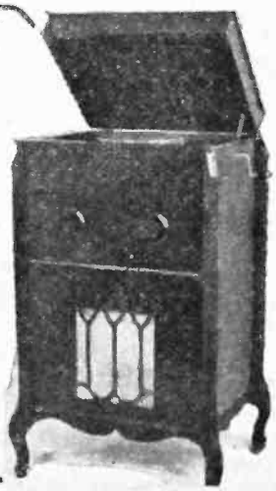
QUALITY GUARANTEED IMPROVED

Soundly constructed in selected oak, etc., and hand polished.

SPECIFICATION.—3' 3" high, 1' 10" wide, 1' 6" deep. To take panels up to 18"×7". Panel opening to suit set. These cabinets allow ample room for the following:—
Pick-up, Motor, Speaker, Batteries, etc., all for the reduced price of 39/6.

Catalogue Post Free. From one of the Largest Mail Order Works in England.

W. S. WILKIN, Cabinet Manufacturer, 12-26 Nelson Mews, Southend-on-Sea, Essex

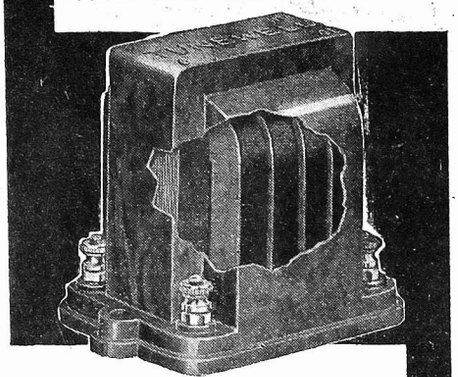


TUNEWELL have removed the Price Bar to Quality Radio

QUALITY has been the main consideration in producing the new Tunewell Components, and only by careful design and *lowering our profits* are the low prices possible. Unless big sales continue Tunewell prices must advance, as we are determined not to lower the quality.

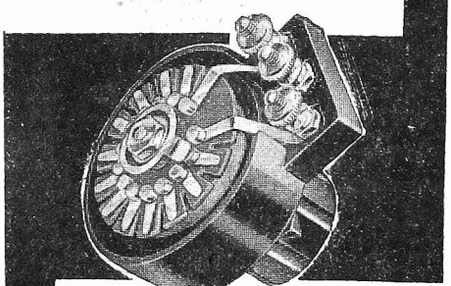
8 FREE BLUEPRINTS

The Tunewell "Guide to Super-Radio" contains details of the new components, and 8 Circuits, including Kit Eliminator and All-Mains Band-Pass 3. Write today for FREE copy, mentioning your nearest dealer's name and address.



Tunewell L.F. Intervalve Transformer

Super tone and performance for Battery or Mains Sets. Good response from 50 to 15,000 cycles. Wound on 4-section bobbin, with alternate primary and secondary windings. Finest Silicon Steel laminations, ensuring maintenance of primary inductance. Ratio 3½ to 1. Housed in handsome bakelite case. **7/6**



Tunewell Volume Control

By far the most satisfactory made. Tunewell Volume Controls eliminate cracklings caused by ordinary types. No more faulty contacts! No breakdowns! Wonderful smooth control! Will last for years. Logarithmically wound with double silk-covered wire. Paper laid between windings. Connections by German Silver contact to 14 studs. One-hole fitting. Type V, 50,000 ohms. **5/6**

Type P. Variable Resistance or Potentiometer. Equal resistance between studs. Maximum dissipation 3 watts. **5/6.**

TUNEWELL

TUNEWELL RADIO LTD.
54, STATION ROAD, LONDON, N.11.

TECHNICAL NOTES

(Continued from previous page.)

number of poles both on the rotor and on the stator, these being often increased to as many as 50 or 100 poles. This makes for steadier running and much greater ease in getting the rotor to run "in step."

The advantage of a gramophone motor operating synchronously in this way is that it runs at a speed which is as steady as the frequency of the A.C. mains. Such a motor, of course, runs only at one fixed speed, and there is no such thing as a speed regulator or governor connected with it.

Correct Playing Speed.

In view of the importance of running a gramophone record at a constant speed, you will see that to have the motor synchronised with the mains is a great advantage. Not only does it run at a *constant* speed, but it also runs at the *correct* speed, which I am afraid many ordinary gramophones do not.

I think there is a great future for electric gramophone motors and for synchronous ones in particular. I was talking to a manufacturer of gramophone motors a week or two ago, and he told me he was anticipating that within a comparatively short time spring-driven gramophone motors would become only a small percentage of the whole.

Naturally there will always be a demand for hand-operated machines for places where no electricity is available, but it seems pretty obvious that in cases where electric supply *is* available the clock-work gramophone machine must soon give place to the electric type.

Piezo-electric Crystals.

I suppose most of you have heard about piezo-electric crystals which have been a good deal used in connection with standard-frequency for radio transmissions and also latterly in connection with the Stenode Radiostat receiving system. The best-known example of piezo-electric crystal is quartz, the plate of quartz being cut from an original quartz crystal in a certain plane in relation to the axes of the crystal.

There are other crystals which act in a similar way, of which Rochelle salt is a prominent example. The crystal plate has the property that it expands and contracts in accordance with alternating potentials applied to its surfaces. When it is used in a radio circuit the circuit can be so arranged as to maintain a constant frequency of oscillation.

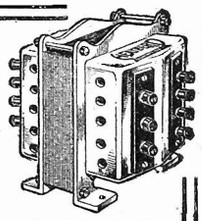
An Alternative Method.

There are certain serious difficulties involved in the use of quartz or natural substances of this kind, as they vary very much from one specimen to another. It has more recently been proposed to use the property of magneto-striction which is possessed by various magnetic substances and is found to be pronounced with a special alloy of nickel iron and chromium.

A wire or rod of this substance, for instance, will vibrate, or rather will suffer elongations and contractions in its length, in synchronism with applied alternating magnetic fields and the important point is that this action takes place at very high frequencies. The effect, of course, varies

(Continued on next page.)

AGAIN FIRST! WITH THE **NEW TRANSFORMERS FOR WESTINGHOUSE LATEST RECTIFIERS**



Whenever a new Westinghouse Rectifier is marketed, Heayberd manufacture a new Mains Transformer to go with it. First again! Here are the new Transformers for the latest Rectifiers:—

W. 33	240 v. 200 ma. 4 v. 5 amps. 4 v. 1 amp.	H.T. 9 .. 300 v., A.C. valves 60 ma. Power valve
W. 34	150 v. 550 ma. 4 v. 5 amps. 4 v. 1 amp.	H.T. 10 .. 200 v., A.C. valves 100 ma. Power valve
W. 35	300 v. 550 ma. 4 v. 5 amps. 4 v. 1 amp.	H.T. 11 .. 500 v., A.C. valves 150 ma. Power valve

Prices: W.33 35/-, W.34 45/-, W.35 65/-

Send 3d. stamps NOW for informative Lists, with circuit diagrams, of Heayberd Mains Equipment.

HEAYBERD
MONARCH OF THE MAINS.

10, FINSBURY ST., LONDON, E.C.2
One minute from Moorgate Underground Station

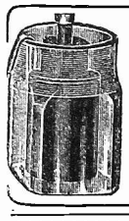
BARGAINS in L.T. and H.T. DYNAMOS

These double current generators were made for Govt. and cost £15. Two commutators, D.C. 6/8 v., 3/5 amps. and H.T. 400/600 v., 100 m/a. 5½" diameter. 12" long. 18 lbs. 3/4000 revs. Ball bearings. Carbon brushes. We have some surplus sets. Guaranteed 12 months. Sacrificed at **22/6**

Propellers 1/- extra. Carriage 2/6

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

LOUD SPEAKERS REPAIRED, 4/-
(*Blue Spot a Speciality*, **5/-**)
Transformers **4/-**, Headphones **4/-**, all repairs magnetised free. Eliminator Repairs quoted for. 24 Hours Service.
Discount for Trade. *Clerkenwell* 9069
E. MASON, 44, EAST ROAD, N.1.



WET H.T. BATTERIES
Solve all H.T. Troubles.
SELF-CHARGING, SILENT, ECONOMICAL
JARS (waxed), 2½" × 1½" sq. 1/3 doz.
ZINCS, new type 10d. doz. Sacs 1/2 doz.
Sample doz. (18 volts), complete with bands and electrolyte, 4/1, post 9d.
Sample unit, 6d. Illus. booklet free.
Bargain list free.
AMPLIFIERS, 30/-, 3-valve set, £5.
P. TAYLOR, 57, Studley Road, STOCKWELL, LONDON

THE PICTURE PAPER WITH THE MOST NEWS
SUNDAY GRAPHIC
and Sunday News

TECHNICAL NOTES

(Continued from previous page.)

with the dimensions of the specimen of the substance and also with the intensity of the field which is applied.

With both the quartz crystal and the magneto-strictive substance there occurs a fundamental frequency of vibration at which the effect becomes most pronounced, and in this way the arrangement can be used for controlling the frequency of radio waves used in transmission.

The special alloy used for magneto-strictive effects can be much more definitely controlled in its properties than natural substances like quartz or other crystals, and consequently it seems likely that this magneto-strictive effect, which for many years was regarded simply as a scientific curiosity, may be turned to important practical use, like so many other scientific curiosities have been during recent years in the advance of radio science.

THE LISTENER'S NOTEBOOK

(Continued from page 368.)

to know how to get his stuff over. There was a liveliness, too, but this may have been due to the inspiring influence of Broadcasting House; after all, environment *can* make a difference.

The first of the "Hazard" talks came entirely up to expectations. It struck me, during the talk, how difficult it must be for the Rear-Admiral—as it will also be for subsequent speakers—to speak honestly yet humbly of experiences in which he himself was obviously the hero. The same might have been said of the speakers in the "Escape" series, but, personally, I feel that there is in this new series peculiar opportunities for self-glorification which didn't arise in the other.

* * *

East is East and West is West, and one may add as a corollary, Eastern music is Eastern and Western Western. Mr. H. B. Drake made the difference very clear in his talk on Korean and Japanese music.

I can't say I enjoyed his selection of Eastern songs—I don't suppose I was expected to—for the agonising notes and cadences of those lovesick Koreans sounded strangely foreign—indeed, primitive—to one accustomed to that more virile (?) expression of lovesickness so beloved of our yearning Yolandes.

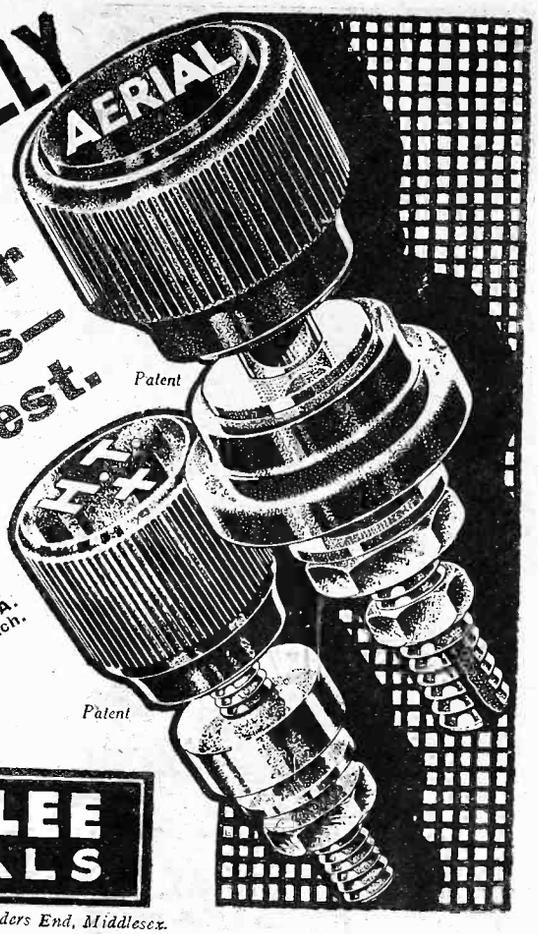
The talk, I suppose, would be classified as educational. On those grounds only could it justify itself. If it were intended as entertainment, then one song only would have been ample. A series of songs such as Mr. Drake gave us upsets one's mental equilibrium.

* * *

It is a pity that Covent Garden's opera season comes so late in the London musical calendar; at a time when the average listener is getting a bit weary of big music. For myself, I listened to the first two broadcasts with rather flagging interest, although I couldn't help remarking once again on the marvellous acoustic qualities of the Royal Opera House. I tuned in, of course, for "Götterdämmerung," but made atmospherics an excuse for switching off a few minutes later.

(Continued on next page.)

USED UNIVERSALLY
The World's Standard for Eight Years—
Still the Best.



"B" Type. Non-rotating name. 2 B.A. stem. Price 6d. each.
"R" Type. Rotating name. 4 B.A. stem. Price 3d. each.

BELLING-LEE TERMINALS

Advert. of Belling & Lee, Ltd., Queensway, Ponders End, Middlesex.

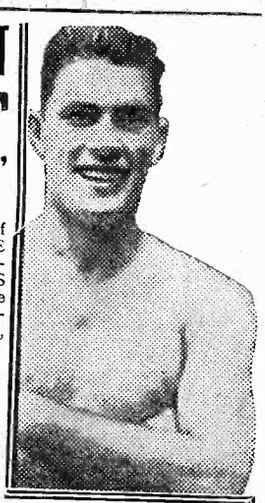
Famous Makers' Offer! £5 Radio Gram CABINET for 65/-
IMPROVES PERFORMANCE 50%
10/- monthly if desired
Polished Oak, Piano Tone Cabinet (42 in. high, 24 in. wide). ON APPROVAL at Makers' Prices!! You may return at our expense if you wish to part with it. 3,000 *clientele. B.B.C., Radio Press.* All Models from 35/- to £15.

PIANO TONE
Patent 8123. Users obtain 50% to 100% greater volume. The rich, mellow tone brings a fine thrill.
PHOTOGRAPHS AND LISTS FREE.
PICKETTS Piano Tone Cabinets (P.W.), Albion Rd., Bexleyheath, Kent

EASY TERMS
WE supply all good quality Radio Receivers, Components and Accessories on deferred terms. We carry adequate stocks and can give PROMPT DELIVERY.
12 EXIDE W.H. HIGH-TENSION ACCUMULATORS (120 volts, 5,000 m/a). Large capacity type. Cash Price £3 15 0
Or 5/- with order and 10 monthly payments of 7/10. Carriage charged on all orders from Scotland. This is the best and cheapest form of High-Tension supply where the Electric Light Mains are not available.
Send list of requirements, and quotations will be sent by return. Price list FREE on request.
LONDON RADIO SUPPLY CO.
(ESTABLISHED 1925)
11, OAT LANE, NOBLE STREET, LONDON, E.C.2
TELEPHONE: National 1977.

ADVERTISERS PLEASE NOTE!
The Rate for a one-inch Single Column Advertisement is 30/-
Minimum Space accepted: Half-an-inch .. 15/-
Send Remittance with instructions to:
JOHN H. LILE, LTD.,
4, LUDGATE CIRCUS, LONDON, E.C.4

"A MAN MUST FIGHT"
is the title of a series of articles which GENE TUNNEY is contributing to CASSELL'S MAGAZINE. In the first of the series, appearing in the JUNE issue,
GENE TUNNEY begins his own Life Story



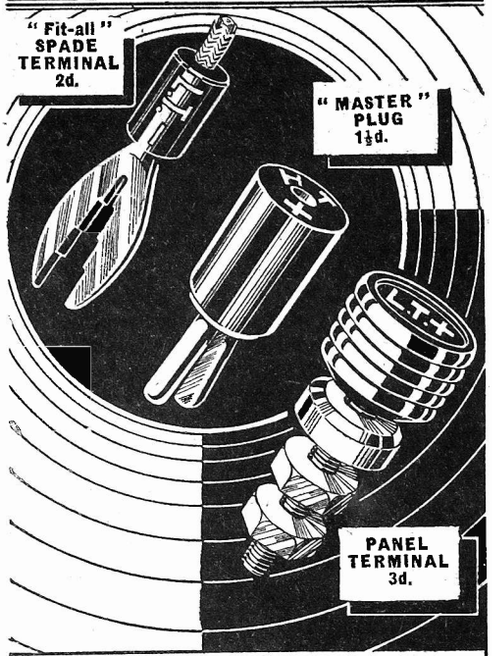
The man who was, until recently, the world's heavyweight boxing champion tells the fascinating story of his rise to world-fame. Each article will carry that story nearer to the moment of his final triumphs in the Ring against the great Jack Dempsey, at Philadelphia and Chicago.

You'll be thrilled by this stirring saga of the gay and grim realities of the struggle for championship honours. Don't miss it!

Of course, there are many more splendid features in the JUNE CASSELL'S, including contributions from BEVERLEY NICHOLS, FRANK H. SHAW, E. C. BULEY and others.

CASSELL'S MAGAZINE ... 1/-
For JUNE. Now on Sale.

CLIX
FOR PERFECT CONTACT



The Clix range covers over 28 different fitments, each designed to create Perfect Contact —and give Better Radio.
'Clix' are constantly specified by the technical press. Illustrated Folder 'P' on request.
Lectro Linx Ltd., 254 Vauxhall Bridge Rd. S.W.1

Wireless is the World's finest hobby, Make it a profitable one

SAVE MONEY.
MAKE MONEY.
NO OUTLAY.

"JOIN THE ELECTROCET CLUB"

Every Wireless Amateur: Experimenter: Constructor:

Should write his name and address in the margin, and post this advertisement in a ½d. unsealed envelope to:—

THE ELECTROCET CLUB
Poplar Rd., Solihull, BIRMINGHAM

EXACT TUNERS

250 to 2,000 metres.
Thousands of these tuners are in use, and we can strongly recommend them. No further coils are required. Send P.C. for particulars and circuits—FREE.
THE EXACT MANUFACTURING CO.,
Croft Works, Priory Street, Coventry.

Make
THE DAILY SKETCH
YOUR Picture Paper

THE LISTENER'S NOTEBOOK

(*Continued from previous page.*)

Actually, this was a feeble excuse, for the disturbance wasn't as bad as all that. It was, I suppose, because I have had my fill of big music for the time being, and need, as much as the performers themselves, the rest which the close season offers.

* * *

Though our enthusiasm for wireless is a genuine one, I shouldn't be surprised to hear from listeners that with something like summer weather when the call of the open (or garden) is irresistible, the set is put on short time.

In fact, I have heard this in several quarters already. "Apart from the news bulletins, we have listened-in to little else; our enthusiasm seems to have gone, but only temporarily, I'm sure," writes a correspondent.

And this is the sort of feeling many listeners must be experiencing now. After all, wireless is not an ideal out-door pastime; it is something to be enjoyed at home with the family; and family life is more intimate in winter than in summer.

Friends and relations, too, have their own sets, and it is no special treat to them for you to switch on whenever they call. The fact is they have dropped in for a chat, and the set is switched off forthwith.

Not that music isn't sometimes used as a sort of background to social intercourse. It is, alas! far too often, to the detriment of both conversation and music.

* * *

I am sorry to think that we have heard the last of Professor James Ritchie's talks. These will be long remembered, because they were both entertaining and instructive. This combination of qualities, met with only too rarely in broadcast talks, is the unique possession of the popular broadcaster.

Whether the entertainment value of a talk is due more to the personality of the speaker than to the nature of the subject he is dealing with, it is difficult to say, though I *do* feel that personality counts for a good deal.

HIGH SLOPE DETECTORS

Some interesting facts about this type of valve

By JEREMY GREY.

DURING the last season or so there has been—I will not say a craze, but a distinct movement towards the "high slope" detector. The basic idea, of course, is quite sound—the achievement of a big stage gain—a large audio-frequency voltage from a comparatively small signal voltage.

Experience, however, has shown that this very worthy object is not always achieved in practice. Other phenomena conspire to defeat the advantages which one would expect to result from a detector having a high mutual conductance.

These phenomena are usually considered collectively under the heading of "input impedance," which means that their united effect on the detector stage is similar to placing an impedance in parallel with the grid circuit. It is of interest, however, to analyse the exact causes of these losses.

In the first place, much of the trouble is due to inter-electrode capacity. High mutual conductance with high amplification factor means low impedance, and to achieve this, the clearances between the electrodes of the valve must be made very small—thus increasing the inter-electrode capacity. The practical effect of high anode-grid capacity is equivalent to connecting between the grid and cathode a circuit possessing both capacity and resistance.

"Miller Effect" Losses.

Two disastrous results follow: first, part of the energy received from the aerial is dissipated, thus decreasing the voltage available on the grid of the detector; and second, because the reaction shunted across the grid circuit varies with the frequency of the incoming signal, the ganging of the various tuned circuits will not be constant.

The resultant flat tuning of the grid circuit reduces both the selectivity of the receiver and the voltage applied to the grid.

The combination of these evils is known as the "Miller effect," and is the principal cause of inefficiency in circuits employing steep slope detectors.

There is, however, a further source of loss, namely the lowering of the cathode-grid impedance, which is almost inevitable in the design of high-slope detectors. As a result of this, the grid current flowing under detector conditions is fairly high and serious damping occurs in the grid circuit.

It can be calculated that if the mutual conductance is increased 100 per cent, the losses due to input impedance are increased by nearly 300 per cent, and there is a definite limit beyond which the increased inter-electrode capacity cancels any gain resulting from high mutual conductance.

Overcoming the Difficulty.

Indeed, many valves now on the market have already exceeded this economic limit, and it is good news to learn that one manufacturer has had the courage to modify the design of an existing high mag. detector in order to obviate these losses, in spite of apparent reduction in "paper" characteristics.

The Mullard 904 V is now made with a slope of 2·2, as against 6·5 in the earlier supplies. The inter-electrode capacity has been approximately halved, and it has been established by practical test that the new valve has a higher efficiency as detector, and, in addition, its use improves the selectivity of the receiver and the accuracy of the ganging of tuning condensers.

"OHMITE" RESISTANCE

Better than Wirewound
All values from 300 ohms to 5 megohms.
Accurate and Constant
1/6 each. Holder 6d.

Made by GRAHAM FARISH Bromley Kent.

DON'T MISS IT!—THE JUNE NUMBER

OF

MODERN WIRELESS

ON SALE EVERYWHERE PRICE ONE SHILLING

FOR THE MUSIC-LOVER

Do Listeners Really Want Opera?

And articles on gramophone topics:
Round the Turntable.
Recent Record Releases.

FOR THE CONSTRUCTOR

A Mains Unit Conversion.
Trouble Tracking.
and two magnificent sets to build, including
The "M.W." D.C. Three.

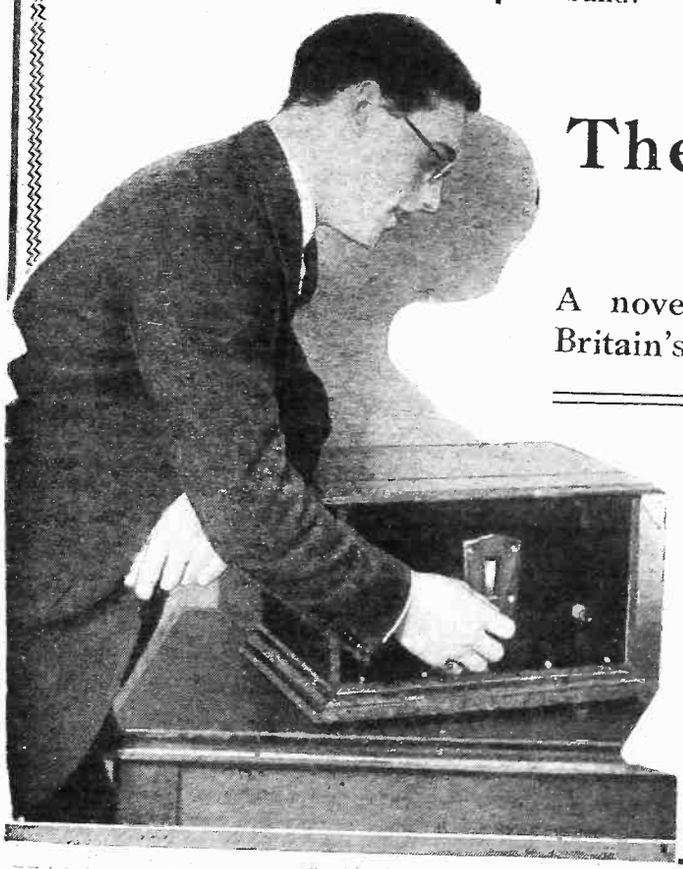
FOR THE SET-OWNER

Many valuable features:—
Using Indirectly-Heated Valves.
Underloaded Mains Units.
Behind the Scenes of Broadcasting.
etc., etc., etc.

THE WORLD'S PROGRAMMES

are fully and fascinatingly dealt with in a special supplement.

Wireless and World Peace.
"Radio Nations."
For the Short-Waver.
Germany's New Sets.
All about Athlone.
Station Alterations.
Interesting New Stations.
On the Medium Wave-band.
Station Information.
Leipzig's Latest.
Short Waves in Summer.
What the Distant Stations are Doing.



also in the June number:

The "W.L.S." Three-Band Two

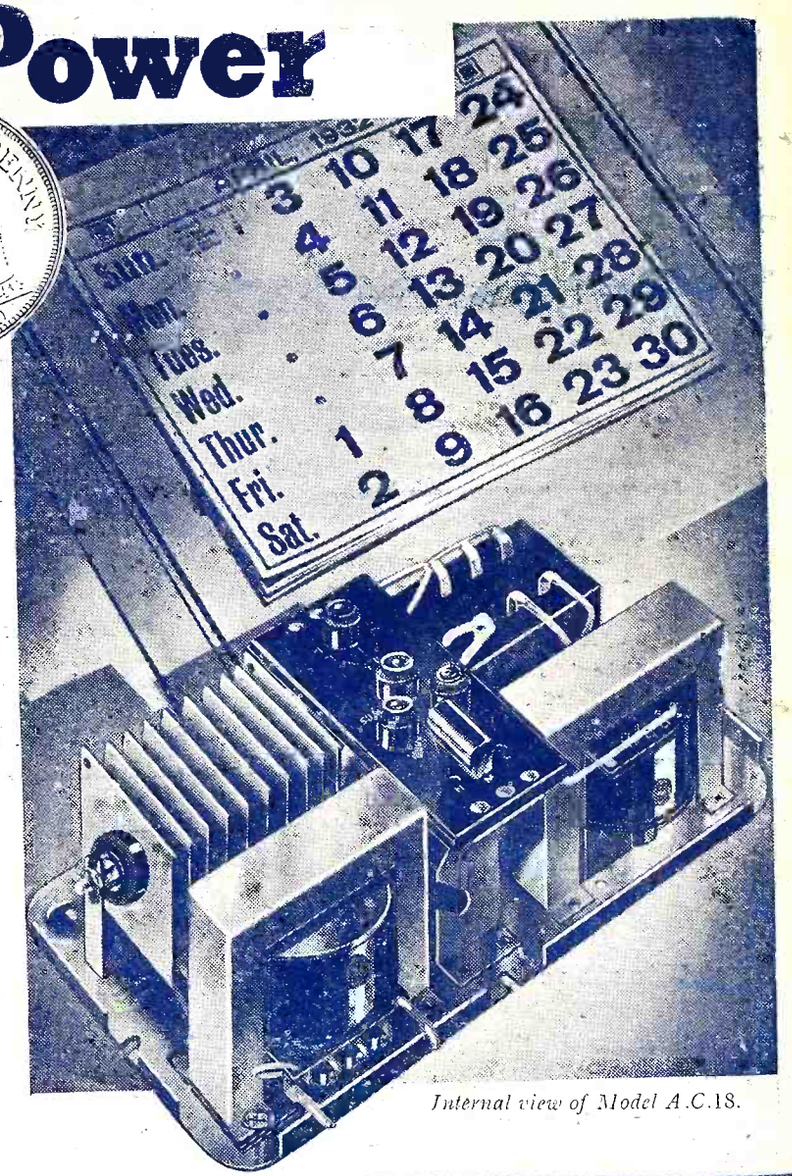
A novel all-wave design fully described by Britain's most popular short-wave expert.

OTHER FINE ARTICLES INCLUDE:—

The Long Arm of Coincidence.
Stopping Fading.
How Valves Are Made.
On the Short Waves.
Controlling the New Studios.
etc., etc., etc.

ON SALE EVERYWHERE——PRICE 1/-

Constant Power for 1d a month

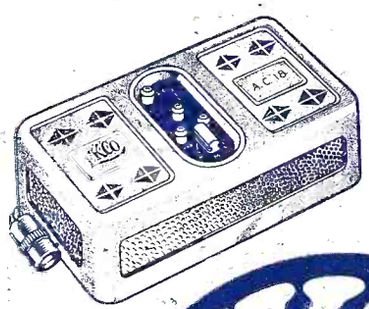


Internal view of Model A.C.18.

Constant and high voltage—always. Ample and silent current—always. Complete reliability—always. All for a penny a month. No battery can give you such service at so low a cost as an EKCO Unit.

There is an EKCO Unit for every size and type of set. Just connect the appropriate model in place of your usual battery, then plug into the electric supply and switch on—that's all. No alterations to your set, valves or wiring.

End all battery worries and expense for ever. Go to your radio dealer to-day and ask him to show you the EKCO Unit suitable for your set, or post coupon now for full details.



External view: all models are similar in appearance. Size, 9 × 5 × 3½.

EKCO H.T. UNITS

Model	Current Output	Voltage Tappings	Price	EASY PAYMENTS Initial Payment	11 Monthly Payments of
A.C. 12	12 m/A	S.G.; 80; 120/150	**£2.15.0**	**6/6**	**5/-**
A.C. 18	18 m/A	S.G.*; 50/80*; 120/150	**£3. 7.6**	**7/9**	**6/2**
A.C. 25	25 m/A	S.G.*; 50/80*; 120/150	**£3.17.6**	**8/9**	**7/1**
D.C.15/25	15 or 25 m/A	S.G.*; 50/80*; 120/150	**£1.19.6**	**6/-**	**3/8**

Combined H.T. & L.T. Charger Units (for A.C. Mains)

Model	Current & Voltage	L.T. Output (*for charging accumulators*)	Price	EASY PAYMENTS Initial Payment	11 Monthly Payments of
K.12	Current Output and Voltage Tappings same as Models A.C.12, A.C.18 and A.C.25.	½ amp. at 2, 4 or 6 volts	**£3.19.6**	**9/-**	**7/3**
K.18		½ amp. at 2, 4 or 6 volts	**£4.12.6**	**10/3**	**8/5**
K.25		½ amp. at 2, 4 or 6 volts	**£5. 7.6**	**11/9**	**9/10**

Tappings marked * are adjustable.

EKCO POWER SUPPLY UNITS

To E. K. Cole, Ltd. (Dept. A.11), Ekco Works, Southend-on-Sea.

Please send me particulars of Ekco Units.

Name.....

Address.....

.....

Woburn

Printed and published every Thursday by the Proprietors, The Amalgamated Press, Ltd., The Fleetway House, Farringdon Street, London, E.C.4. Advertisement Offices: Messrs. John H. Lile, Ltd., Ludgate Circus, London, E.C.4 (Telephone: City 7261). Registered as a newspaper for transmission by Canadian Magazine Post. Subscription Rates: Inland and Canada, 17/4 per annum; 8/8 for six months. Abroad (except Canada), 19/6 per annum; 9/9 for six months. Sole Agents for Australia and New Zealand: Messrs. Gordon & Gotch, Ltd.; and for South Africa: Central News Agency, Ltd. Saturday, June 4th, 1932. S.S.

REGISTERED AT THE G.P.O. AS A NEWSPAPER.

NOEL ASHBRIDGE ON EMPIRE BROADCASTING (See Page 399)

Popular Wireless

Every Thursday PRICE 3d.

No. 523. Vol. XXI. INCORPORATING "WIRELESS" June 11th, 1932.

MORE ABOUT THE "DECADE" IN THIS ISSUE

YOU WILL ENJOY READING—

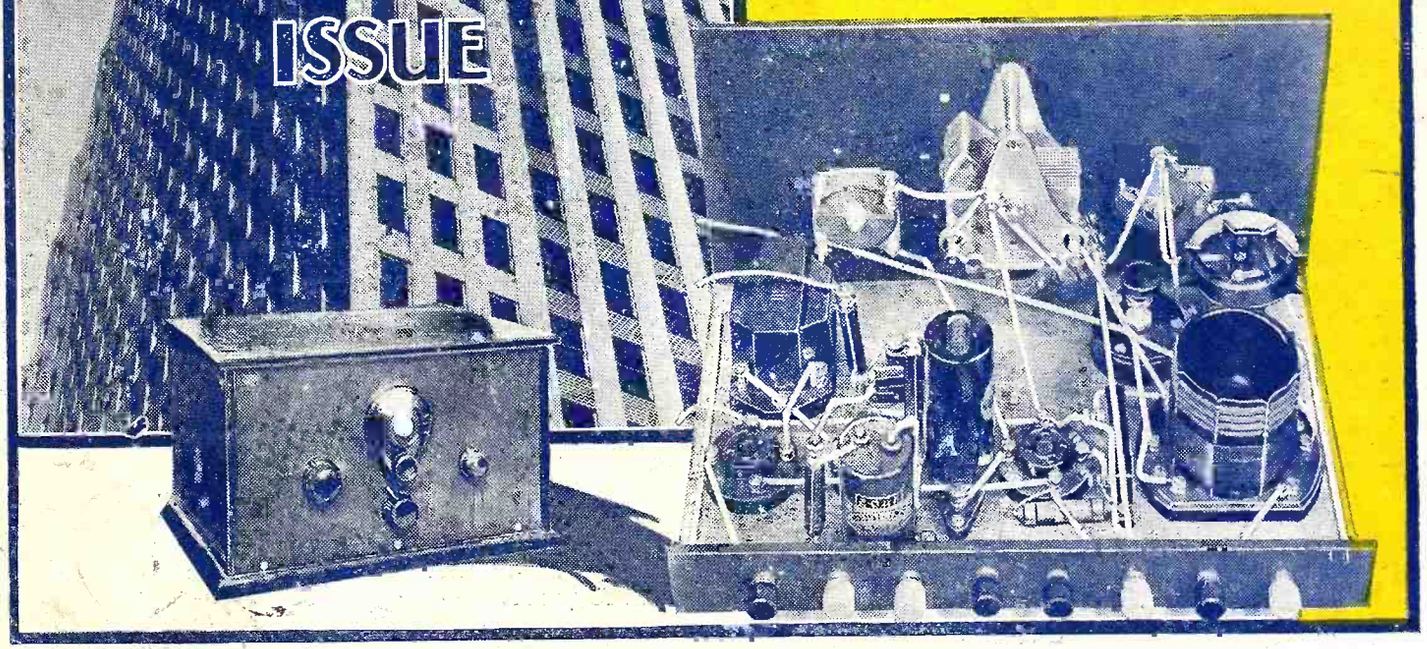
THE B.B.C. AND THE NEW MICROPHONES

YESTERDAY—AND TO-DAY

LETTERS to a YOUNG "HAM"
By "ARIEL"

Also—

OLIVE GROVES on how she won her radio fame



The World's **GREATEST** *Kit Suppliers!*

Showrooms: ***159, Borough High St., London Bridge, S.E.1.*** *Hop 3000.*

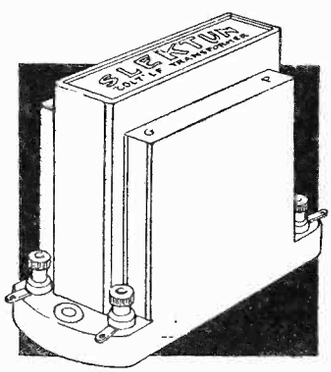
READY RADIO

Head Office: ***Eastnor House, Blackheath, S.E.3.*** *Lee Green 5678.*

Advt.

AND NOW SLEKTUN

A NEW AND AMAZING TRANSFORMER



The SLEKTUN Colt is both robust and compact—Ratios 2-1, 3-1, 4-1 and 5-1. Priced at 4/9

WITH A 3 YEAR GUARANTEE

The expert will consider primary inductance, self-capacity and primary voltage drop . . . The amateur will be satisfied with results—perfect reception and no trouble . . . Both are satisfied when they realise that the makers of the SLEKTUN Transformer are proud to publish the test curve made by the National Physical Laboratory and to back their own opinion by a guarantee which lasts for at least three years.

8/6

SLEKTUN PRODUCTS LTD., 21, DOUGLAS STREET, VAUXHALL BRIDGE ROAD, S.W.1.

Popular Wireless

LARGEST NET SALES

Scientific Adviser:
Sir OLIVER LODGE, F.R.S.
Chief Radio Consultant:
CAPT. P. P. ECKERSLEY, M.I.E.E.
Editor: NORMAN EDWARDS.
Technical Editor: G. V. DOWDING, Associate I.E.E.
Assistant Technical Editors:
K. D. ROGERS, P. R. BIRD,
A. JOHNSON RANDALL.

THIS WEEK'S GEM
A LONG SHOT
STRIKING FIGURES
"P.W.'s" PULL

RADIO NOTES & NEWS

RADIO HISTORY
SPLITTING THE ATOM
BISCUIT-TIN TWO
CLASS WARFARE?

Our Best Wishes

FULL of years, honours, and, may I say, vim, Sir Oliver, on Sunday (June 12th), celebrates his 81st birthday, and on behalf of our readers and ourselves we offer him our most sincere congratulations and best wishes for his happiness and well-being.

He is a man who, after what most of us would consider to be a full life's work, is still working—mentally restless and creative—proof that work does not kill and that to the properly trained and controlled mind life has always something to bestow. He is an inspiring force to his fellow-men—and that, he might justly claim, is his greatest honour and award.

This Week's Gem.

THE Faraday House Wireless Company, in a letter to the press explaining why their name is so similar to that of the famous electrical engineering college, says: "The last thing we desire is in any way to shelter under the reputation of the Institute which also bears this name." Methinks that this might also be a two-edged sword, cutting also the other way!

As a matter of fact, the company took over a business which was carried on in premises wherein Faraday once worked; hence its name.

Accumulator Tonics.

I HAVE always entertained a timorous curiosity about "battery solutions," "cell dopes," and the like, which are supposed to cure accumulators of the staggers, hardening of the arteries and general debility.

But I now hear the Bureau of Standards at Washington have collected about fifty of these specifics, analysed them, and found them mostly eyewash! A great pity!

A Very Long Shot.

FOR some reasons known only to themselves the Americans last month staged a "round the world" radio transmission of the sound of a shot fired by the Governor of Massachusetts in imitation of the shot which, fired 157 years ago, is said to have been the first shot of the rebellion.

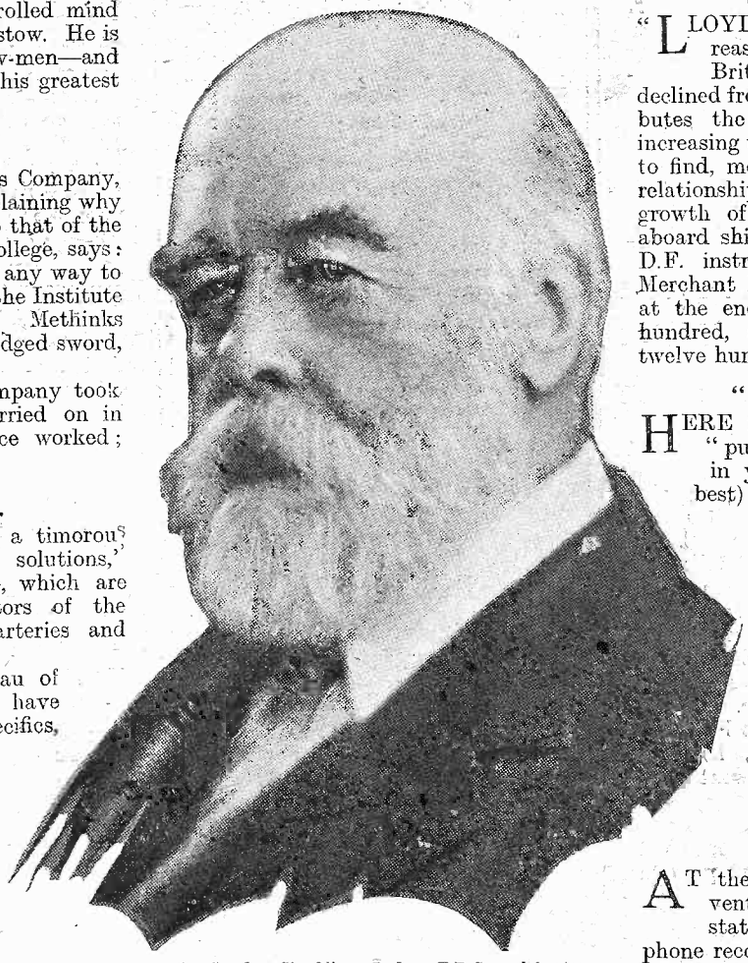
From Schenectady the noise went to Holland, then to Java, thence to Australia and back to the U.S.A. They call the original of this shot, "The shot heard round the world," which is slightly flattering to Yankee ordnance, surely.

Progress of Television.

FROM the annual report (1931) of the Radio Corporation of America, the leading radio firm in the U.S.A., I extract this: "Although the development of television is still in the laboratory, marked progress was made in 1931 in its transmission and studio phases." "Television receiving equipment will be offered to the public when experimentation has demonstrated that a reliable and serviceable system of sight transmission of practical value can be assured."

This report is dated March 14th, 1932, and can therefore be taken as the latest word on the subject.

SIR OLIVER'S BIRTHDAY



On Sunday Sir Oliver Lodge, F.R.S., celebrates the 81st anniversary of his birthday. Among the congratulatory messages from all over the world none will be more sincere than that from "P.W."—the journal which has been honoured by a long association with the great scientist, who, among his many claims to fame, was the inventor of tuning, and, of course, the first man to tune a wireless set.

Some Striking Figures.

"LLOYD'S LIST" in discussing the reasons why the annual number of British ships posted as missing has declined from 29 in 1920 to 3 in 1931, attributes the improvement mainly to the increasing use of radio. It is not surprising to find, moreover, that there is a marked relationship between these statistics and the growth of the use of Direction Finders aboard ship. For in 1920 the number of D.F. instruments in use in the British Merchant Navy was not more than five; at the end of 1923 there were about a hundred, and to-day there are between twelve hundred and thirteen hundred.

"P.W." Pulls Perpetually.

HERE is a remarkable tribute to the "pulling power" of advertisements in your favourite (and the world's best) radio weekly. In July, 1929, Messrs. E. K. Cole, Ltd., ("Ekco") took a page in "P.W." for advertising a three-valve receiver and certain H.T. mains units. They now send us this page, torn from the rest by a reader with a receptive and retentive mind; on it is written this reader's inquiry for a list of battery eliminators.

An advertisement of 1929 still bringing inquiries in 1932! What a periodical!

Records of Records.

AT the British Musical Trades' Convention, held on May 9th, it was stated that nearly a million gramophone records are bought in England each week; that these records, placed edge to edge, would reach farther than from London to Bournemouth; and that if their playing tracks could be unfolded and joined up they would encircle the earth over seventimes.

(*Continued on next page.*)

"ARIEL'S" RUNNING COMMENTARY ON RADIO *(Continued)*

It appears, too, that the public taste in records has during the past two years veered from dance music to light orchestral pieces, and, at the moment, the demand is for old favourites of pre-war times and Victorian waltzes.

"Ariel's" Wireless History.

IT is characteristic of the Briton that he loves to hark back to the past. This has been amply illustrated by the letters which I have received, asking me to tell more of the apparatus of the earlier days of radio. It is a tempting subject, I confess, but these Notes are not supposed to be devoted to the dead past. However, I will shortly try to slip a few more anecdotes past the blue pencil of the merciless sub-editor.

Meanwhile, I may say, in reply to a number of inquiries, that it is a fact that some of the earliest "feed-back" coils were about six inches long and five inches in diameter and were tricksy customers indeed!

"Water, Water Everywhere."

NO alcoholic drink is allowed on the premises of the Manse, otherwise known as Broadcasting House. "Pain-killers" and toothache drops used by the staff there have to be certified 300 per cent under "proof" strength, and a man who refers lightly to herbal beer has to go "on the carpet" and get a severe quotation from John Knox.

In fact, so that there shall be plenty of water, the Director-General has, so I read in the "Evening Standard," a private bathroom! How I could frolic with that fact, if only I were allowed to do so!

Bring Out Your "Gems."

COME ON! There must be scores of jolly good radio jokes going the rounds, so trot them out for the benefit of other readers, please. S. B. (Maltby) tells one of a man who bought some acid for the new H.T. accumulator and was charged only sixpence. Thinking that he had a bargain, he paid up and went while the going was good. His honesty was rewarded, for it was subsequently found that he had filled up some forty-five new cells—with paraffin oil!

Splitting the Atom.

NOW that the highly-coloured accounts in some of the newspapers have become drab with age, let us consider dispassionately the facts of what has been reported about Dr. E. T. Walton and Dr. J. D. Cockroft of the Cavendish Laboratory, Cambridge, and their ill-treatment of atoms. Briefly, they have "bombarded" hydrogen atoms with electrons and broken some of them. It was observed that when the atoms broke they left helium behind—a genuine bit of transmutation.

No "Power from Atoms" Yet

THE electrons were shot at the hydrogen atoms at a velocity of about 6,200 miles a second, and when the atoms broke up they produced 100 times more energy than that of the bombarding particles. Very encouraging, but as only about one hydrogen atom in ten million was split up, there is no immediate prospect of using the process for the production of energy on a commercial scale.

The real achievement of these scientists is that they have broken up atoms by means of a voltage of only 120,000, whereas voltages of the order of one million have hitherto been contemplated for the job. This triumph will not, however, solve the helium problem for airship builders, I fear.

"SHORT WAVES"

In a description of the interior of the new B.B.C. Headquarters, it is stated that artistes are so overawed by its palatial solemnity that they forget their jokes. Yet we hesitate to give the designer credit for this intention. —"Punch."

* * *

Smith: "Well, what do you think of it? I guess you've heard worse reception on a wireless set than on this one, old man."

No answer.

Smith: "I say, I guess you've heard worse reception than this, haven't you?"

Brown: "I heard you, old chap. As a matter of fact I was just trying to remember"

* * *

As an experiment, a married man and his wife are living in separate houses. Their first quarrel will probably be over who shall be kept awake by the wireless.—"Pictorial Weekly."

* * *

A London waiter is an expert ventriloquist. When questioned by a faddy diner regarding the ripeness of a piece of Stilton, he makes the cheese speak for itself.—"Humorist."

We should like to hear this big cheese from the studio!

* * *

SO SIMPLE!

"Listeners can easily learn to RIDE Radio Kilocycles," we read in a contemporary.

* * *

BABEL.

A wireless writer, condemning "knob-twirling," says: "It's no use trying to hear two stations at once."

With my set, it's no use trying not to. —"Sunday Pictorial."

"Minimum Charge" to Radio Users.

SO many applications for electricity supply for radio only are being received at Burton-on-Trent that a minimum charge of £1 per annum is to be introduced. Although I favour the principle of minimum charge in certain instances, such as for telegrams, I feel that in this matter the charge is not in the best interests of the industry.

The charge will cause much annoyance and it will "kill" a lot of would-be electricity users, whereas a charge based solely on consumption would strike the small user as just; and the supplier, having got "juice" into the house, ought by proper sales methods to be able to induce the householder to indulge in an electric iron and a few "points" of electric light, thus by degrees making the Burtonities "electricity-minded."

The "Cossor Courier."

I BID welcome to this "trade only" little publication. Its first number has a good deal of *mu* in it—the classic touch. Moreover, Cossor's Bristol manager, whose photograph is given, is one of the old diehards of the "love me, love my mighty pipe" school, which, I thought, had died with General Murphy on the stricken field.

Ah, and there's a story of a man who fell down a lift shaft and escaped with only a few bruises because the "Cossor" set he was carrying acted as a shock absorber. Phew! Build your sets into "Sorbo" cabinets!

Souvenir of Faraday Exhibition.

J. L. W. (Melbourne) puts it up to me to find out for him about a souvenir of last year's Faraday Centenary Celebrations. The reply may interest collectors and others.

Souvenir catalogues of the Exhibition may be obtained from the Institution of Electrical Engineers, Victoria Embankment, London; paper covers, one shilling; cloth, with gilt edges, half-a-crown. I suppose something ought to be added for postage.

The "Biscuit Tin" Two.

INSPIRED by an article published in "P.W." some time ago, a Glasgow reader has been experimenting in the design of very compact, low-power portables, and has produced a set which fits into a biscuit tin 9 in. by 8 in. by 4½ in., complete with two valves fed by five flash-lamp batteries, giving some fifty hours' intermittent use.

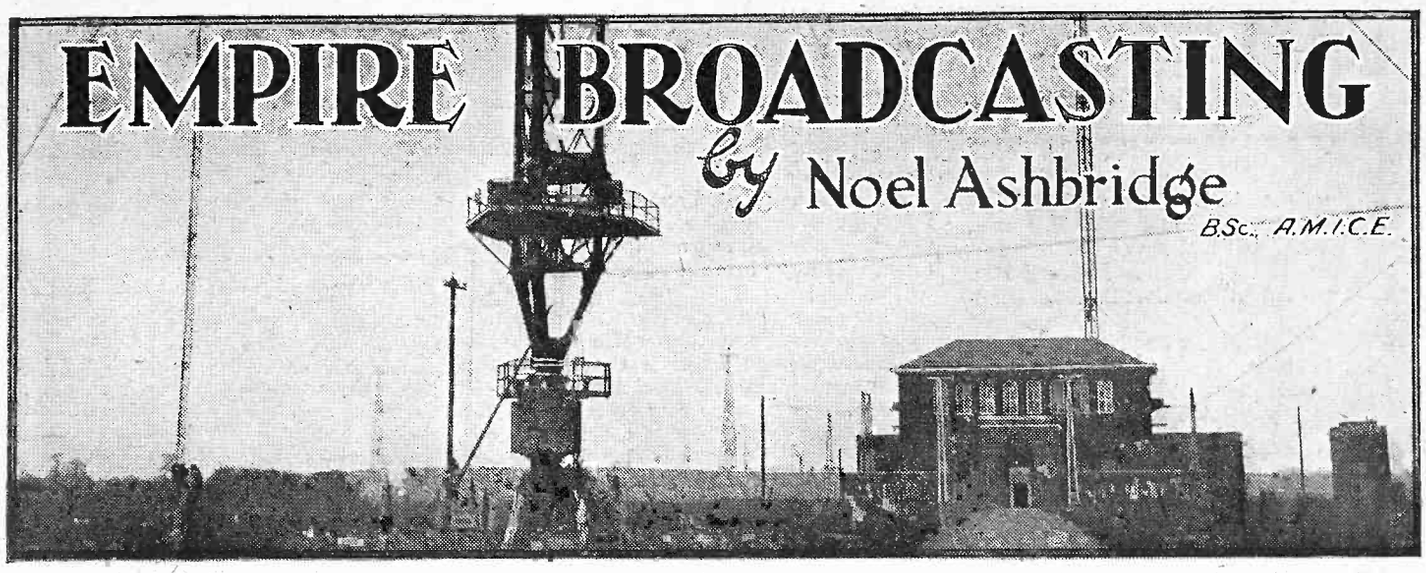
We congratulate him, and thank him for his excellent sketches. Our technical staff say, "What *kind* of biscuits?" Either shortbreads or oatmeal, I suggest.

More Class Wordy Warfare.

I DO not think that it is necessary to apologise for serving up the following joke, which I recently found in one of those beautifully-produced shilling "society" monthlies — whichever it was I give it full acknowledgments.

A lady, showing her new charlady over the house, remarked of her receiver: "It isn't a bad set, but we notice that it hums sometimes." "That's funny," replied the other, "we never notice any smell about ours!"

EMPIRE BROADCASTING



by Noel Ashbridge B.Sc., A.M.I.C.E.

MOST readers of this journal will be familiar with the past history of the experiments with the short-wave station G 5 S W, which ultimately led to a decision to build a permanent station for broadcasting programmes direct to the Empire. In particular it will be remembered that the object of the transmissions from G 5 S W was to determine whether the quality of reception available overseas from such a station would be acceptable and of value from the point of view of a permanent service.

The B.B.C. now has the construction of the new Empire station at Daventry well in hand, and in the following article the entirely novel aerial arrangements and other striking features of the apparatus are described by THE CHIEF ENGINEER OF THE B.B.C.

A Long Process.

These experiments were somewhat protracted owing to the fact that long-distance reception on short waves cannot be judged in a few weeks or even months. It is necessary to make regular observations extending over at least two years before an estimate can be formed of the average standard of reception which is likely to be available in any particular region.

In addition, the process of collecting reports from all the various Colonies and Dominions is of necessity somewhat lengthy. However, having once obtained sufficient data to decide that such a service had definite value, the only difficulty which remained was the financial one, and this led to negotiations with the Government and discussions at the Dominion and Colonial conferences which took place in 1931.

At one time it appeared as though the scheme might fall through owing to these difficulties, but the B.B.C. was so convinced of the importance of establishing such a service, particularly at the present time, that it decided it would be justified in building a station on economical lines at its own cost.

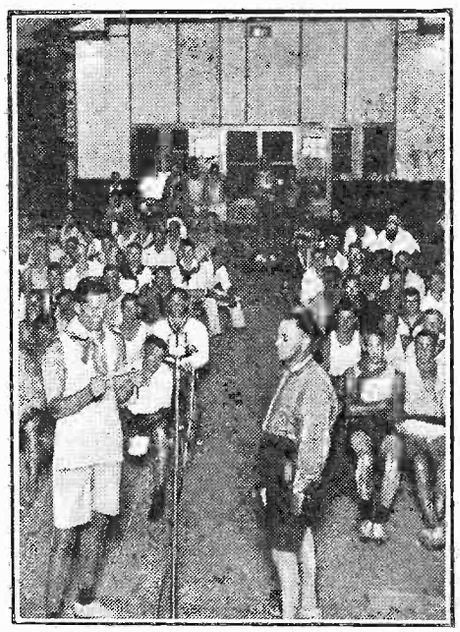
Not a Perfect Service.

However, the hope remains that in the future some reimbursement may be forthcoming, either from the Treasury or from those making use of the service. This stage was reached towards the end of 1931, and immediately the B.B.C. started to put into operation plans for building a station which had already been prepared.

The technical requirements for such a station are extremely interesting, mainly because the problem is a difficult one. It is fairly obvious that it is impossible to supply a service to the whole of the British Empire which can be comparable in reliability and strength with that existing, say, in the neighbourhood of London.

In fact, it cannot even approach the service available in those parts of the British Isles where reception of our National stations is at its worst. We therefore have to strive towards setting up a station which will provide at least intelligible reception in those regions which it is intended to serve.

WAY DOWN UNDER



Outside broadcasts are popular features of Australian broadcasting, and here you see Lord Somers, who until last year was Governor of Victoria, presiding over the microphone at a Boys' Camp Concert. This concert was broadcast from the famous Melbourne transmitter, 3 L O.

Musical quality of high artistic value is completely out of the question, although the lighter forms of music should provide acceptable material. The effect which this will have on the technical operation of the station will be referred to again later on.

No Band Available.

Our first technical consideration is concerned with the wavelengths which are available, and the bands allotted by the Washington Convention are as follow:

6,000– 6,150 kcs.	(50	–48·8 m.)
9,500– 9,600 „	(31·6	–31·2 m.)
11,700–11,900 „	(25·6	–25·2 m.)
15,100–15,350 „	(19·85	–19·55 m.)
17,750–17,800 „	(16·9	–16·85 m.)
21,450–21,550 „	(14	–13·9 m.)

It is hardly necessary to say that it is only the short waves below, say, 60 metres which are likely to be of value for this purpose, but even if this were not so there would be no band available for broadcasting between 50 and 200 metres.

In order to be quite certain that the equipment would cover all possible requirements, it became necessary to specify that transmission in any one of the above bands should be possible.

The next question to be answered was: Could effective use be made of directional aerials? If one examines the globe, it soon becomes obvious that to serve all parts of the Empire one has to transmit over a very wide angle, when looked at from England, and therefore a single directional aerial to transmit to the whole Empire is out of the question. Moreover, even if it were not, the same wavelength is unsuitable for transmission to all parts of the Empire, even apart from the question of difference in time.

The Zone Scheme.

A scheme was eventually adopted which divided up the Empire into five zones, from the technical point of view. These zones are determined by the following three factors:

(*a*) Time of transmission.
(*b*) Direction of transmission.
(*c*) Distance from this country.

The actual zones are as follow, the numbering being of no significance. The description of the zone is, of course, only approximate, and many important places are included which are not mentioned.

(*Continued on next page.*)

EMPIRE BROADCASTING

(*Continued from previous page.*)

ZONE.

1. Canada and the Pacific Isles, West Indies, Trinidad and British Guiana.
2. New Zealand and Australia.
3. India, Burma, and the Malay States.
4. South Africa and East Africa, including Egypt.
5. West Africa, including Nigeria and the Gold Coast.

Unfortunately, most directional aerial arrays are only suitable for a narrow band of wavelengths, and therefore if it is necessary to transmit on more than one wavelength to any particular zone, more than one aerial must be provided for that zone.

Sixteen Aerials!

As already stated, these aerials can cover a narrow band of wavelengths, but as a rule the change of wavelength required with the season is a very big one. Thus for Zone No. 1 three aerials will be erected, to transmit wavelengths of 19, 32 and 48 metres respectively. Zone 2, on the other hand, only requires one aerial, since the only wave-band likely to be of use is that in the neighbourhood of 25 metres.

Zone 3 will have aerials for three wavelengths, namely, 17, 25, and 32. Zone 4 will have two wavelengths, 32 metres and 14 metres, the last-named being intended for transmitting when daylight exists over the whole route.

Zone 5 will have two wavelengths, namely, 48 and 32, but the latter will be arranged to cover both Zones 4 and 5. It will be realised, of course, that the smaller the angle for which the aerial is designed the greater will be the gain from the directional effect.

It should be pointed out that the wavelengths mentioned above do not indicate the exact channel which will be used, but merely the wave-band in which the channel will be located.

In working out this scheme, the main object in view was to provide the best possible reception between the hours of 6 p.m. and midnight, local time. Occasionally, transmissions may be required at other times, and in order to cover possible difficulties in this direction six omni-directional aerials will be erected in addition to the directional ones.

Since the best wavelength to use at a certain time of the day at a certain season to reach a distant region is still not a definitely fixed quantity, it was highly desirable to adopt an aerial system which would be flexible, and which was economical in first cost.

Pigmy Masts.

The type of aerial which has been adopted is that put forward by Messrs. Standard Telephones and Cables, Ltd., who will also supply the transmitters and auxiliary plant. These aerials are simple in construction and are supported by masts less than 100 feet high.

The question now arises, how many transmitters are necessary to feed this somewhat extensive array of aerials? Remembering that the main object in view is to supply a programme between the hours of 6 and 12 o'clock midnight, local time, we are greatly helped in this matter by the difference in time between the various zones.

Economy!

Thus Montreal time is 5 hours behind G.M.T., Melbourne is 10 hours ahead of G.M.T., Calcutta 6 hours ahead of G.M.T., and so on. Thus it becomes possible to feed all these aerials at the appropriate times with only two transmitters. If at any time in the future longer hours of transmission are required, or it becomes essential to give directional transmissions to all zones simultaneously, then, of course, additional transmitters would have to be provided.

Another interesting question is, should these transmitters have a performance exactly similar to those used in this country for national broadcasting? At first sight it would seem that an exacting specification for frequency characteristic is unnecessary, since fading, and particularly differential fading (independent fading of the carrier wave and the sidebands) is bound to stand in the way of very high-class reproduction.

TO LONDON 5,877 MILES!

This lonely Britisher, living far away in India, is one of many distant readers of "P.W." who will greatly appreciate the new Empire service. Note the signpost—5,877 miles to London.

On the other hand, intelligibility in speech depends on the complete reproduction of the upper frequencies, between, say, 300 and 4,000 cycles per second, and therefore we find that, at any rate, we cannot afford to depreciate any frequencies in this band, and it is very desirable to arrange for a wider band.

Perhaps the reproduction of frequencies below, say, 150 or above 6,000 cycles per second is not of great importance in this case, but in actual point of fact the transmitters will be designed to have a far better over-all frequency characteristic than this.

Depth of modulation, however, would seem to be of much greater importance, and it is essential that the mean degree of modulation shall be kept as high as possible, and therefore the transmitters must be capable of modulating up to about 100 per cent. without serious distortion.

In fact, I anticipate that we shall operate these transmitters with a much higher degree of modulation than we adopt for our other stations, although of necessity this involves a certain amount of cutting of the peaks, i.e. amplitude distortion. The ordinary regional transmitter is modulated normally up to 80 per cent. on peaks, and in practice it is difficult to prevent the peaks sometimes rising to 90 or even more.

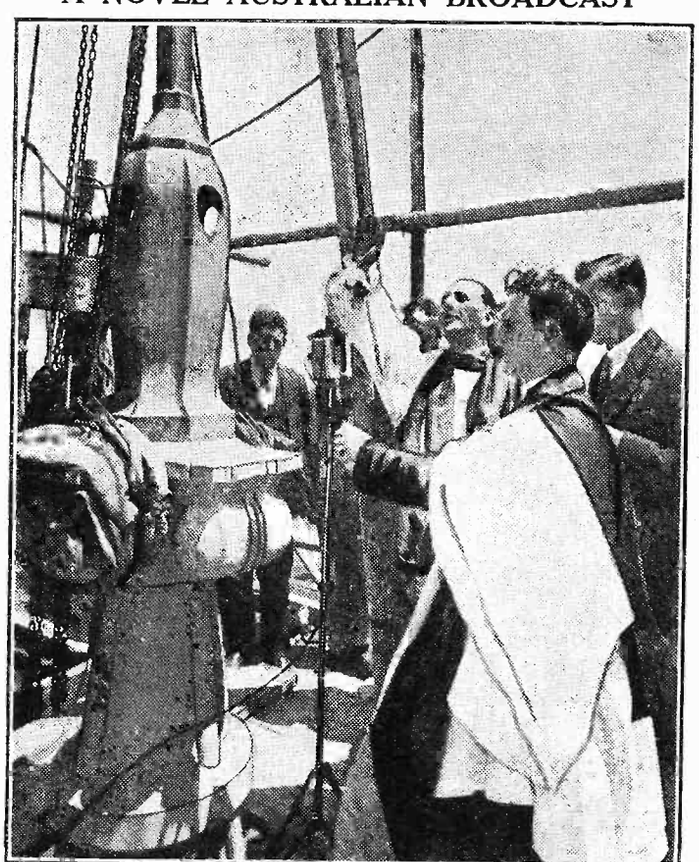
Mean Modulations.

This gives a mean modulation of the order of 25 or 30 per cent. In the case of the short-wave transmitters, however, it will probably be advantageous to allow the peaks to come up to 100 per cent., or even to be cut off somewhat in order to raise the mean modulation to as high as 40 or 45 per cent.

With regard to power, short-wave transmitters usually operate with about 15 to 20 kilowatts in the aerial, and it is doubtful whether any material advantage would be gained by raising the power much above this figure, unless it were raised to a very

(*Continued on page* 423.)

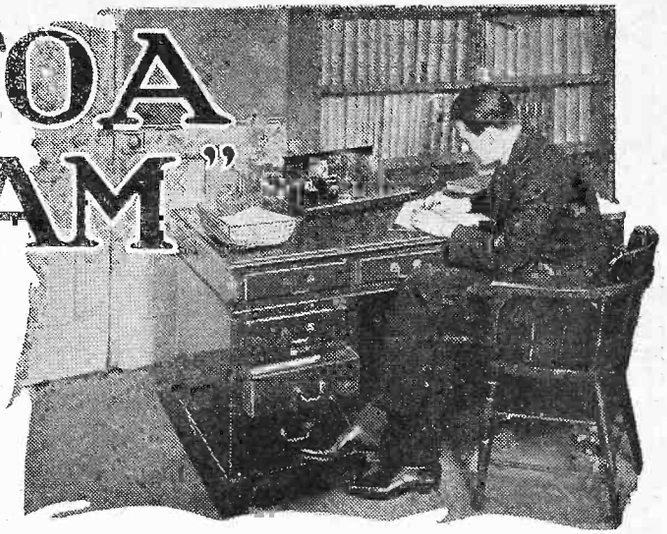
A NOVEL AUSTRALIAN BROADCAST



This broadcast, carried out from the dizzy heights of St. Paul's Catbedral, Melbourne, on a specially rigged platform 300 feet above the ground, was made on the occasion of a special dedication service by the Archbishop of Melbourne as the finial of the spire was placed in position. The wind at such a height was considerable, and one of the Archbishop's assistants had to steady the microphone with his hand, to prevent it being blown over.

LETTERS TO A YOUNG "HAM"

by ARIEL



With the whimsical perversity which might be expected from the writer of our "Radio Notes and News," "Uncle Ariel" starts his letters to young radio enthusiasts by addressing this one to a nephew who is only six months old!

And he gives the young fellow some really good advice, too, including hints on a course of training for dial-twisting!

MY Dear Young "Ham,"—I learn on good authority that you have been a member of the population for six months. How do you find things in general? Doubtless you consider this to be a great and terrible world, composed of milk, soap, water, powder, pins, and enormous heads which hover over your cot and emit the most foolish views; they remind you of the earliest forms of loudspeakers fed by distorting L.F. amplifiers.

A little bird whispered to me that you once had a father. However, I greatly fear that you have almost lost him since he built that "All and Every" Waver.

Goteborg and Tobacco!

Still, he will make rare appearances and will be known to you for many years as the bristly man who got Göteborg, and smells of tobacco—against which I would warn you. I don't smoke myself. Only a pipe. One every hour. Study moderation, young ham, and you will not overload the reaction.

It is early days to expect you to be able to speak with authority on the subject of "fading," but in a month or two you will have to begin to buck up and follow the trend of design. We can't molly-coddle you in that cot for ever, you know. The 1932 kid who can't hook up something and pull in a Yank is a back number, out of print. You'll have to drop blowing those bubbles soon and get down to a bit of good, honest wiring—and no scamping the joints, either!

Quite Simple.

I advise you to cut out the Benger's, or take more milk with it. It is the dopiest stuff and no good at all for DX work, for which you need a clear, sleepless head. Tell ma I said so, and see if you can come to some arrangement.

Yes, I know that ma is a *leetle* obstructive. Your late father told me about it when we went to buy his ganged condensers. These women—eh? Well, I'll have to leave you to get round her in your own way, but if I might be permitted to throw out a pointer or two I would mention that a nice big tooth—she'll call it a "toosumpeg"—would mollify her a whole lot, if you could manage it; whilst if you could humour her by saying "Dad—dad, mum—mum" whenever she holds a baby demonstration—why, she'll eat out of your hand. It's quite easy. Practise it while you are officially supposed to be asleep. You know what I mean—"bysie-bye." (Isn't it frightful stuff, this baby-Esperanto?) Quite!

A Costly Chest.

We will assume, then, that you have overcome the maternal scruples and are ready to get into the game. I advise you to talk it over with the chap in the next pram, because he has lost his father also—from the same malady which carried off your own lamented sire—except that *his* pa works chiefly on the South American and Australian stuff.

You will have observed, my dear young ham, that when Uncle Jim looms into your universe you find that you are levitated and pressed relentlessly against an unsympathetic semi-solid. It is Uncle Jim's chest, dear old "ham"! Nothing to be frightened about at all. It is deuced weak and is destined to cost the Wigan United Life Insurance Co. the sum of £1.000 in about three years. But that is another story. On this uncomfortable expanse you will discover divers harder substances known as buttons. I advise you to advance your fat little hand and give them all a good twisting. This will train you in dial twisting—and get rid of Uncle Jim.

You will remember me. I am the man who discovered that you were sitting on the nutmeg-grater. Your poor mother was telephoning for the doctor, being convinced that you had the croup! I removed the annoyance and gave you my watch ("tick-tick") to play with. The darned thing loses a minute an hour now.

A Family Friend.

So you will admit that I am a friend of the family. On the strength of that I beg you to steer clear of indoor aerials, which are sapping the vigour of the amateur movement. Unless, of course, you are going to give your life to D.F., in which case I shall have to see my lawyer about my Will—and you know what *that* means!

I was talking to your new nurse the other day. She disturbed me, rather, by saying that she thought you were somewhat unorthodox on the subject of screening. That is a terrible thought and has cost me several sleepless moments. My dear chap—Benger's apart and no joking—have I deserved this? Well, if you persist in this way of life—*no bunch of keys for you to dribble all over* the next time I call to inquire whether your pa has been heard of.

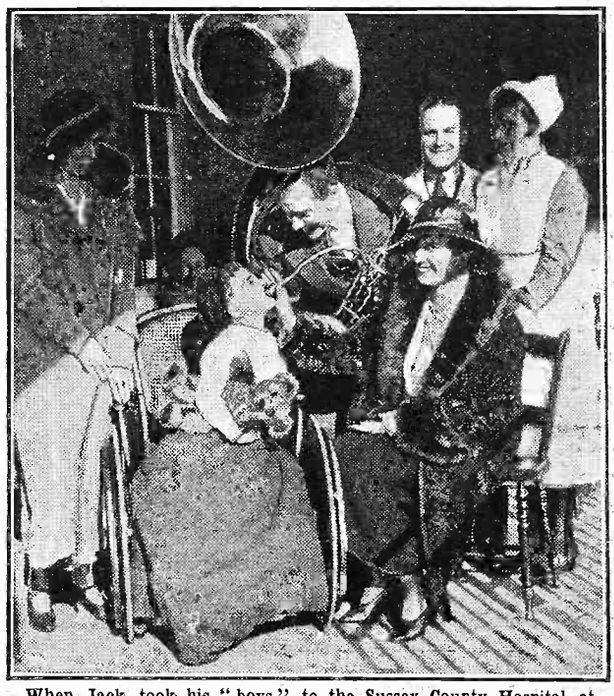
Fixing Matters.

By the way, that new nurse of yours—have you noticed any—er—well, well! I'm an old fool, I suppose, but—did you understand her to say that her brother has a really posh wave-meter? You see my point, my dear fellow? If you could fix the matter up—I should not require it for more than six months—I should be grateful. You will recollect that your first birthday is due in a few months. Could you do with a Teddy bear?

Yours in the Cause,

UNCLE ARIEL.

A LUNG TEST BY JACK PAYNE!



When Jack took his "boys" to the Sussex County Hospital at Brighton one small patient expressed a wish to blow the sousaphone. So, as shown here, Jack gave him a chance—but nobody was deafened!

THE MIRROR OF THE B.B.C. By O.H.M.

MEMBERS OF PARLIAMENT IMPRESSED

UNNECESSARY SUSPICION—A "WATT-HULBERT" REVUE—ALONE ACROSS ATLANTIC—SUNDAY MORNING PROGRAMMES.

SO the visit of members of Parliament to Broadcasting House, exclusively forecast in this column, has come and gone. I have spoken to several "backbenchers" on both sides as well as to a few of the "nibs," and I discover a curious unanimity of attitude. They are all impressed, and also they are all a little shamefaced, that heretofore they had such little and inadequate knowledge of the enormous influence of wireless in the modern scheme of things.

Commander Kenworthy, of course, was prominent. He is one of the few members who vie with Captain Ian Fraser in knowledge of broadcasting.

Commander Kenworthy, by the way, tells me that he has always maintained personal contact with Mr. Whitley—former Speaker of the House of Commons, and before that a prominent Liberal—now chairman of the B.B.C.

Suspicion Overdone.

Although I yield to no one in the admiration I advance for Broadcasting House, I am bound to enter a mild note of protest about the new attitude of suspicion towards visitors to Portland Place.

I was "watched" the other day all the way to the official I was seeing, and he seemed mightily anxious to attend me himself until I was off the premises.

I realise, of course, that undue advantage has frequently been taken of the "freedom of Savoy Hill," but I suggest seriously to those in charge that to victimise numerous friends for a few known enemies will lead only to the increase of the latter category.

The Pace Stiffens.

The best product of the move to Broadcasting House that I have observed is a general "heart-searching" on the point of whether the old gang or part of it can live up to the necessarily higher standards that will be expected of them.

In this connection Mr. George Grossmith has decided views. He was for several years paid adviser to the programme chief, and he has consistently advocated a more "professional" view of the production of B.B.C. entertainment. He is credibly reported as stating repeatedly that the only sure way to give the public what it should want is to introduce "sponsoring" by the entertainment industry.

I hear that the other "programme adviser," Mr. Filson Young, is not of the same mind, preferring to maintain and develop present talent and enterprise. The decision should be taken by the B.B.C.

Humorists Combine.

I hear that Ashley Sterne and A. A. Thompson, two of our leading humorists in print, are collaborating in the writing of a radio revue entitled "Grand Slam," which is to be presented in the near future. And what is even more interesting, is that Mr. Sterne is not only assisting in the preparation of the book, but is writing the music as well.

A Hulbert Novelty.

With this piece of news comes another item about a musical comedy show by John Watt and Claude Hulbert, with music by Harry Pepper, which is being presented for Regional and National listeners on Thursday and Saturday, June 23rd and 25th respectively.

The play has not yet been given a title, but, of course, it will have one by the time that Claude Hulbert is ready to take part in it with Gene Gerrard, who, I understand, is making his first important studio appearance in the leading rôle.

A Cockleshell Adventure.

The thrilling experiences of Mr. Weston Martyn in a cockleshell craft for three hundred miles down the coast of America will be described in the fifth "Hazard" broadcast talk on Saturday, June 18th.

Mr. Weston Martyn is continually undertaking long voyages in small boats at no small peril to himself, as, for example, when he sailed from Falmouth to New York and back in a small cutter, and accomplished his journey of ten thousand miles in seventy-eight days!

Sunday Extension.

Within a few weeks the mid-day Sunday programmes which started on June 5th will be as commonplace as other regular features of the broadcast fare. For the time being, however, they bear the stamp of novelty, and listeners will welcome a few details of those for Sunday, June 12th, the second week of extended hours.

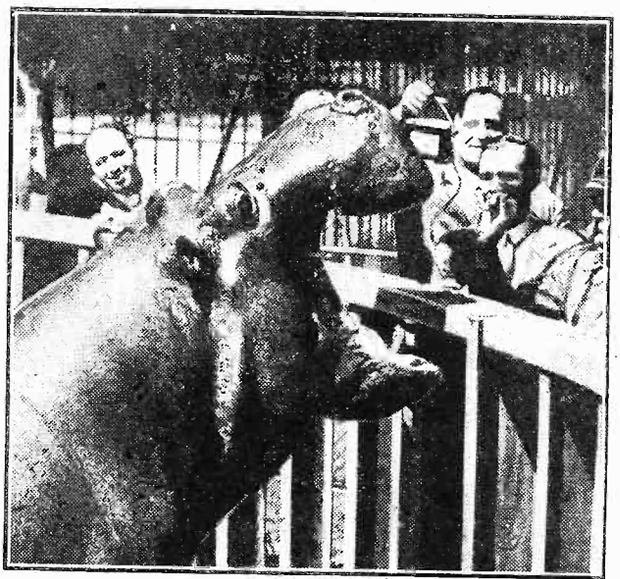
For this Sunday (June 12th.) there is a concert by the Commodore Grand Orchestra, directed by Joseph Muscant, relayed from the Commodore Theatre, Hammersmith.

Such a broadcast would normally excite the greatest interest, but the items will be characteristic of Sunday programmes played by outside orchestras which are transmitted by the B.B.C. Personally, I think they are worth setting out in detail.

They are: Fantasie—Linke-Winke (Linke); Entr'acte, Two Guitars (Horlick); Medley, compiled by Joseph Muscant; Intermezzo, Nightingale in the Lilac

(*Continued on page* 423.)

"I WANT MY DINNER"



Budapest listeners who switched on the other day were astonished to hear the most awful roar imaginable—it was a broadcast by a hungry hippopotamus during a running commentary from the Budapest Zoo.

THE LISTENER'S NOTEBOOK

A rapid review of some of the recent radio programmes.

AN article in a recent number of "Die Rundfunk Tage" (a German wireless journal), entitled "What the Listener Must Know," suggests that the German listener is just as prone to grouse at the programmes as his English cousin!

It says, among other things, "Wireless has to speak to *everybody* from 7 a.m. till midnight every day, to townspeople and to country people, to rich and poor, to high and low, to men of all parties, stations, vocations and creeds, to young and old, to the healthy and the sick—in short, to all sorts and conditions of men. . . Since wireless is *everybody's* possession, it must consider *everybody* in its programmes, and provide suitably for *everybody*."

* * *

The fact that there was no commentator at all on the occasion of the foreign relay of Gustave Carpentier's Dramatic Symphony leads one to believe that the B.B.C., far from having solved the difficult problem of commentating, have abandoned the practice altogether. Surely such a relay as "La Vie du Poète" required something in the way of an explanation, for a fuller understanding of the work?

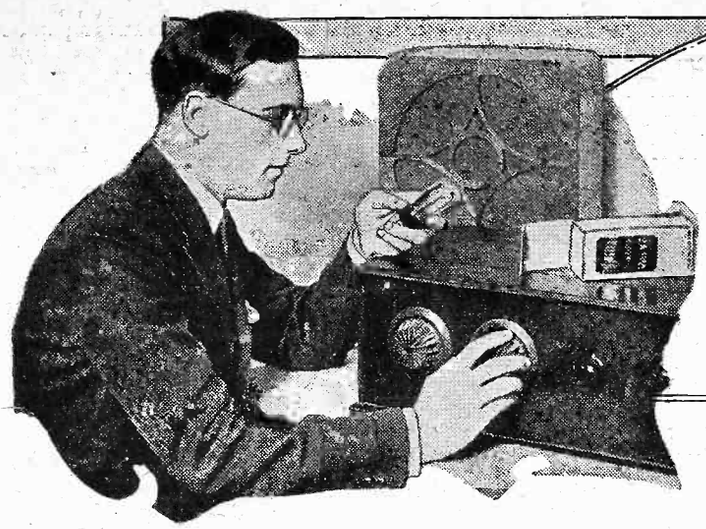
* * *

Though I feel that America hasn't much to teach us of the art of Broadcasting, I do think, from what I hear, that their methods of commentating might be studied by us to our advantage.

* * *

When a satisfactory system has been devised, I should then plump for more of these foreign relays. Interchange of programmes between nations can only result

(*Continued on page* 424.)



Yesterday —And Today

Wireless enthusiasts in 1932 think of the days of "crystal and cat's-whisker" much as they think of Stephenson's "Rocket"!

Yet only *ten years* have passed since the strange experiences recalled here by our contributor.

A PARAGRAPH in "P.W." dated June 17th, 1922, reads as follows:

"Mr. Kellaway, the Postmaster-General, recently said to an 'Evening News' representative:

"If wireless broadcasting becomes as popular in this country as it is in the U.S.A., there should be something like 500,000 receiving sets here in a short time, instead of the 7,000 or 8,000 at present. There is no doubt that we are at the beginning of the creation of a considerable new industry."

A considerable new industry!

Tremendous Advances.

Much current has flowed in the service of wireless entertainment since those prophetic words were spoken—spoken, remember, at a time when amateur wireless enthusiasts were regarded by the general public much as the medieval romancer was regarded by his fellows—as a being apart, to be viewed with considerable distrust.

The experiments of the old-time seeker after knowledge usually led him to a dark, damp dungeon, or a stout stake and a hot fire. But in 1922, a more enlightened age, men simply shrugged their shoulders at the wireless experimenter, tapped their foreheads, made pitying noises, and passed on.

Carborundum crystals held the field as detectors or rectifiers, and were judged according to their merits. Some detected and some didn't! They were generally soldered into little metal cups, and were stimulated into action by being carefully tickled with a thin spiral of wire, the "cat's-whisker."

Heigho! Only ten years ago!

But the coming of wireless telephony, as distinct from wireless telegraphy, created a real interest for a large section of the public. POPULAR WIRELESS was born, the first popular wireless weekly.

Some Queer Queries!

Readers thirsted for wireless knowledge with an avidity which flattered the editorial staff. Here are a few actual queries from 1922:

"What does H.T. stand for?"

"What is the difference between a rectifier valve and a three-electrode valve?"

"What is a capacity condenser?" (Ah, what?)

Also letters like the following, received from earnest enthusiasts in the first flush of wireless fever:

"Dear Sir,—I have made a crystal set, but cannot hear music. Please write and tell me why.

"Yours truly,
"____."

And:

"Dear Sir,—I have manufactured a crystal machine, and am using the spring of my bed as an aerial and a flower-pot for my earth. The flower-pot is right full with dirt, and the earth lead is buried in it. I cannot hear anyone speaking or singing, so I thought I would ask you if anything is wrong.

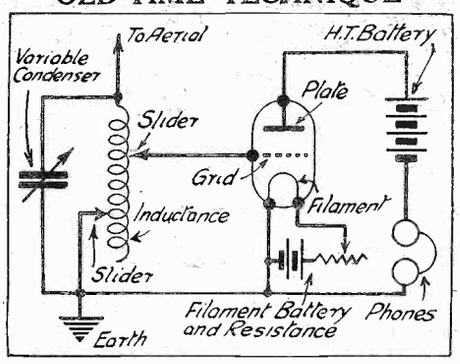
"Yours faithfully,
"____."

Compare these with Captain Eckersley's "Query Corner" to-day!

In "P.W." (No. 3) appeared the ancestor of the "Titan-Magic-Comet" receivers, the forefather of all "P.W." sets.

The theoretical diagram is reproduced here. Note the position of the telephones—an accepted practice in 1922.

OLD-TIME TECHNIQUE



This ten-year-old one-valver had the telephones connected to H.T. negative, and used no grid-condenser or leak! A modern one-valver would knock spots off it!

The valve, of course, was a bright emitter requiring 6 volts on the filament and between 60 and 80 on the plate, according to type. Oh, yes, strange as it may seem, more than one type of valve did exist! On very rare occasions they were even *delivered* to purchasers who had faithfully paid their money and served the necessary probationary period (enforced rigidly by the makers on all would-be customers). Did not their very advertisements state "valves are short at present"?

Thus with cash—and patience—a Marconi-Osram receiving valve could be obtained for 27s., post free; a V24 valve for 24s. 6d.; or a Mullard "O.R.A." valve for 15s. 6d.

The Good Old Days?

Other component prices ruling in 1922 make interesting reading. Here are a few. Valve holders, 2s. to 6s. 6d. each. Grid leaks, 4s. 6d. to 7s. 6d. each. Filament rheostats, 5s. 6d. to 9s. 6d. Fixed condensers, ·002 mfd. and ·003 mfd., 6s. 9d. each, post free. Telephones (high-resistance), 36s. a pair, post free.

Viewing this price list, one can understand why a component of any description was hoarded like miser's gold, and locked away each night for fear of dust or damage.

A really good piece of crystal, for instance, was pampered like the lap-dog of a Restoration duchess. It was bathed in alcohol and treasured in cotton-wool when not in use.

The happy owner would exhibit it proudly to a selected and favoured few, putting it through its paces ("Poldhu with the 'phones on the table, old man, if you bend down"), eyeing his pet fondly the while, and returning it to bed, exhausted, at the close of the performance. He lavished more care and consideration on its welfare than he would have done on the "Koh-i-noor."

That "New Industry."

How many wireless amateurs to-day possess a crystal? Many would hardly recognise one if they saw it. Shades of the coherer and the magnetic detector! The crystal passes to your ghostly brotherhood!

Times change, and not only crystals, but all the heavy, unwieldy components of a decade ago have gone for ever. Out of date, in many ways inefficient, expensive to make and therefore costly to buy, they have been ruthlessly eliminated by keen competition among the members of that "new industry" forecast by the Postmaster-General in 1922.

NO HOPE FROM THE MONTREUX MEETING!

Our SPECIAL CORRESPONDENT is pessimistic about the results from this month's conference of European broadcasters.

THE annual general meeting of the Union Internationale de Radiodiffusion, which takes place this month, will not be at Lausanne, the usual meeting place of European Broadcasters. Instead, they will meet a little further along the lake of Geneva, at Montreux.

I have a very selective receiver and use a small indoor aerial some 20 feet in length. I can eliminate my local station, situated only two miles away, in three degrees of the dial. The set is located in Berlin, in the heart of the town. I can get Prague at any time in the day.

International Cocktail.

Langenberg also comes in, though a little weaker. But during the last weeks I have hardly been able to tune-in the North Regional lying between the two. I get either a mixture of English and Czech or a cocktail of German and English. And there is seldom an evening that London is not heterodyned by either Mühlacker or Graz.

Every month I have a good look at the extremely interesting curves published by the Brussels laboratory of the U.I.R. I see thin lines referring to Russian stations; those same Russian stations that again intend increasing their power for the coming winter. And Russia is not a member or signatory to any international radio convention.

As I say, I have a selective receiver, one that cost quite a lot. I have a short aerial and can make it even shorter (I don't mind cutting off some of the higher frequencies), but I am unable to get the station I want without a whistle or "talk-over."

I know I shall have to get an even more selective receiver for next winter. For there is no hope from Montreux and even less hope from Madrid.

Already Engaged.

A very high German Post-Office official pointed out recently that even should the broadcast waveband be enlarged at Madrid, for the whole world, this will only mean a gain of some 14–16 waves and most of these are taken up already by Swiss, German, Russian and Luxembourg stations. So that even should we get the waves from 600–1,300 m. for broadcasting, this does not mean that we shall get more wave separation.

Granted that broadcasting gets 16 more wavelengths at Madrid (we will hardly get more because nobody wants waves below 200 metres or over 2,000 metres); granted that at the world conference the nations decide to limit the power of broadcasting stations; granted that some system of international single wavelength working is approved of, all this will first have to be ratified before it can come into force.

North v. South.

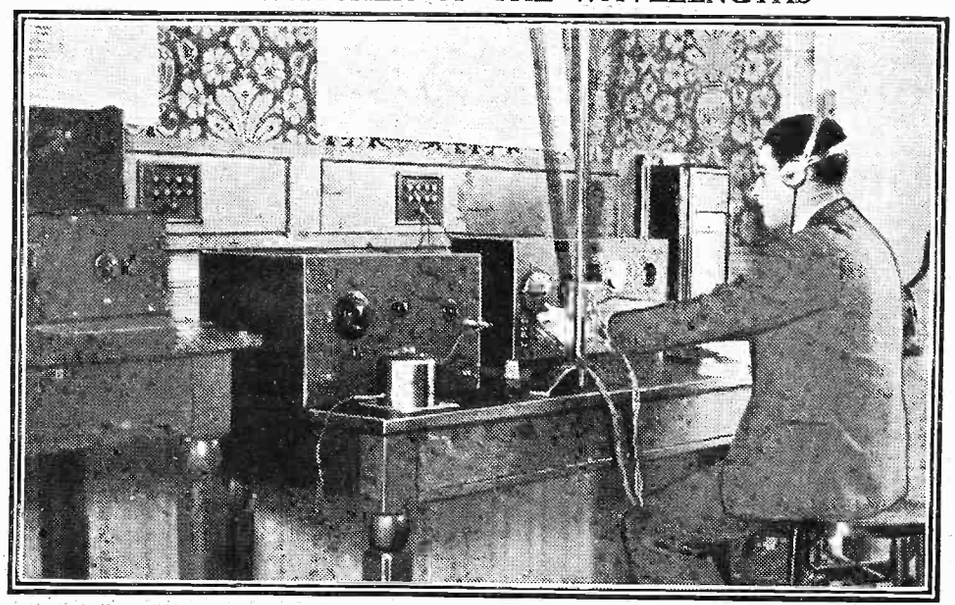
The Washington conference took place in 1927. The new regulations decided upon at that conference only came into force on January 1st, 1929! It cannot be otherwise with Madrid. The conference begins in September and will last some months.

But we always forget that the Madrid conference will only be concerned with *world* problems. We Europeans want more wavelength space between stations. I once suggested giving those countries with few listeners fewer wavelengths; all southern countries have less listeners per thousand inhabitants than any northern country, and this is natural, for in the south one lives out of doors, and in the north indoors.

But nobody can take somebody else's wavelengths without him agreeing to it, and for reasons of national prestige and policy no State will give up its wavelengths. Germany is prepared to give up the four waves it has "loaned" from other countries. It may be prepared to give up one wave to help generally.

Britain is prepared to do the same. But in spite of all this, we shall have to be thankful if the present 9 k.c. separation is adhered to. Even if we can hope for some relief it cannot come before 1933/34. Next winter will be the same as this, only worse.

THE WATCHER OF THE WAVELENGTHS



One of the official watchers at Brussels, who checks wavelengths, notes heterodynes, and generally "polices" the ether channels used for broadcasting.

"R.I.'s" TENTH ANNIVERSARY

Congratulations to a Famous Firm.

RADIO INSTRUMENTS, LTD., has just completed its first ten years, and we offer the firm our sincerest congratulations. Archæologically speaking, ten years is a mere moment of time, but in radio, and particularly in the radio industry, the past ten years covers an almost incredible wealth of development, success . . . and misfortune.

Full Sail Set.

And there is no greater proof of the solidity and integrity on which the foundations of the business of R.I. were built, than that this firm has weathered these ten years with full sail hoisted all the time, and emerged into 1932 in the very van of the industry.

In 1922 the name of R.I. stood for high-class production, and in later years R.I. was nearly unique in the manner it stalwartly refused to join the "get rich quick" scramble for easy money at the expense of an uninformed, intrigued, and excited public.

(That this policy was suicidal is proved by the records of the Bankruptcy Court.)

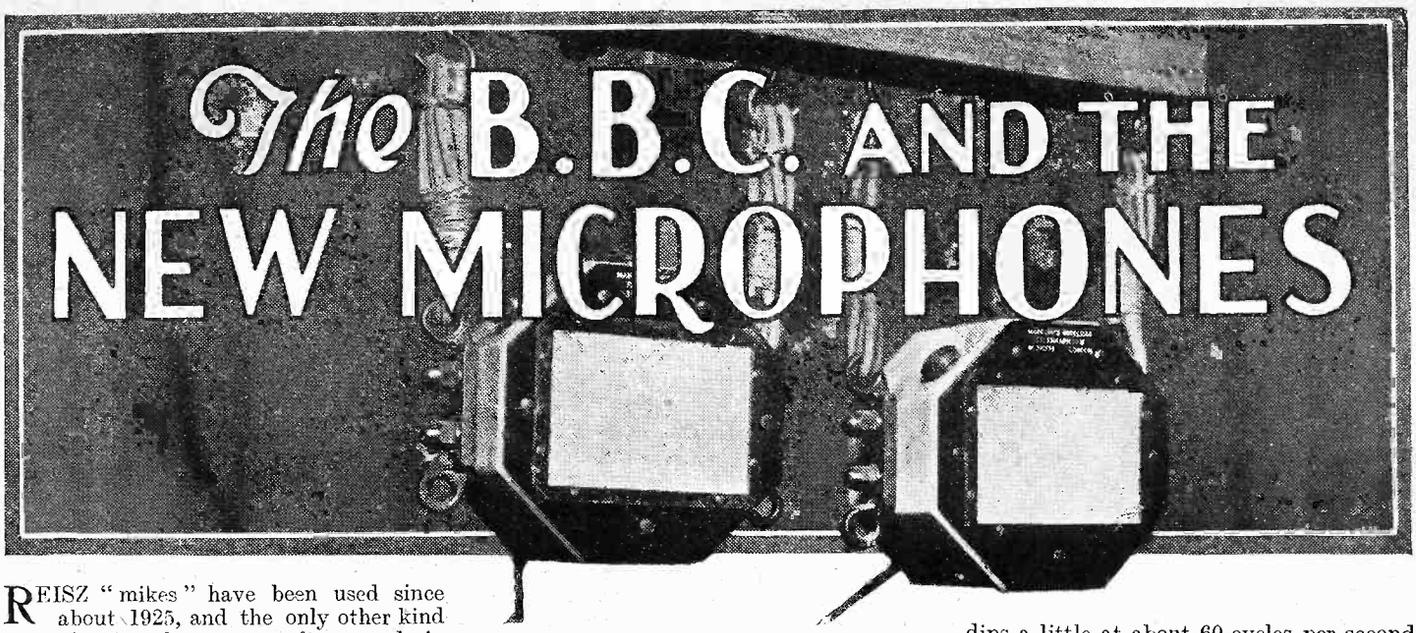
"P.W." owes R.I. no inconsiderable debt in that "P.W.'s" first great valve set success, the "P.W." "Combination" Receiver, could hardly have achieved its colossal triumph had R.I. not been in existence to supply unlimited quantities of dependable, high-grade L.F. transformers.

A Golden Example.

And through the whole of the subsequent years R.I. maintained and even increased its powers and stood as a golden example for all to benefit from. R.I. has never manufactured down to a price, and enclosed shoddy materials within polished cases, so the result is that to-day, as ever, the name of R.I. is respected by engineers and public alike.

Mr. J. Joseph, the builder and captain of the good ship R.I., has ample reasons for feeling intense self-satisfaction. But we know that he won't, for he is too modest, and is a man who sets his eyes on the horizon—ever looking forward.

The B.B.C. AND THE NEW MICROPHONES



Not content with putting new amplifier and control gear into Broadcasting House, the B.B.C. engineers are now testing out new microphones in an attempt still further to improve quality. These extremely interesting instruments are here described by A SPECIAL CORRESPONDENT.

REISZ "mikes" have been used since about 1925, and the only other kind of microphone now often used in B.B.C. studios is the condenser mike.

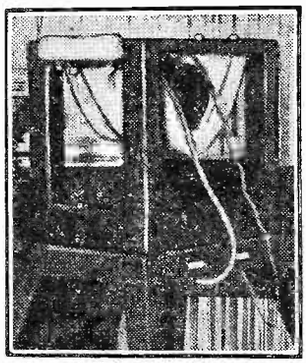
Rumours are always going the rounds, though, that some new kind of microphone is to be introduced, and since the installation of the new Broadcasting House amplifiers for microphonic work, there have been further reasons for supposing that the Research Section of the engineering staff is on the lookout for a new kind of microphone which will work hand in hand with the Reisz microphones and overcome some of their disadvantages.

The Best All-Rounder.

When, a few days ago, I was chatting with one of the leading engineers, about studio matters, I happened to see some microphone response curves on his desk, and conversation naturally turned towards the old topic.

"I doubt if we shall get a microphone quite so generally satisfactory as the Reisz for quite a long while," said this official.

AN OLD TYPE



One of the old magnetophone "mikes" showing the method of suspension by a thick rubber band.

"In the 1923 days we gave up carbon microphones (Post Office type) because of the frequency cut-off, and, still later, we gave up the magnetophone (a moving-coil speaker type of instrument, working in reverse) because it was not good enough at the extreme ends of the frequency scale.

A Fine Frequency Response.

"The B.B.C., in common with many leading broadcasters on the Continent, adopted the Reisz microphone, which is really only a modification of the old carbon mike, because it has such a fine frequency response and because it is so reliable. It does not need batteries near it, as did the magnetophone, and it can stand a lot of kicking about—an essential thing where outside broadcast work is concerned!"

"What about the condenser microphone in the Wharf studio?" I asked. "Wasn't that a type of mike which might have been used for other transmissions?"

"It is a popular supposition that condenser microphones have been done away with," he said, "but new tests make it very likely that transmissions shortly to be heard, especially of music, will be by new condenser microphones."

The B.B.C. at the Clapham Research Department makes up microphones for its own tests and also conducts extensive experiments with large numbers of commercial types of microphones.

Condenser Instruments.

There are two kinds of condenser microphones which may shortly feature in the transmissions, one being the high-frequency condenser microphone, and the other the ordinary condenser microphone.

Both have their uses, but the output of the high-frequency condenser is so much less that it can only be used in certain circumstances. The engineer explained both systems to me and showed me the frequency curves of both types.

The high-frequency condenser goes down to about 35 cycles per second, so that organ lovers need not fear that the deep pedal notes will be "chopped off." The curve dips a little at about 60-cycles per second but rises at the frequency point where many receivers begin to drop off, about 100-cycles per second.

It drops to its lowest output at about middle C, and then rises progressively to about 7,000 cycles per second, in order to counteract the cut-off which the average receiving set makes here.

The output of the ordinary condenser microphone, always at a higher level than that of the H.F. job, is greatest in the bass and decreases gradually to about 2,000 cycles per second, when it rises sharply to a peak at 4,000 cycles per second, to counteract the receiver cut-off.

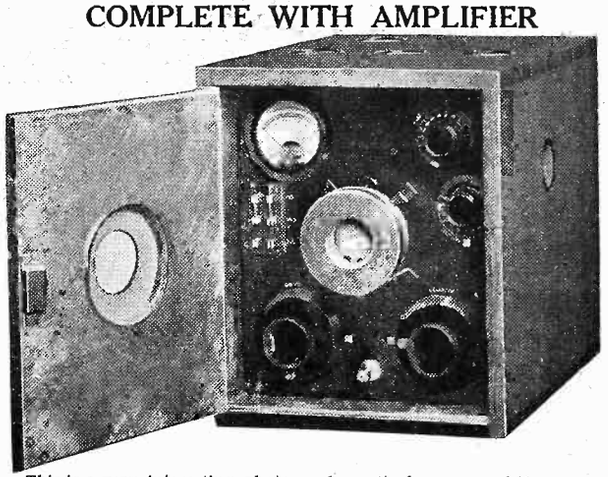
Balancing the Curves.

Not only do the B.B.C. engineers have to choose a good microphone, but they have to get the curve right to correspond with the reproduction curves of average receivers. Response in the average set is very poor at above about 4,000 cycles per second, and if the transmitter were to cut-off here, too, there would be no "top" to the radio reproduction.

The H.F. condenser mike is mounted on the ebonite panel of the oscillator and amplifier valves which are connected

(*Continued on next page.*)

COMPLETE WITH AMPLIFIER



This is a very interesting photograph, as it shows one of the new H.F. condenser "mikes" complete with oscillator and amplifier. This type of microphone gives exceptionally brilliant quality.

THE B.B.C. AND THE NEW MICROPHONES.

(Continued from previous page.)

directly to it, and which are contained in a little wooden box, with a hinged front through which the microphone opening can be seen.

I was told that in the H.F. job the microphone, consisting of the two plates of a condenser, is connected across the grid of a valve which oscillates at 667 kilocycles. The little condenser modulates this miniature transmitter, and as the output is so feeble the amplifier has to be built right up to the oscillator in the same case.

High-Frequency Distortion.

The H.F. mike is not quite so simple as this, though, and the engineer explained to me that in early microphones of this kind the trouble was to get rid of the H.F. distortion. They correct this in an ingenious way. Part of the little unmodulated carrier-wave set up by the oscillator is separately detected and applied to the following amplifier after the "phase" has been changed.

This corrects any carrier-wave noise which might be present in the detected speech-wave. Technical enthusiasts will know what I mean when I say that this kind of "mike" has a ratio of signal to noise of 60 decibels.

I can best explain this by saying that, whereas an ordinary Reisz microphone has a noticeable hissing background, especially when there is nothing going on in the studio, the H.F. condenser mike is quite silent.

The controls are seen on opening the hinged front of the microphone box, they include the two tuning knobs for the oscillator and balancer circuits, a variable condenser which "tunes" the high-frequency microphone, and a double-purpose meter with a switch.

The difficulty of using an H.F. condenser microphone, or, indeed, a condenser "mike" of any type for B.B.C. outside broadcast work, is the need for batteries close to it. The H.F. condenser mike and amplifiers need 6-volts 4 amperes for the valve filaments, an H.T. battery giving 150 volts 60 milliamperes, and a 24-volt G.B. battery.

Largely Used for Records.

This makes the whole equipment rather bulky, and means running battery lines into the studio. As all the leading gramophone companies use condenser microphones, though, this should not be a serious snag for B.B.C. work. The "crispness" of tone on many new records is due to the condenser mikes.

An ordinary condenser microphone (not H.F.), has a little diaphragm of the new metal duralumin, separated from an insulated steel backplate by a small air-gap.

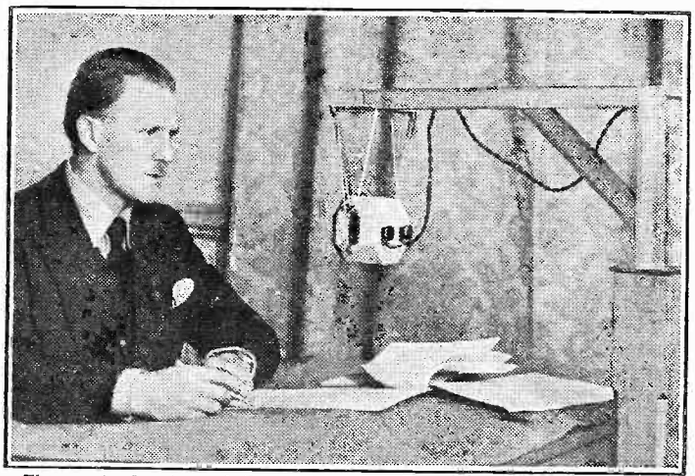
A 150-volt battery is connected between the backplate and the diaphragm, thus forming a charged condenser, the capacity of which varies as the sound waves reach the duralumin diaphragm. The "mike," in the case of one standard model, plugs into its following amplifier with a simple ball catch, and the three batteries for the L.F. valve are carried in a separate case.

Completely Screened Case.

The small wooden box which carries all the apparatus is, I saw, lined with sheet brass to screen it. If this were not done, the microphone would pick up noise from the electric light wires in the studio. In another type of condenser mike, used by the gramophone companies, and tried by the B.B.C., the single-stage amplifier is carried in a metal tube, earthed to prevent pick-up, and the microphone itself is held in a bracket beneath this canister.

New artistes who have rehearsed before a Reisz microphone must not be startled if, on entering the studio, they are faced with a weird piece of apparatus looking more like a camera than a "mike." It may be one of the new condenser-microphones, and they must blame the engineers!

REDUCING THE BACKGROUND NOISES



The great advantage of the condenser microphone is that the background noise is much less noticeable than with the Reisz type. The instrument shown in the above photograph is of the latter pattern.

A SUPER-HET. SUGGESTION.

By F. BRIGGS.

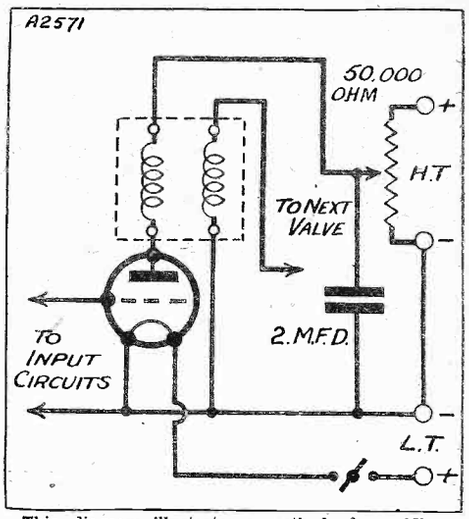
SUPER-HETS. are quite popular just now, and many enthusiasts have turned their attention towards this fascinating type of receiver. I myself have been experimenting with them for some time now, and in the course of experiments have come across several extremely interesting little points.

Only the other day I hit upon one which I feel sure will be of interest to readers of this journal, and especially if they are super-het. enthusiasts. Of course, there are probably a few who have already discovered the same thing for themselves, but for the benefit of those who have not, here goes.

It concerns the voltage which should be given to the anode of the first detector, and it applies particularly to that type of "super" which employs a separate oscillator valve, and an ordinary three-electrode "tube" for the first detector.

Experience has shown me that if the

GREATER SENSITIVITY



This diagram illustrates a method of providing the 1st detector of a super-het. with a variable H.T. tapping.

set is to be worked at its maximum efficiency it is very important that the correct voltage is given to this valve. And what is more, it is surprisingly critical. A variation of a few volts makes a tremendous difference to the results obtained.

The only extra components required are a wire-wound potentiometer of about 50,000 ohms, and a large fixed condenser having a capacity of anything from 1 mfd. upwards. Fig. 1 gives all the details for connecting up, but it should be pointed out that some method must be provided for breaking the lead between the potentiometer and H.T. negative when the set is switched off.

Breaking the Pot. Circuit.

If this is not done, the H.T. will be constantly discharging through the potentiometer, no matter if the set is in use or not. If a mains unit is being used, however, this precaution is not necessary, as the unit is always disconnected from the mains when it is not in use. Of course, there is an alternative method if batteries are being used, and that is to see that the H.T. plugs are removed when the receiver is turned off, but it is not nearly so satisfactory as a proper switch. By far the best scheme is to use a three-point on-off switch in the set.

Referring to the diagram, the on-off switch should be omitted and a through connection made. But in its stead you should procure one of the three-point variety.

The New Wiring.

Now disconnect the wire going from L.T. negative to one side of the 2-mfd. condenser, etc., and also the lead from H.T. negative to one side of the potentiometer. You are now ready to insert the three-point switch.

Join each of the three points mentioned—namely, bottom side of potentiometer, H.T. negative and the junction at the bottom of the 2-mfd. condenser, to separate contacts on the switch.

It is remarkable the difference this simple alteration makes to the range of a super-het. At any rate, just try it and see.

STATIONS WORTH HEARING

Up-to-the-minute information for the long-distance searcher.

THE hateful atmospheric is still with us pretty frequently, though, thank goodness, the trouble that we are experiencing from this kind of interference with wireless reception is nothing like so bad as it was this time last year. So far man has failed to find any reliable method of eliminating "X's" completely; the most that we can do is to adopt such palliatives as are available and to hope for better times.

What palliatives are there? One of the most effective, if the set has plenty of H.F. amplification, is to use a frame aerial. It can be used often in such a way as to dodge atmospherics.

These are usually broadcast from one particular centre; the impulses due to them therefore reach the frame from a definite direction. If we rotate the frame slowly we frequently find that there is a position at which atmospheric interference is at a minimum. This, of course, limits one's choice of stations considerably—but half a loaf is better than no bread.

I referred recently to the very interesting conditions prevailing on the medium band, and prophesied that before very long we would hear little or nothing of the majority of Continental stations near its top. I seem to have proved myself a poor prophet, for during the past few days there have been very distinct signs of an increase in the strength of transmissions on wavelengths between 440 and 500 metres.

Broadcast Bandits.

Budapest, previously almost if not quite inaudible, has been heard on several occasions, and Vienna has made a welcome return to the pages of the log. Rome has shown an improvement that is nothing short of extraordinary. On several nights I have found him one of the best and strongest of the medium-wave stations.

Below 260 metres heterodyne and jamming are very bad at the moment, though there is, happily, very little spark interference. The lower part of the band has long been the most lawless portion, and it is high time that the U.I.R. took measures to restrain the activities of the bandit stations which grab any wavelength that takes their fancy.

A station well worth your attention, for I am sure that you will not have logged him for some time, is Belgrade. On several recent evenings remarkably good reception has been obtained from him—full loudspeaker strength with excellent quality.

Brussels No. 1 maintains the improvement that he began to show recently, and is now quite first-class. Florence varies, but is always worth trying for. Prague, recently rather weak, seems to be returning to form, and Beromunster provides fine entertainment.

Milan, the Poste Parisien, Breslau, Göteborg, Hilversum, Bratislava, Heilsberg, and Gleiwitz are all stations to make a note of at the moment.

R.W.H.

SHORT-WAVE NOTES

By W. L. S.

THE news of the week is hardly startling; most of my letters are informing me that Rome on his 25-metre setting is coming over well, and that C T 1 A A on his new wave of 31·25 metres is irregular, but generally good; 42·9 metres is quite a blank spot these days!

As a matter of fact, I doubt whether Rome will ever go back to that wave, although it is possible that some pitch between 43 and 46 metres will be filled by him when his 25-metre season is over.

Apropos my remarks recently about expressing reception in "percentages," as a correspondent suggested. I have received another list (from "J.S." of Dumbarton) which checks up quite well with the first. He, however, puts Zeesen first with 95 per cent; C T 1 A A is second with 90 per cent; after him come Rome, Rabat and Moscow (all 50 per cent), Radio Colonial (35 per cent), and a long "tail" composed of Americans, Sydney and Nairobi.

New Americans.

I have had confirmation of the fact that the American broadcast just above the 20-metre amateur band is from W A J. The other new one just *below* the band is W Q V (or W 2 X B J).

"R.T.W." (Tavistock) badly wants a tip for reducing the interference from the ignition systems of cars along a nearby main road. He is already using a "detector-only" type of set, which gives better results than most in the way of quietness.

Cutting down the aerial and the usual dodges seem to have no effect. Short of the erection of level-crossing gates on the main road, "R.T.W.," I'm afraid the only remedy is to grin and bear it. Thanks for your log.

Instant Identification.

I hear that our old friend P C J is experimenting on 38 metres, and wants reports. Having had very little time for listening this week I have not heard him myself as yet.

Although I have already pointed out that I can't possibly give a list of amateur telephony stations in "P.W." I think it might be a help to the novices if I mentioned the "nationality prefixes" of some of the more common Europeans. Great Britain, of course, in G. France uses F, Holland PA, Belgium ON, Germany D, Denmark OZ, Czecho-Slovakia OK, Hungary HAF, and Spain EAR.

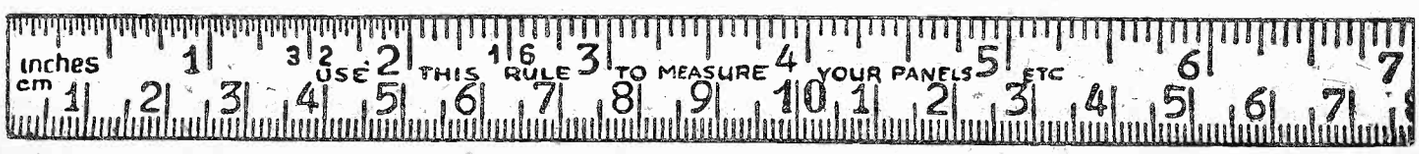
I should estimate that anyone with an average receiver ought to be able to log 500 European amateurs, and at least 100 of them on telephony, during the course of the average Sunday morning. This implies listening on both 80 and 40 metres, although I shouldn't be surprised if it were possible on 40 alone.

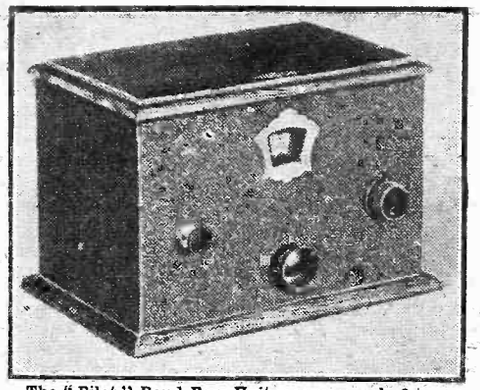
The chief trouble lies in identifying some of the unbelievably bad French transmissions, some of which sound as if the owner were trying to superimpose telephony and music on *spark!*

That "Ticking"!

How many readers remember the mysterious "ticking" that used to bother me on short waves two or three years ago! I never found out what it was, but it disappeared and saved me from further worry. I have thought no more about it until now, but here before me is a letter from "W.H.L." (Scarborough) complaining of the same sort of thing. He has no mains on the premises, and there are no motors round about.

I am rather inclined to think, "W.H.L.," that you may trace it to a gas-engine a fair distance away, with a long plug-lead that makes a nice aerial! Having heard one of these in Wales recently, I believe my own ticking and yours may be put down to something of the sort. So if you walk round the neighbourhood listening for an asthmatic "chuff-chuff" you will probably find the cause of the trouble.





The "Pilot" Band-Pass Unit measures only 9 in. × 6 in. × 6 in., and it is but the work of a few moments to fit it to your existing set.

THE "PILOT" BAND-PASS UNIT

Here is a simple little unit which brings band-pass tuning within the reach of all. It is the latest product of the Peto-Scott Company, and in this article a "P.W." technician describes the results of his tests with this ingenious adaptor unit.

IS band-passing the coming thing?

Perhaps that seems rather an unusual method of approach to a review of what is, I believe, the first self-contained band-pass unit to make its appearance for converting existing sets.

Yet it is, I feel, a point of view well worthy of consideration in view of the fact that considerable divergence of opinion seems to exist concerning the future of band-pass circuits in general.

The Future of Band-Passing.

Some will tell you that there is nothing to equal a band-pass circuit—others may rule out the scheme as being far too costly, or may even turn it down on grounds of complication.

While it is impossible to predict with any degree of certainty whether the band-pass circuit will ultimately become as much an accepted practice in radio design as, for instance, the "Cosmic" arrangement, the modern tendencies point quite definitely to the fact that its popularity is on the increase.

Obviously, there must be a reason for that, and I regard it as a sufficiently good one to justify the ingenious little unit which the Peto-Scott people have recently placed on the market.

A well-designed band-pass circuit does definitely give a degree of selectivity adequate for present-day conditions, and when we reflect upon the present state of the European ether, that is saying a lot in its favour. The same is true of the "Pilot" Band-Pass Unit. It is without a doubt the ideal thing for use with almost any set in which station separating difficulties are experienced. What is more, although it necessitates the manipulation of an extra tuning control—which is inevitable unless the circuits are ganged—it does not seriously complicate the operation of your existing set.

A Commendable Scheme.

For those who are interested in theoretical considerations, it may be of interest to mention that the "Pilot" unit consists of the aerial half of a more or less conventional band-pass scheme with, of course, the necessary coupling arrangements.

Obviously, it is rather a commendable scheme, because it means to say that you can make your set into a band-pass arrangement without making any alterations to the existing circuit.

At the back of the unit—which, as will be apparent from the photographs accompanying this article, is extremely neat in appearance—there are three clearly marked terminals. To the left-hand one marked A1 you connect the aerial lead-in, while the one on the right marked A2 is joined to what is normally the aerial terminal on your existing set.

The third terminal on the back marked E is joined by a piece of flex to the earth terminal on your set, to which is also joined the usual earth lead.

Those are all the connections that it is necessary to make to put this little unit into use, and to make your set into a band-pass arrangement.

Concerning the Controls.

Before I pass on to the question of our official tests with this little unit, I am going to make just a brief reference to the controls on the front of the panel.

As a matter of fact, although there are three knobs in all, there is only one—the centre one—which requires to be operated in conjunction with the controls on your existing set. The left-hand knob is merely a wave-change switch, while the control on the right enables the selectivity of the unit to be adjusted to suit your own local conditions.

Incidentally, in connection with this selectivity control it is advisable to set it with the pointer as near to the right as is consistent with adequate selectivity, for as the selectivity is increased by turning it in an anti-clockwise direction, the coupling efficiency is reduced and stations tend to become weaker. That, of course, is not a fault peculiar only to this unit, it is common to almost any circuit in which "aerial" coupling is regulated by a variable control.

Now a word or two concerning our practical tests with this little unit.

For the first test we coupled it up to a very ordinary detector and two L.F. receiver in which the selectivity was of a decidedly low order. The improvement in selectivity was excellent.

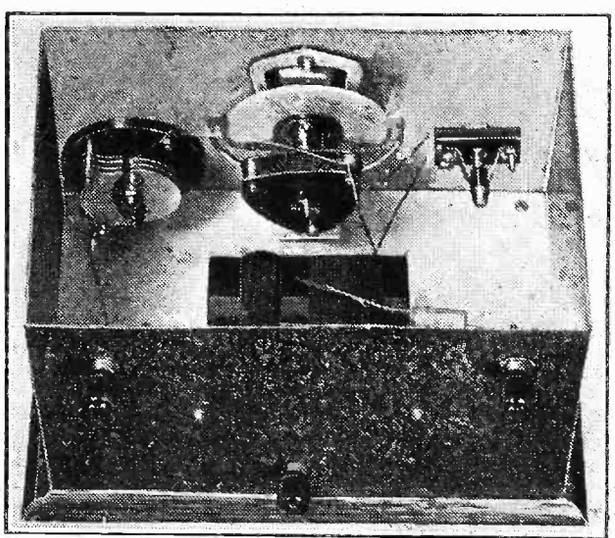
Satisfactory Separation.

The two powerful local stations which had previously spread over a considerable part of the tuning dial were found with the unit in use to be confined to reasonably narrow bands, and stations could easily be tuned in which were previously inaudible in consequence of the local station interference.

Where it was possible without interference to compare the strengths of distant stations without and with the unit in circuit, slightly greater strength was obtained when the unit was out of circuit, but then that was only to be expected, for there are very few—if any—band-pass schemes which enable such a marked improvement in selectivity to be obtained without at least some sacrifice in signal strength.

For the second test the unit was coupled to a comparatively unselective S.G.—Det.—L.F. arrangement, and again the improvement in selectivity was very marked.

A NEAT-LOOKING INTERIOR



The "walls" of the "Pilot" Band-Pass Unit are of black crystalline-finished aluminium, which tend to minimise the possibility of direct pick-up on the unit coils.

In operation, we found the unit quite simple to handle, and although the dial readings did not remain in step due, of course, to differences in the tuning coils, no difficulty was experienced in keeping the two circuits in tune. That, as will be appreciated, is a very necessary procedure when operating a band-pass circuit.

The tuning condenser in the "Pilot" Band-Pass unit is fitted with an efficient slow-motion drive which is geared down to a ratio of approximately 12 to 1—a figure quite adequate for all normal uses.

Easily Read Dial.

The actual dial is calibrated in degrees from 0 to 180, and it is an easy matter to read the setting of the condenser through the neat escutcheon mounted centrally towards the top of the panel.

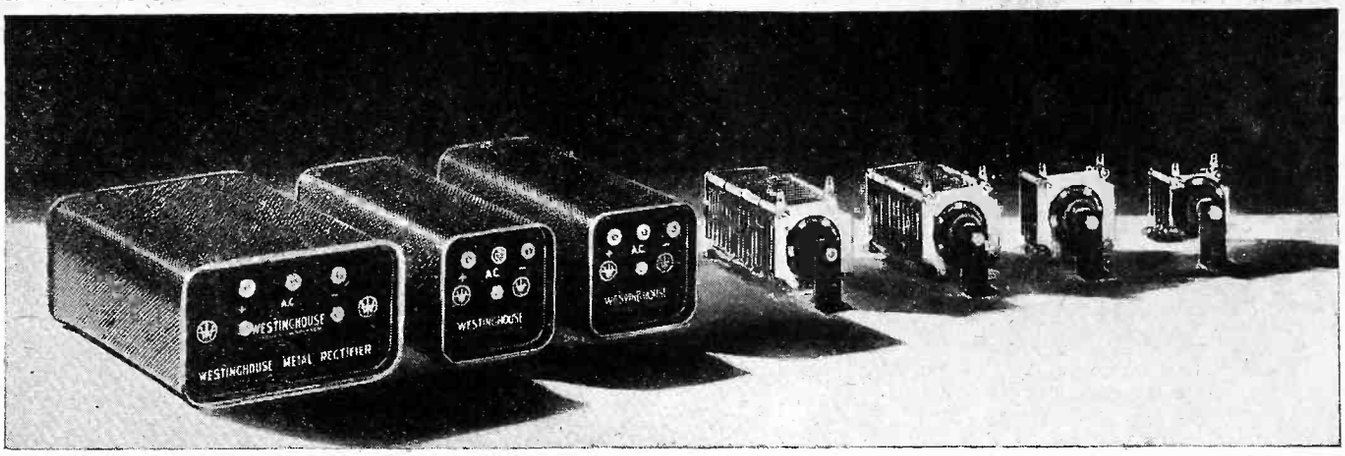
The complete unit has every appearance of being quite a solidly-built job, and as there is nothing inside which is likely to go wrong, it can aptly be described as a foolproof adaptor.

Not Expensive.

As a result of our tests, we have no hesitation in recommending the "Pilot" Band-Pass Unit as an ideal selectivity adaptor for all those who experience station-separation difficulties, and we regard the price of twenty-five shillings, which includes operating instructions, as very reasonable for what it will do.

The unit is very neat in appearance, and the finish is of the high order that one would associate with the name of Peto-Scott.

NEW WESTINGHOUSE METAL RECTIFIERS



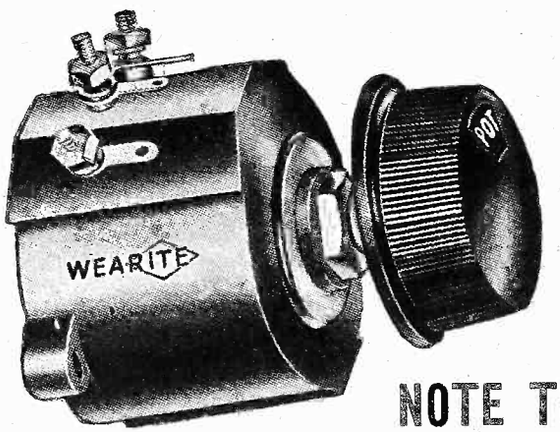
As from June 1st, 1932, the following NEW Westinghouse Metal Rectifiers will be available for constructors' use, AND THE H.T.8 WILL BE REDUCED IN PRICE FROM 21/- to **18/6.**

H.T.				L.T.			
Type	D.C. Output		Price	Type	D.C. Output		Price
	Volts	mA			Volts	Amps.	
H.T.9	300	60	**21/-**	L.T.1	6·0	0·25	**10 6**
H.T.10	200	100	**21/-**	L.T.2	6·0	0·5	**11 -**
H.T.11	500	120	**35/-**	L.T.4	6·0	1·0	**13 -**
	400	150		L.T.5	12·0	1·0	**15 -**

Details of these new units are given in our booklet "THE ALL METAL WAY." Send a 3d. stamp for a copy, marking your application "Dept.P.W."

THE WESTINGHOUSE BRAKE & SAXBY SIGNAL CO. LTD., 82, YORK ROAD, KING'S CROSS, LONDON, N.1.

A *NEW* VOLUME CONTROL BY WEARITE



LOOK at the illustration of this latest Wearite product—a real workmanlike job. The Q.V.C. is just another proof of Wearite's intimate knowledge of the constructors' need. Study the following points. Where else is there such a volume control—at such a price?

SILENT IN USE
due to the special roller contact bearing working on unique principle.

SQUARE LAW ELEMENT
assures even control of volume over entire range.

SPACE-WOUND WINDING
assures free heat dissipation and ability to carry heavy current.

COMPLETELY ENCLOSED ELEMENT
with transparent *fireproof* protective cover.

RECESSED INSULATING BUSH
permits easy fitment to metal panel.

SPECIAL LUG BRACKETS
for baseboard mounting and for ganging.

THE Q.V.C. VOLUME CONTROLS are made in the following resistances, with current-carrying capacities as under:

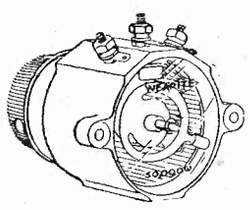
50,000 ohms.	.. ..	10 ma. at 5 watts
25,000 ,,	.. ..	15 ,, ,, 5 ,,
10,000 ,,	.. ..	22 ,, ,, 5 ,,
5,000 ,,	.. ..	30 ,, ,, 5 ,,
1,000 ,,	.. ..	70 ,, ,, 5 ,,
600 ,,	.. ..	90 ,, ,, 5 ,,

Write for full particulars and details of resistances above 50,000 ohms.

Should you have *any* special technical query write to our "Service Dept."—they will find the solution.

WRIGHT & WEAIRE LTD.
740 HIGH RD., TOTTENHAM, N.17
Telephone: Tottenham 3847/8.

NOTE THE PRICE 4/6



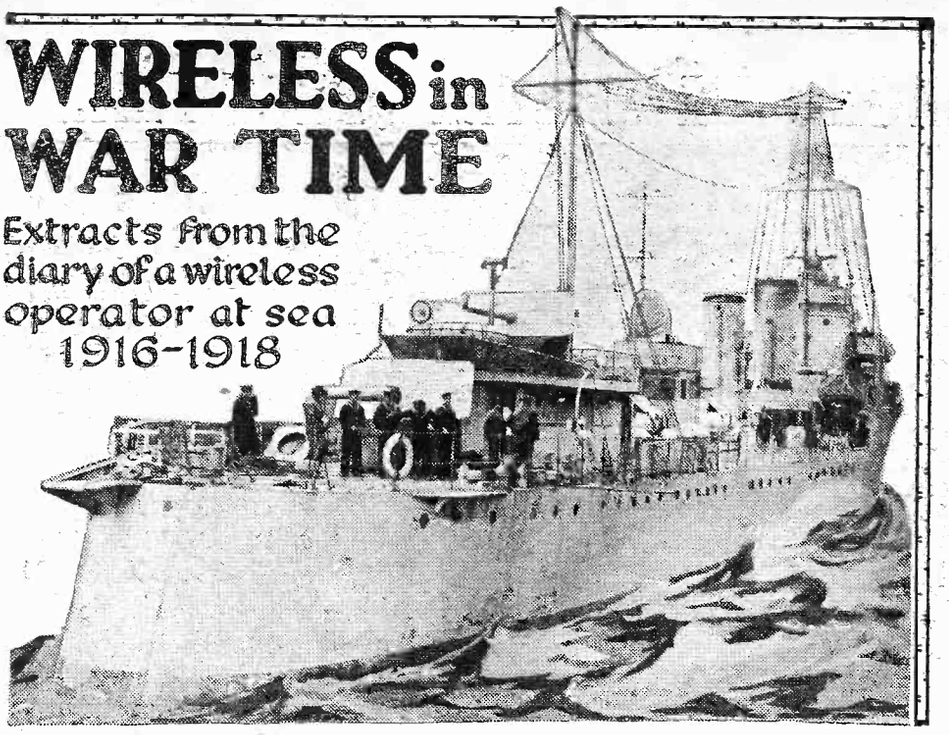
Here is shown the reverse of the Q.V.C. Note the mechanical structure, giving perfect contact with silent operation.

THE WEARITE 3-POLE CHANGE-OVER SWITCH (123)
is specified for the
"DECADE"
4/-
and Paxolin Panel, 12 in. x 7 in. Price 4/6

620

WIRELESS in WAR TIME

Extracts from the diary of a wireless operator at sea 1916-1918



Visit to a Sheikh.

One evening V—— and I strolled ashore after dinner and made our way to a small Arab village that lay further up the river. The weather was hot and oppressive, and when we called on the local sheikh to pay our respects, we were very glad to sit down and accept his hospitality.

The sheikh was a stately old man, courteous and hospitable. He offered us coffee, cigarettes and sherbert, the latter being very sticky and sickly. Everything was dirty and rather tawdry, but nothing could have bettered the old man's charming manners. Unfortunately, we could not stay long, for the hour of evening prayer was approaching, and from the west great dark clouds were piling up.

Calling the Faithful to Prayer.

As we walked back again along the river bank, the wind began gradually to rise, rustling the palms and blowing clouds of sand in our faces. From behind us, in the direction of the village, we could hear the beating of the muezzin's drum calling the faithful to prayer. And, suddenly, there came a long-drawn-out cry:

"All-ah!"

Following the little goat track that led through a palm belt, we heard the first distant mutter of thunder, and then suddenly, for a brief instant, the whole sky flashed into flame. From the village I again heard that cry:

"All-ah!"

An Approaching Storm.

It was almost dark. Wearily, we stumbled along the uneven path, the dust cutting our faces and parching our tongues. For the most part we were silent. The air was pregnant with the approaching storm, and the rising wind made strange noises, as it blew through the palms. It was like a woman crying, and sometimes like the sound made by a child's finger rubbing up and down on a window pane.

As we swung on to the high road, and the lights of Ashar came into view, we both felt glad to be back near the ship again.

As we walked on we could still hear, faintly, yet quite clearly, the cry of the muezzin from the Arab village:

"All-ah!"

JUNE 10TH, 1917 (Bombay).—I am continuing this diary after a lapse of over a fortnight. Failure to recount several incidents in connection with our departure from Mesopotamia is due to the fact that I have been pretty ill with dysentery. It was devilish hot up in the Gulf, and we were all glad to get away.

We Have a Night Out.

The other evening several of the officers banded together and we decided to go and have a good dinner at Green's Hotel. A change of food is always welcome after one has been on a boat for some weeks. At midnight we hired a motor-car and had a run round the city.

Later on we visited an opium den. Following our guide up a rickety flight of stairs, we were admitted by a slant-eyed Chink into a long, low, dimly-lit room. Down each side of the room lay rows of slumbering figures. There must have been at least a couple of dozen of them. One or two were puffing slowly at pipes, and the stench was frightful.

With one exception the smokers were natives. The exception, I regret to say was a white man. Li San, the boss, jerked his finger at him, and said: "Him much fine smoker!" We did not stay long, for the heat and the smell was a bit too much of a good thing.

That Missing Mine!

We heard to-day, by the way, that the "City of Exeter" has been mined ten miles outside Bombay. It appears the Germans laid twenty-seven mines, of which twenty-six were recovered. The "City of Exeter" struck the twenty-seventh. Hard luck!

JUNE 25TH—We are due to leave Bombay in a few hours. Yesterday we heard that the S.S. "Mongolia" had been mined thirty miles from here. Time won't allow me to describe all I have seen in Bombay, but I must say, taken all round, the place did not interest me so much as Alexandria.

JULY 7TH.—Yesterday we crossed the Equator, and I was struck by the coolness of the weather. At home I had always imagined that to be near the Equator was the equivalent of being shut up in a gas oven. It was rather a memorable day for me, for I was initiated into the freedom of the sea by undergoing the ceremony of "Crossing the Line."

Four days ago the following notice appeared in the saloon: "On or about Wednesday, the ceremony of Crossing the Line will be enforced, and the following candidates for initiation are hereby notified: Fourth Engineer, Fifth Engineer, Chief Wireless Operator.

"N.B.—Owing to war-time economy, certain concessions will be made, providing each candidate signs a chit for six bottles of beer. (Sd.): FATHER NEPTUNE."

I wagered the organiser of the ceremony, to wit, Father Neptune, that I would not be found by his four policemen on the day we crossed the line. The policemen, by the way, have the job of hunting up the victims.

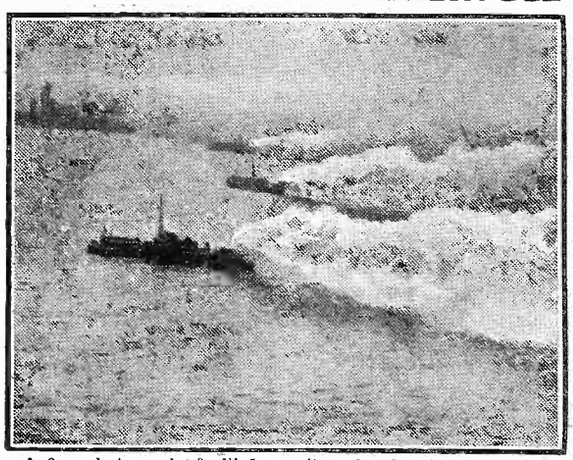
"Crossing the Line."

Well, eventually the fun started. When I came back from dinner that evening I found the lock and bolt had been removed from my cabin-door, and the porthole had been tampered with. Obviously I could not shut myself up in the cabin. I had some idea of climbing up the mast, but decided against it.

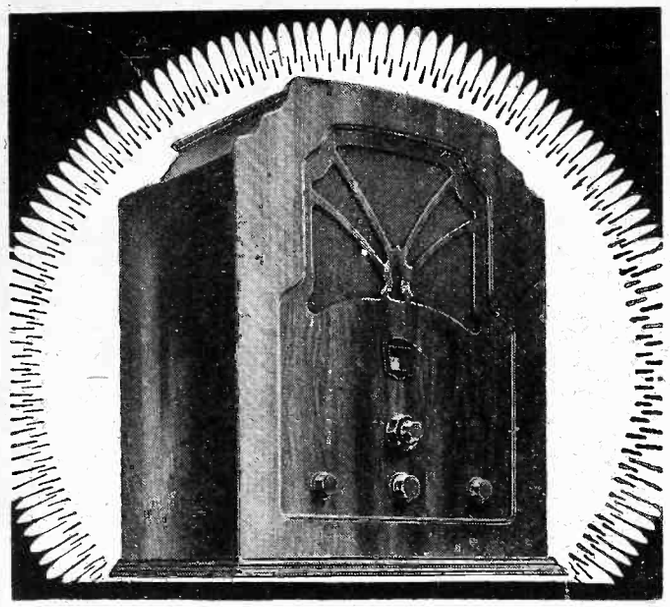
Anyhow, eventually I squeezed myself into a small wardrobe and, provided with a jug of water, I sat down to wait. I sweated in that beastly cupboard for three hours, but at last the "advance guard" arrived. They sounded rather surprised not to find me in the cabin. They then started to search the ship and, as time wore on, my hopes revived, and I thought I might win the bet. But Daddy Neptune called a consultation in my cabin, and I suppose he must have heard my breathing, or something, for he suddenly yelled out: "The young devil's in there!" The others ridiculed the idea, but Neptune got a cold chisel and—well, the game was up.

(To be continued.)

A SMOKE-SCREEN AT ZEEBRUGGE



A fine photograph of allied monitors bombarding Zeebrugge under cover of a smoke-screen supplied by a small fleet of "M.L.'s." The monitors were equipped with large-calibre guns, and had a very shallow draught which made them ideal for in-shore work.



Half an hour with the magnificent new Regentone 3 valve All-Electric Receiver in your own home is more convincing than anything we can say. Let it speak for itself. Ask your local dealer to arrange a demonstration—there's no obligation, of course!

16

GUINEAS

OR 39/6 DOWN, including B.V.A. valves and royalties. For 200/250v. 40/60 cycles. Three valves. For A.C. Mains. Built-in moving coil speaker. Super-selective. Provision for mains aerial, external aerial and gramophone pick-up.

SPECIAL 25 CYCLE MODEL 14/- EXTRA

REGENTONE

REGENTONE LIMITED, Regentone House, 21, Bartlett's Buildings, E.C.4
Telephone: Central 8745 5 lines.
Irish Free State Distributors: Kelly & Shiel, Ltd., 47 Fleet Street, Dublin.

NEW LISSEN METALLISED S.G. VALVE

THE new Lissen Metallised Screened Grid Valve will give you much higher amplification without instability. During months of research Lissen have succeeded in getting the inter-electrode capacity of this Screened Grid Valve down to the minute figure of ·001 micro-microfarads. (Inter-electrode capacity causes instability and howling). Lissen have also been able to increase the magnification figure of this valve to 1,000. Get one of these new Lissen Metallised Screened Grid Valves in your receiver and get higher amplification than ever before. It will give you immensely increased range and bring in many stations you have never heard before.

Ask for Lissen S.G.215. Price **12/6**

LISSEN ECONOMY POWER PENTODE

The Lissen Power Pentode Valve—P.T.225—converts any set with one stage of L.F. amplification into a fine full-volume "Pentode-output" receiver. This valve puts new power into your loudspeaker, and new brilliance of tone, too. Use it instead of a power valve and at once you get an amazing step-up in volume. Where before you got a whisper, now you get a torrent of pure sound. And it takes no more current than the power valve it replaces—its H.T. consumption is only 7 m/A. Ask for Lissen P.T.225. Price **12/6**

LISSEN PARTS USED IN THE "DECADE."

Lissen Torex Transformer, 5/6.

Lissen Variable Condenser, 4/6.

Lissen H.F. Choke, 5/6.

LISSEN LIMITED, WORPLE ROAD, ISLEWORTH, MIDDLESEX.

MORE ABOUT the "DEC

By G. V. DOWDING, Associa

This fine receiver exemplifies the almost incredible progress v valve sets were delicate, complicated, and expensive pieces of a week's article how wonderfully flexible and yet free from in

IT is not until you actually handle a "Decade" that you can appreciate how wonderfully it combines real flexibility with simplicity of control.

You see, it is in the struggle to make a set simple to handle that power is usually lost.

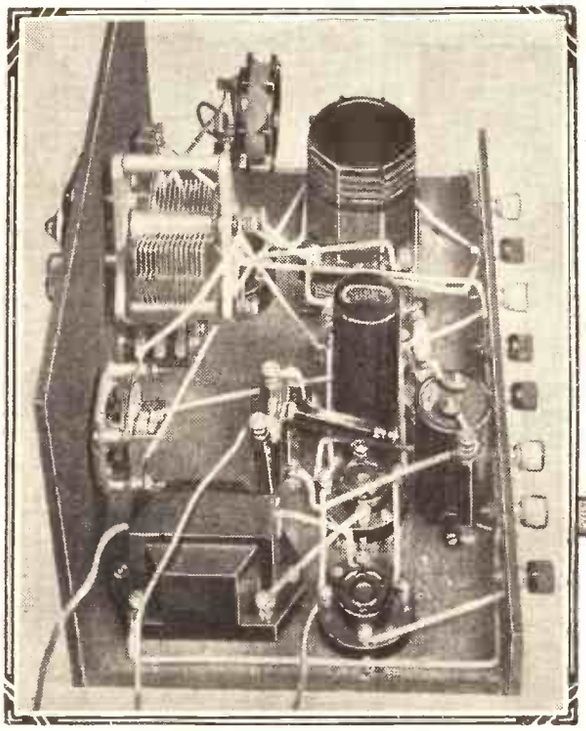
It is realised that at least fair selectivity is essential, but the problem is to achieve even this implied modest degree of station-separating qualities without resort either to expensive and complicated methods or the deliberate sacrifice of energy.

Modern Ideals.

A simple tuner of the single-winding solenoid type, with one or two tappings, can be made selective by the simple expedient of placing a very small fixed condenser in series with its aerial connection.

The same effect is possible by cutting down the aerial until it is only a few feet in length. But it is easy to see that these steps are tantamount to reducing the sensitivity of the outfit.

A crystal set so insensitive that it is able to pick up only one programme on a large aerial can logically be described as selective, for it certainly ignores the etheric clamourings of the scores of other broadcasters, but this is an extreme example of useless selectivity.



COMPLETE STABILITY

High quality of reproduction at great volume is made possible by a combination of transformer and resistance-capacity L.F. stages and effective detector de-coupling.

AS A "HOME" RECEIVER

THE "DECADE" IS IDEAL FOR "HOUSEHOLD" BROADCAST RECEPTION, IN THAT ITS CONTROLS ARE REDUCED TO A MINIMUM, AND THERE IS A COMPLETE ABSENCE OF CRITICAL BATTERY OR TUNING ADJUSTMENTS. ANYONE CAN TWIDDLE ITS FEW KNOBS WITH THE CERTAINTY OF GETTING GOOD RESULTS.

The aim of the modern designer ought to be to preserve sensitivity as well, but it doesn't always seem to be!

Those Distant Stations.

The B.B.C. are largely to blame for the cult of tuning-sharpening by throwing away power, for their engineers are constantly circulating advice which results in this wasteful practice.

But the B.B.C. naturally have no interest in the reception of distant stations; their job is to ensure that listeners get separated programmes from, at most, a pair of B.B.C. regional transmitters.

On the other hand, it is, in general, "P.W.'s" job to produce sets which will enable listeners to pick and choose programmes from a wider selection than that.

And special steps must be taken if this is to be possible with apparatus within the financial reach of the majority of listeners, and which is within the operating capabilities of those whose knowledge of the art of "knob twiddling" is slight or even non-existent.

There would be no difficulty in achieving this end with standard circuits, and without great power sacrifice, if all listeners were country dwellers living scores of miles from powerful B.B.C. stations.

But they aren't; many are, indeed, right in the shadow of big transmitting aerials.

Perfect Flexibility Control.

Nevertheless, it is a fact that tens of thousands of radio enthusiasts are luckily situated at great distances from these difficult "swamp areas."

And there's the rub! How can one set hope to be able to satisfy both requirements without the one or the other class of listener having to lose something so that the local conditions of the "other fellow" can be combated?

It couldn't—before the Moderator was invented.

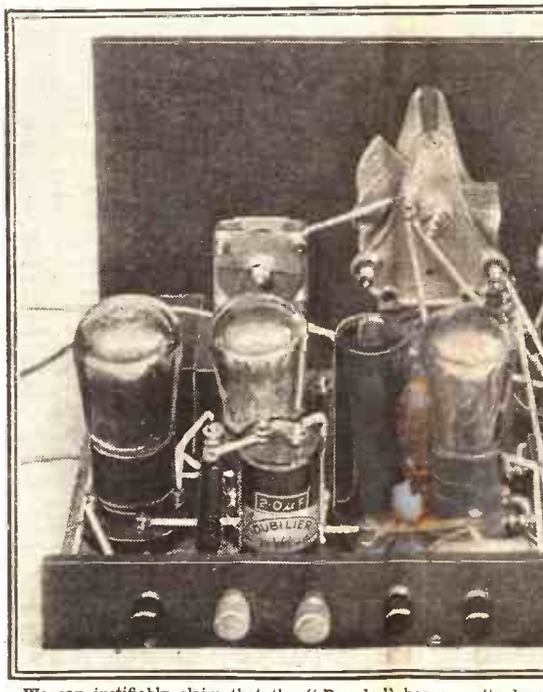
The "P.W." Moderator is the perfect flexibility control, for it gives a set the power to accommodate itself to those widely varying conditions. It adds only a few shillings to the cost of an outfit, and is such a "robust" little adjustment that you can leave it to anyone to manipulate with the certainty that he or she is sure to get something out of it.

Its effect is so quickly discernible on the loudspeaker that they simply can't go wrong. And you have the satisfaction of knowing that it hardly matters how and when the little knob is twisted, for at any point of its adjustment it must be giving you better results than is possible without it.

You build up from the common level of inefficiency and waste, with the Moderator,

THE MODERATOR GIVES YOU COMPLETE COMMAND OF POWER AND SELECTIVITY

COMPACTNESS WITHOUT CROWDI



We can justifiably claim that the "Decade" has a pretty layo points of view. And it is to this fact it owes much of its gre consideration of design.

WITH THIS SET YOU CAN MAKE YOUR OWN COMPROMISES, WHERE NEC

ıte I.E.E.

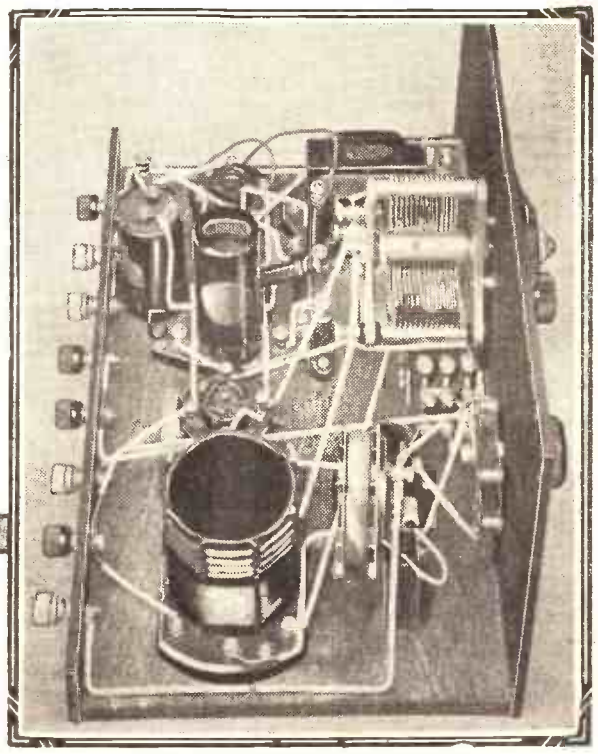
which has been made since the days when pparatus. And you will learn from this ıtricacies the "Decade" is in operation.

and the extent to which you build up largely depends upon how you operate the control. And that is why the "Decade," in which the Moderator is a special feature, is as satisfying to the man with D X ambitions as it is suitable to the less adventurous "domestic" purposes.

It is not critical in regard to accessories. It will do full justice to the best moving-coil loudspeaker, while it will also work the cheapest electro-magnetic variety to its best advantage.

NG OR CONFUSION

ut, both from technical and æsthetic eat efficiency, for "layout" is a vital



NO ENERGY WASTED

In the normal course of events energy is thrown away in the aerial circuit in order to achieve some degree of selectivity. But in the "Decade" practically all the available energy can be conserved and turned to good account owing to the Moderator.

But choose your valves for it with discrimination, and don't try to "make do" with old ones of doubtful efficiency. Our component list provides numerous alternative types and makes, and if you want to compile a good log of stations don't wander outside these.

At least 120 volts H.T. should be employed, and you will note, by the way, that there is only one H.T. plus terminal. Not a very important point, it is true, but just one further item to credit against complexity.

The grid-bias voltages will depend upon the valves and H.T. used, but you will find full details concerning this in the leaflets provided by the valve makers in their cartons.

Easy to Tune.

And now for the actual operating of the "Decade." We shall deal with this in minute detail for the benefit of those who desire to extend this fine set to its limits. Others must not think that the procedure is necessarily intricate because of that, and if they just hook the instrument up and twiddle its few knobs more or less haphazardly they will doubtless be quite pleased with what they will get.

The first thing to be done is to insert the valves, join up the aerial and earth, batteries and loudspeaker.

Then screw down the knob of the ·001-mfd. condenser, which is on the baseboard, as far as it will go, and insert the Moderator coil plug in the centre socket. Set the control switch for medium waves and the reaction for minimum regeneration — which ought to be hard round in the anti-clockwise direction if the reaction condenser is of normal design.

You should be able to find your local station on the tuning dial with little difficulty, and you should carefully note how its strength and the area of the tuning dial that it covers can both be controlled by a touch the Moderator knob.

Having got the "feel" of these two items, the next job is to decide which of the Moderator coil tappings you are going to use, for, once you have done this, you need seldom or ever refer to this adjustment again.

Testing the Taps.

You should locate two stations of fairly widely separated wavelengths, say the London National and the North Regional, and to do this you will probably have to employ a little reaction.

Then try each of the Moderator coil tappings in turn. The one to use will be that one which enables the Moderator condenser to bring both of these stations to full strength with some little latitude.

That is to say, the lower-wave one should be strongest just before the Moderator condenser knob is turned right round in an anti-clockwise direction. Similarly, you should obtain the greatest volume from the higher-waved station before the condenser reaches its maximum capacity adjustment.

You do not have to adjust the Moderator condenser for every station, but you can set it roughly for bunches of stations in accordance with the selectivity and volume you need. And greatest volume means least selectivity, and vice-versa.

Extreme Elasticity.

The position of the Moderator coil provides further elasticity in this compromise control. You can obtain even greater selectivity by moving the Moderator coil

(Continued on next page.)

FOR THE DX ENTHUSIAST

NO ARBITRARY LIMITATIONS ARE IMPOSED ON THE SENSITIVITY OF THIS SET IN ORDER TO ACHIEVE A STANDARDISED DEGREE OF STATION SEPARATION, AND ITS POWER POTENTIALITIES ARE, THEREFORE, GREATLY ABOVE THOSE OF THE USUAL DET. 2 L.F. TYPE OF RECEIVER.

CESSARY, IN ORDER TO SUIT YOUR OWN LOCAL CONDITIONS

MORE ABOUT THE "DECADE."

(Continued from previous page.)

further away from the tuning coil. The same effect is obtained by dispensing with the block of wood and dropping the Moderator coil nearer to the baseboard.

But there will be only a few of you who will need to make this departure from the lay-out, and we mention it only to show how widely flexible the "Decade" is.

And now for the long waves. On this band the Moderator gives no station-by-station control. Its function on the long waves is to prevent "break-through."

However the Moderator condenser is set it will make no difference to volume or selectivity, but you adjust it if you should happen to be so situated that a medium-wave station tends to "break through."

Similarly, the ·001-mfd. condenser on the baseboard has no effect on the medium waves, but by adjusting the capacity of this you can vary the long-wave selectivity.

Long-Wave Selectivity.

You do not require to alter the capacity of this ·001-mfd. condenser every time you go over to long waves and every time you tune to a different station. Indeed, once set in accordance with your requirements during your first try-out, it can be left untouched for ever afterwards.

Thus the long wave tuning resolves itself into a most elementary pair of adjustments—just the one for tuning and the reaction.

Use of Moderator.

On the medium waves you can employ the Moderator in addition while you are actually searching for stations after you have got acquainted with controls.

At first you need only decide on two or three approximate Moderator adjustments corresponding with three or so areas of the dial tuning condenser.

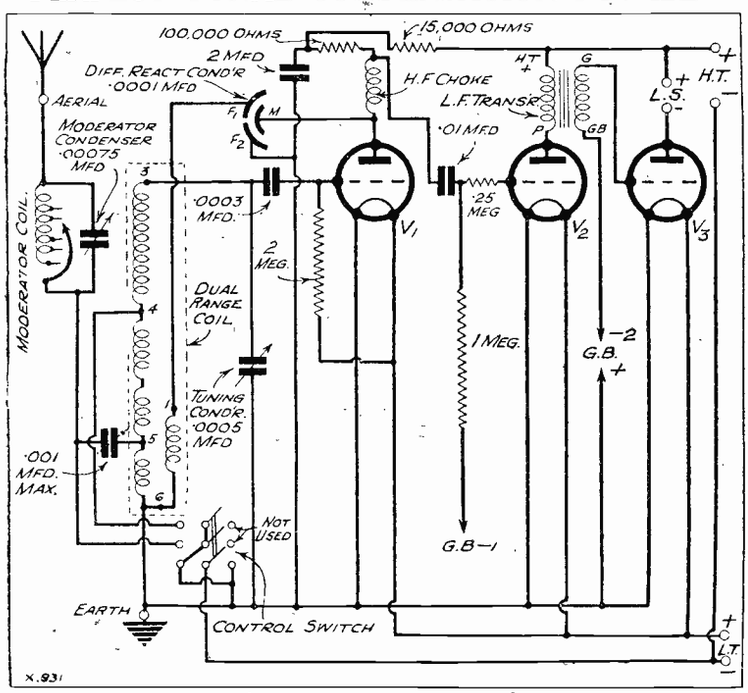
And then, having acquired experience, you can recruit the Moderator as an aid for searching, giving it a deft adjustment for each station as you come to it.

Finding Feeble Foreigners.

You will find it quite a marvellous subsidiary to the reaction for this purpose, and with practised handling the three controls together (tuning, moderator and reaction) will enable you to coax programmes out of the ether which are usually to be picked up only by the biggest and most powerful of sets.

Moreover, there will be a much quieter background than you would have with complicated and expensive apparatus of that nature.

PERFECT TONAL COMPENSATION POSSIBLE



That "peak tuning" which Capt. Eckersley advocates as being the perfect compensation for the average loudspeaker is available to a 100 per cent. degree by adjustments of the Moderator and reaction.

THE "DECADE" ON PARADE

Concise details for installing the receiver, and abbreviated tuning instructions.

1. **Carefully check the wiring.**
2. **Join up aerial, earth, loudspeaker, H.T., L.T. and G.B. batteries.**
3. **Check positions of H.T. and G.B. battery plugs, and give the battery leads a "once over."**
4. **Insert valves in their RIGHT holders.**
5. **Insert Moderator coil plug in the centre socket and screw knob of ·001-mfd. condenser (on baseboard) down for maximum capacity.**
6. **Set reaction control at minimum and switch set on for medium waves.**
7. **Discover best Moderator position in accordance with instructions given in the accompanying article.**
8. **Switch over to long waves and adjust ·001-mfd. baseboard condenser for required long-wave selectivity.**
9. **Now commence your tour round the Continental stations.**

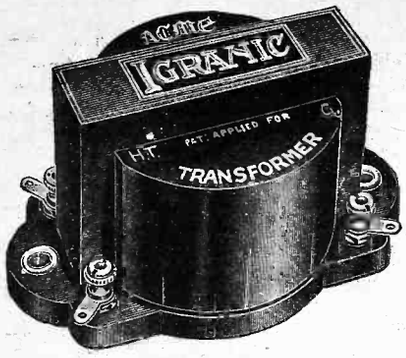
THE "DECADE" USES INEXPENSIVE AND READILY OBTAINABLE PARTS

COMPONENTS REQUIRED.

1 Panel, 12 in. × 7 in. (Peto-Scott, Permcol, Ready Radio, Wearite, Lissen).
1 Baseboard, 12 in. × 7 in. × ⅜ in.
1 Cabinet to fit (Peto-Scott).
1 ·0005-mfd. variable condenser (Lissen, Ormond, Telsen, Polar, Cyldon, J.B.).
1 Slow-motion dial (Formo).
1 ·0001-mfd. differential reaction condenser (Lotus, Ready Radio, Telsen, Cyldon, J.B., Polar, Wavemaster, Magnum).
1 ·00075-mfd. solid dielectric condenser (Magnum, Polar, Telsen, Ready Radio).
1 3-pole change-over switch (Wearite 123).
3 4-pin valve holders (Lotus, Lissen, Telsen, Graham Farish, W.B., Tunewell, Igranic, Clix, Benjamin, Bulgin).
1 Dual-range coil (Colvern, R.M.3).
1 Moderator coil (Ready Radio, Peto-Scott, Sovereign).
1 ·001-mfd. max. compression condenser (Lewcos, Sovereign, Goltone, Graham Farish, Formo, Polar).
1 ·01-mfd. mica condenser (T.C.C., Dubilier, Telsen, Lissen, Graham Farish).
1 2-mfd. condenser (Dubilier type 9200, Telsen, Lissen, T.C.C., etc.).
1 ·0003-mfd. fixed condenser (Lissen, etc.).
1 H.F. choke (Lissen, Lewcos, Telsen, Atlas, Tunewell, Graham Farish, Ready Radio, Varley. R.I., Peto-Scott, Sovereign).
1 2-meg. leak (with holder if required) (Igranic, Lissen, Telsen, Graham Farish, Ready Radio, Loewe, Dubilier).
1 15,000-ohm resistance (Graham Farish Ohmite, etc.).
1 100,000-ohm resistance (Graham Farish etc.).
1 ½-meg resistance (Graham Farish, etc.).
1 1-meg. resistance (Graham Farish, etc.).
1 L.F. transformer (Lissen Torex, R.I., Graham Farish, Telsen, Varley, Lotus, Igranic, Tunewell, Slektun, Ferranti).
1 Terminal strip, 12 in. × 1½ in. (Peto-Scott, etc.).
8 indicating terminals (Bulgin, Belling Lee, Eelex, Igranic, Clix).
1 Block of wood for mounting moderator coil, 1⅞ in. high.
18 gauge tinned copper wire and sleeving (Wearite), or Quickwyre, Jiffilinx, Lacoline).
Flex, screws, etc.
Battery plugs (Belling Lee, Eelex, Clix, Bulgin, Igranic).

RECOMMENDED ACCESSORIES.

LOUDSPEAKER. — Blue Spot, Celestion, H.M.V., Marconiphone, B.T.-H., Epoch, R. & A., Cossor, Graham Farish, W.B.
VALVES.—Detector: Mazda H.L.2, Mullard P.M.1H.L., Cossor 210H.L., Marconi and Osram H.L.2, Tungsram H.210, Eta B.Y.2020, Lissen H.L.2, Six-Sixty 210 H.L., Triotron H.D.2, Dario H.F.
1st L.F.: Cossor 210 det. or 210L.F., Mullard P.M.1L.F., Marconi L.2/B., Osram L.210, Mazda L.210, Tungsram L.210, Eta B.Y.1814, Lissen L.210, Six-Sixty 210L.F.
Power: Mullard P.M.202, Mazda P.220A, Marconi P.2, Osram P.2, Cossor 220P.A., Eta B.W.602, Tungsram P.220, Six-Sixty 220S.P., Lissen P.220A, Dario H.P., Triotron U.D.2.
BATTERIES.—H.T. 120 to 150 volts (Lissen, Pertrix, Ever Ready, Drydex, Siemens, Cossor). Super capacity should be used. G.B. 16½ to 18 volts (Ever Ready, etc.).
ACCUMULATOR.—2-volt (Exide, Pertrix, Lissen, Ever Ready, G.E.C., Ediswan).
MAINS UNIT.—To give 20 milliamps. at 120 volts (Atlas, Heayberd, R.I., Tunewell, Tannoy, Regentone, Formo, Lotus).



THE VERY LATEST ADVANCE IN RADIO RESEARCH!

ONE GUINEA ....and worth it!

The "ACME" L.F. TRANSFORMER

Here is the Transformer "par excellence"—the IGRANIC "ACME" L.F. The most up-to-the minute component for critical constructors. It is not low in price but it overcomes that handicap by its unrivalled performance. Made in two ratios—3-1 and 6-1. Beautifully finished with moulded Bakelite case of refined colour and design. Price 21/- and worth it . . . . . made by IGRANIC, of course!

Write for illustrated Leaflet No. R188.

"If it's IGRANIC . . . . . it's Best for your set!"

IGRANIC H.F. CHOKE

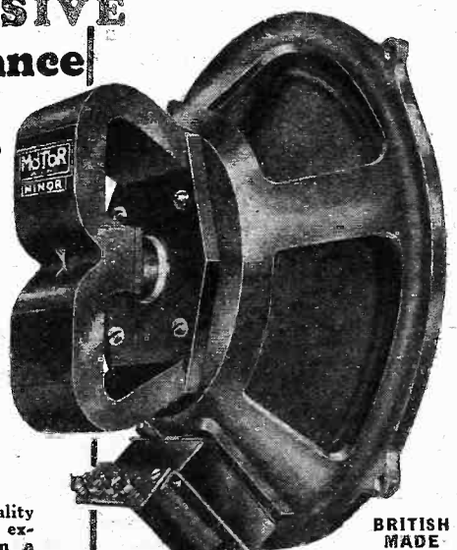
A compact and very efficient choke which is used extensively in modern receivers. The inductance being of a high value, it is effective on wave bands up to 3,000 metres, while its self-capacity is so low that it can be used with equally good results on the lowest broadcast wavelengths. Highly finished in neat moulded Bakelite case.

4/-

IGRANIC

Igranic Electric Co., Ltd., 149 Queen Victoria Street, London.

IMPRESSIVE Performance at an Impressive Price!



The MoToR "Minor" is not, in spite of its price, a "cheap" moving coil loudspeaker. It has a superior magnet of finest cobalt steel; a large *rear suspension* providing unusual flexibility; a heavy *cast* aluminium chassis; non-metallic spider; and every high-grade feature of construction and design for which all MoToR speakers are acknowledged.

Impressive in tone quality and sensitivity, it gives excellent results on even a two or three-valve battery operated set using ordinary output valves.

Write for free illustrated descriptive pamphlet.

BRITISH MADE

Overall Diameter, 9⅝".
Overall Depth, 4¼".
Cone Diameter, 7".

45/-

Including Transformer and Baffle Board.

D.C. Resistance: 10 ohms.
Impedance of Speech-coil: 5 ohms.
Approx. Coil Gap: 1 mm.
Transformer Tappings: 25:1, 20:1, 15:1.

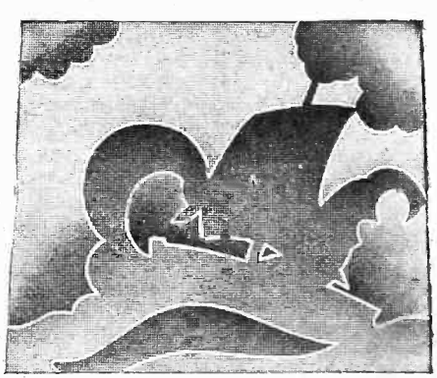
The CHESTER

The handsome figured walnut cabinet version of the MoToR Minor Moving Coil measures 16" by 15¾" by 8", and has no equal at anywhere near its common-sense price of ... **75/-**

MoToR MINOR
Permanent Magnet
MOVING COIL SPEAKER

TEKADE RADIO & ELECTRIC LTD.
147, Farringdon Road, London, E.C.1
Telephone: Clerkenwell 2486.

FOREMOST AS PIONEERS



The name of Varley is associated with the earliest research work of the Electrical Industry. To-day, in Radio as in Electrical Progress, the firm which bears his name are still foremost as pioneers.

Creative force and initiative are the Varley Tradition. ***The first big step forward in the quality of reproduction from L.F. Amplifiers, the first real solution to the selectivity problem came from Varley.***

Watch **Varley**

Props.: Oliver Pell Control Ltd.
103, Kingsway, London, W.C.2.

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found—?

It is a very handsome instrument in appearance and, as with all Marconiphone speakers, it is not clumsily large but achieves a satisfying compactness without acoustic sacrifices—this is the hallmark of high-class loudspeaker design.

It is sufficiently sensitive to make it practical for the small-set man to enjoy its qualities, while it will, of course, handle large inputs without distress.

I particularly like its clean reproduction of high notes—you clearly hear frequencies on it which are simply not there with many speakers.

It is certainly an instrument which should be heard by all radio connoisseurs.

A USEFUL BROCHURE.

ALL "P.W." readers should make a point of securing copies of "How To Get the Most Out of Your H.T. Battery," which has recently been published by the Edison-Swan Electric Co., Ltd. It includes some very useful information and there is also a station chart.

MEASURING INSTRUMENTS FOR WIRELESS.

This is the title of a booklet published by the G.E.C., in which the G.E.C. range of meters is interestingly described and in which there is a deal of informative reading matter about meters and their uses for tracing faults in radio sets, etc.

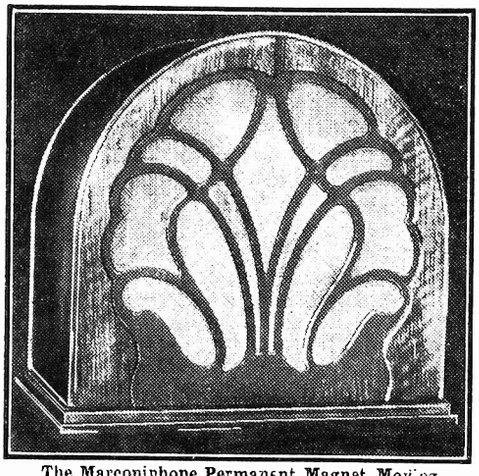
THE MARCONIPHONE 136.

The Marconiphone Co. provides an apt example of that industrial rarity, the combination of tradition and enterprise. It is easy to visualise the temptation to be complacent with such a name and history as are possessed by this particular firm, but happily there is no indication that it is tending to succumb to it. Very much the reverse, in fact, is the case.

For example, despite the existence of a range of loudspeakers of high individual merit and popularity, they have only recently added yet another instrument to it, the Model 136.

This is a permanent magnet moving-coil speaker, and, complete with transformer, in a handsome cabinet it costs £8 10s.

A NEW SPEAKER



The Marconiphone Permanent Magnet Moving Coil Type 136.

A SAFETY LEAD-IN.

There is a very ingenious feature in the Pressland Safety Lead-In, which is made by Pressland Products, Ltd., and this is that one end comprises a tubular sliding condenser.

By sliding this in and out you can vary selectivity and volume within surprisingly wide limits. By pushing it right in the series capacity is shorted, and the plunger can be pulled right out in order to disconnect the set entirely.

The standard 12-in. size costs 3/6, and purchasers are given a £100 guarantee that the lead-in will provide complete safety.

I have only one small criticism to make, and that is that the metal parts could with advantage be of some metal having greater corrosion-resisting powers than brass. However, in view of the price of the device and what it does one cannot but say that it is worth buying.

LOUDSPEAKER CONES.

It must be admitted that the construction of loudspeaker cones is a somewhat tricky operation. And although with care the amateur should be able to achieve fairly satisfactory results, the fact remains that it is improbable that any but a comparative few will do full justice to the units they use with their home-made cones.

But the incentive to make one's own cone is liable to recede almost to vanishing point when one examines a good and inexpensive commercial production such as the "Ripper" (G. G. Johnstone, 154, Southwark Bridge Road, London, S.E.1).

The "Ripper" is made of a tough and stiff but reasonably light paper, mounted by means of a fine linen material. The angle is rather wide although this is of little practical moment with the average electro-magnetic unit and may be in fact a definite advantage.

Anyway, with either this type or with a moving-coil speaker unit the "Ripper" is perfectly satisfactory and gives splendid results.

EASY STATION FINDING.

The Custerson Tuning Dial (made by R. Custerson of Redditch) is one of the most interesting and novel devices I have come across for some time.

It is a good slow-motion dial and it is supplied with a collection of 58 small metal slips having the names of stations on them.

The dial is so made that these slips can be quickly placed in position to provide a direct reference to the tuning of the various stations.

Having tuned-in a station you insert the appropriate slip at the point marked by the indicator so that at any future time you can at once return to that station merely by rotating the pointer until it points at the name of it.

Both medium and long-wave stations can be accommodated and in the event of a station changing its wavelength it is a simple matter to change the position of its slip.

The dial costs 7/6, and a useful station identification chart is supplied with it. The device should find its way to the panels of a large number of "household" sets.

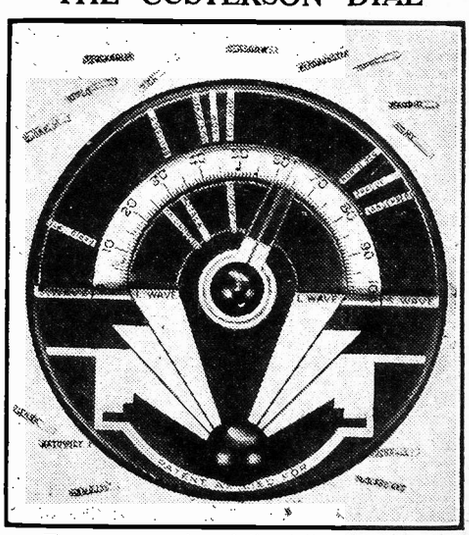
PLEASE NOTE.

Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department with the strictest of impartiality, under the personal supervision of the Technical Editor.

We should like to point out that we prefer to receive production samples picked from stock, and that we cannot, in any circumstances, undertake to return them, as it is our practice thoroughly to dissect much of the gear in the course of our investigations!

And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are, therefore, framed up in a readily readable manner, free from technicalities unnecessary for that immediate purpose.

THE CUSTERSON DIAL



Here you see a few of the station name slips in position while others are shown detached from the dial.

CAPT. ECKERSLEY'S QUERY CORNER

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

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

THE NATURE OF ELECTRICITY—SCREENING—SHORT-WAVE VARIATIONS.

What is "Positive" Electricity?

W. L. (Leith).—"I have been reading a book on elementary wireless. Electricity, it states, consists of electrons; further on, electrons are referred to as negative.

"What, then, is positive electricity?"

Nobody knows what electricity is. In science we have theories which are conveniences of expression.

When we abandon one theory it does not mean that that theory was *wrong*. It means it isn't quite so convenient as a new one.

It is convenient to say this: We do not know what is electricity. We can say however, that matter is composed of minute particles, electrons and protons. Electrons carry negative and protons positive charges of electricity.

We don't know what electricity is however, we only know that if we have a lot more electrons than protons in a conducting plate, then that plate is negatively charged.

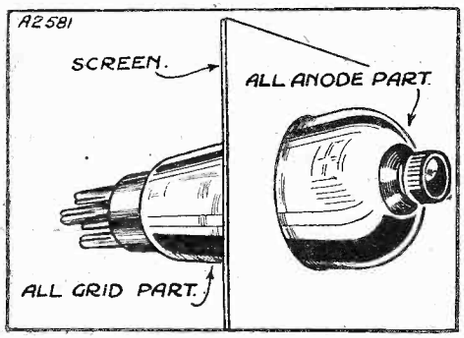
An uncharged plate has as many electrons as protons in it. Forces are always acting to try and establish equilibrium. When any conductor contains as many electrons as protons—a battery by chemical action is always making the negative pole surplus to normal electron establishment and the positive pole less than normal—then, when a conductor is placed between the pole with the surplus and the pole with the least, electrons pour from negative to positive and there is a flow or current of electricity.

The Electron Flow.

This current is electrons flowing from negative and protons from positive. But protons are enormously bigger than electrons so the current is really only electrons (negative) flowing from negative to positive, trying to establish that equilibrum, the battery (or the dynamo) is always once more upsetting.

That's a convenient theory. But lately someone's been saying there's a third party concerned called a neutron (uncharged). That doesn't say that what I have told you isn't a perfectly good way of explaining elementary electricity and magnetism.

TO OBTAIN EFFICIENCY



S.G. valves of the non-metal coated type are generally best used poking through a screen.

Earth Tube or Plate?

H. K. (Ilford).—"I am installing a new earth, and I wonder if you will be kind enough to say whether an ordinary earthing tube is likely to be as efficient as a metal plate buried deeply in the ground. The earth tube appeals to me, because it is so simple to fit."

I suppose that theoretically the earthing tube may introduce an ohm or two more in the aerial circuit than if a plate were used.

But the total change in efficiency using the plate rather than the earth is probably of the order of one or two per cent only. Considering that retroaction can change the aerial efficiency from say 10 to 90% why worry?

Certainly use the tube, because it's much simpler mechanically. Give it a fair chance though and drive it into reasonably wet earth.

These Variable Short Waves.

R. O. L. (London).—"I have recently been carrying out a certain amount of short-wave reception on a three-valve short waver. I find that on some nights reception is very good, whereas on other nights practically nothing can be heard.

"This is not due to a fault in my set, and I should be grateful if you could tell me why conditions should vary so much?"

We must get you to understand the Heaviside Layer. Have you ever asked yourself why it is that you can signal by wireless to the Antipodes?

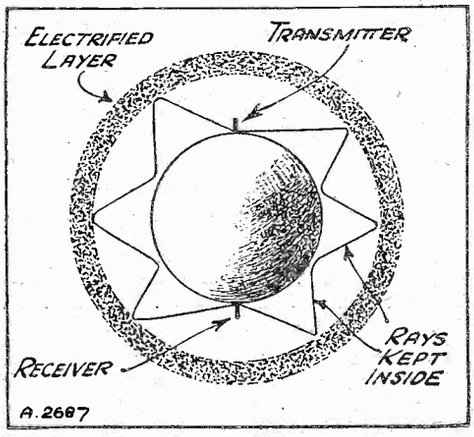
We have always known that "rays" go straight. And so obviously rays shoot along the ground. But the world is curved, so they leave the ground and go on, and would appear to shoot off into space for ever and for ever.

If there was nothing to deflect them back again on to the earth they would disappear and we should *not* be able to signal to the Antipodes or even America by wireless.

But (see my diagram) there is a layer of electrified particles or a multi-layered arrangement of electrified particles which bend the rays back again.

The layer's reflective powers depend upon: 1, wavelength; 2, time of day or night; 3, season; 4, world path; 5, momentary structural changes; 6, sunspots and magnetic and electric atmospheric states. So no wonder things vary a bit!

THE EARTH ROUNDABOUT



Showing how radio waves are reflected back and forth by the earth and Heaviside Layer, thus enabling them to travel round the globe.

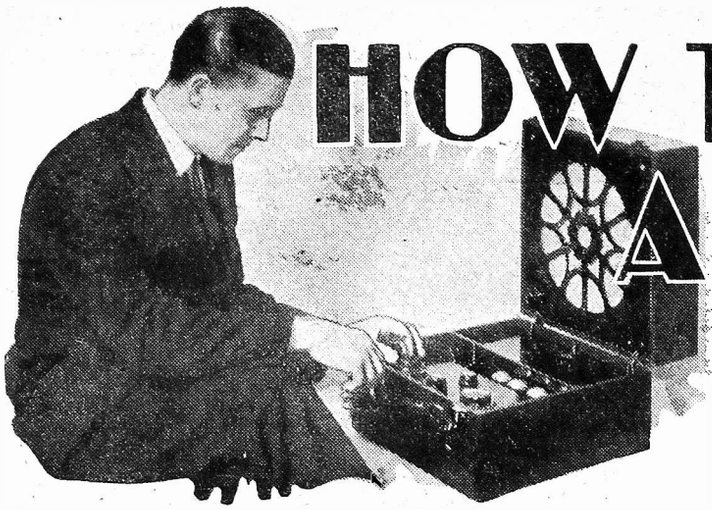
A Question of Screening.

P. M. (St. Ives).—"I have been rather puzzled as to why in some sets the S.G. valve is placed through the screen and in others it is merely placed vertically by the side of the screen. Is there any hard-and-fast rule as to why it is placed through the screen in some cases and not in others."

If you are speaking of non metallised valves, more complete screening is obtained by poking the valve through a screen as shown.

But sometimes the screening does not have to be so complete as to warrant all this trouble.

If you are not using metallised valves, I should prefer you to use the best screening—S.G. valves want a lot of watching!



HOW TO DESIGN A PORTABLE

BY J. ENGLISH

With the summer holidays before them, many readers will be considering the construction of a portable receiver. Below, our contributor describes efficient two-valve schemes, and indicates how their novel features can be embodied in complete designs.

WHEN it comes to getting the immediate benefit of the latest developments in radio, there can be little doubt that the keen constructor does score over the man who runs a manufactured receiver. This is even more noticeable in the case of portables and transportables. Here the immediate use of the latest valves and circuits and the opportunity of individual construction puts you well ahead of the owner of the mass-produced receiver.

For example, constructors have now a splendid opportunity of developing a new type of receiver which, as yet, has received little attention on the commercial side. This is what I might call the portable-cum-permanent receiver, a compact all-purpose set of economical design, based on a special ar angement of two valves.

A GOOD CIRCUIT

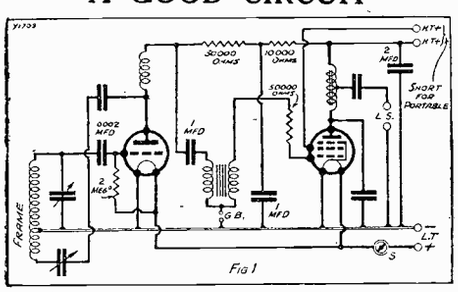


FIG 1

Although two valves only are used in this circuit, it will give excellent loudspeaker results when operated in conjunction with either a frame or a small outdoor aerial.

As a frame aerial portable for summer use it gives you excellent loudspeaker reception of local stations, and as a permanent receiver for the rest of the year the benefits of mains operation as well as far more selective tuning arrangements for external aerial and earth than you usually get with portables or transportables.

Use High-Efficiency Valves.

Some of you may wonder why a limit of two valves is suggested. Actually this is enough for adequate volume and good quality without any necessity for a "freak" circuit, but it is necessary to specify high-efficiency detector and pentode output stages. Incidentally, this is a two-valve combination which, as a loudspeaker transportable, has only recently become a practical proposition with the introduction of the new low-consumption pentodes.

A good example of the circuit we require is that of Fig. 1. This looks simple enough, but given sound design and the proper valves, it is really surprising what good volume and quality you get with only a frame pick-up. Reaction into the frame aerial is essential, and for this I find a simple circuit arrangement the most satisfactory, provided full and smooth control is arranged.

The frame feeds into a grid detector of the H.2 type, which makes a really sensitive detector (or type H.L.2, another good valve) with shunt-feed transformer coupling to a low-consumption pentode of the Pen.220 type. The overall magnification with critical reaction is of a high order, sufficient for good 'phone reception of many foreigners and a few at loudspeaker strength.

High-Note Compensation.

Now, in any receiver working from a frame aerial where you must use plenty of reaction to get full sensitivity, there is naturally considerable cutting of side-bands. Consequently you often get reproduction which is rather boomy and lacking in crispness unless departure from straight line response in L.F. stages and loudspeaker accidentally counteracts this tendency.

If this natural correction is insufficient the remedy is to introduce compensation on the L.F. side to accentuate the high notes. This is, of course, a modern innovation which is not used in transportable design as often as it might be.

Referring back to Fig. 1, you will see there that the pentode output is not fully compensated in the usual way for limiting high-note response, as here we can make good use of the pentode's natural tendency to emphasise the upper register.

Of course, only actual experiment can decide how much compensation your portable requires while as a permanent receiver less compensation may be needed. You can also experiment with a smaller condenser in the lead to the transformer primary, if bass-note response is excessive.

The average type of loudspeaker for use in transportables is generally lacking in low-note response, so that this modification is only occasionally necessary. As regards the loudspeaker itself, you can now get models with windings to match the pentode without the necessity for a tapped choke output coupling.

Another interesting circuit of a special type is that of Fig. 2. Here an S.G. valve is used as detector, resistance-coupled to the output valve, which may as well be a pentode if you intend using only a frame aerial.

Perfectly Stable Receiver.

The arrangement of the resistance coupling is rather unusual, but with the values given in Fig. 2 you get just the right screen voltage for the detector from a common H.T. + terminal, a very useful feature.

Ample reaction is obtainable without an H.F. choke, while the reaction condenser need not be larger than ·0001 mfd., or the reaction winding on the frame larger than one-quarter of the grid winding.

If you are able to use a mains unit providing up to 150 volts H.T., you will find this receiver perfectly stable and far less susceptible to mains hum than a portable with the normal type of detector, when used with a mains unit.

INCREASED SENSITIVITY

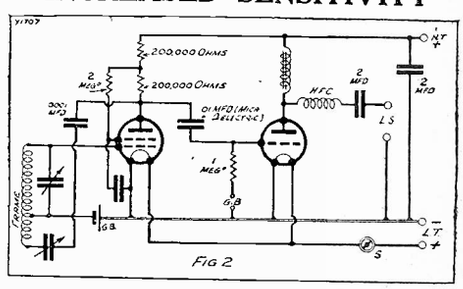


FIG 2

Greater sensitivity can often be obtained by using an S.G. detector. The screening-grid voltage is critical, but the arrangement of resistances shown here ensures that it will be correct.

Now let us turn to the interesting problem of how to use an outside aerial to the best advantage with this new type of receiver. When you use an external aerial and earth with a portable, results are not usually very satisfactory. Either there is poor volume on foreigners, or, more often than not, inadequate selectivity.

The usual idea of tapping the aerial lead on to the frame windings is, after all, rather primitive, isn't it? Why not be right up-to-date and introduce an adaptation of the ingenious scheme developed for the "Cosmic" receivers? This scheme, which can be applied to any portable, is one of the most effective I have yet tried.

MYSELF and the MICROPHONE

by OLIVE GROVES

How at the age of seven she won a record number of marks at the Royal Academy of Music; how she learnt boxing at a boys' school; and how she finally won fame and popularity through the microphone—these are some of the exciting experiences which Miss Olive Groves tells below.

PEOPLE who have broadcast have assured me time and again that entertaining the microphone is the most cold-blooded task in the world. The wireless studio, they say, is devoid of all feeling; and the B.B.C., in sympathy with these assurances, has for years past supplied an audience to the vaudeville entertainers in an effort to catch that evasive thing—"atmosphere."

But, to my mind, the mierophone *has* an atmosphere, albeit a different atmosphere from that of the stage or concert platform. I am never aware of unresponsiveness in the studio, but rather of a certain intimate "home" touch which is well-nigh indefinable in mere words.

Three Hundred Performances.

Nevertheless, it is to me very real, and almost tangible. Perhaps my long experience as a wireless singer has something to do with it—I made my first broadcast in April, 1926, and am now approaching my three hundredth microphone "appearance."

Another remarkable thing about broadcasting is the curiosity about the broadcast artistes. During the six years I have been singing more or less regularly for the B.B.C., I have received hundreds of letters asking about myself—what I look like, what I dress like, details of my life, and so on. People who meet me for the first time frequently remark, "Oh, I thought you were bigger"—or, "I thought you were smaller."

It is extraordinary that a single voice can create so many different mind impressions of its owner. Perhaps a psychologist could best explain it.

But if the few details of my life which I have been invited to set down serve to give some accurate idea of me as I really am (even at the risk of disillusioning a few of my admirers!), they will at least have served one useful purpose.

Born in London.

I am a Londoner, although there is a good deal of Yorkshire blood in me. There is, too, a marked musical strain in my family—especially on my father's side. My aunts and uncles include several "semi-professional" performers, which means, of course, that their musical skill earned them an occasional fee.

My mother gave me my first piano lesson when I was six. A year later I entered for an examination at the Royal Academy of Music; I can remember sitting on the examiner's knee, and telling him all I knew about melody. He must have been a kindly man, for he passed me out top of all England with a record number of marks.

At that time I was undergoing the very unusual experience of being educated at a boys' school. That was my father's own school at Hampstead, and my sister and I were the only girl pupils.

Won Several Scholarships.

We boxed and played and roughed it generally with the boys. Mother said the experience knocked "the nonsense out of us," but my own opinion is that we were never given the opportunity of absorbing nonsense.

I was sixteen when, through my piano playing, I won a scholarship to the Royal Academy of Music. This entitled me to free tuition for three years, but at the end of that period it was extended for another year.

Incidentally, I had never thought of turning to music as a lifelong profession. Even had I done so, it would certainly have been as a pianist and not as a singer that I should have hoped to succeed. However,

SIX YEARS OF SONG

Most popular of radio singers, Miss Olive Groves has broadcast almost every week since her first appearance in 1926.

there is an Academy ruling that every pupil must take up a second study.

I felt no inclination for any other musical instrument, and, having a voice which I thought reasonably promising, I adopted singing. At the end of my fourth year I was granted two further scholarships for singing.

I was still at the Academy when my mother went to Cologne (where my father was in the Army of Occupation), taking with her an amateur concert party composed mostly of children, of which I was a member. Our stay was only a matter of weeks, but we appeared at the Scala Theatre, where I played and sang.

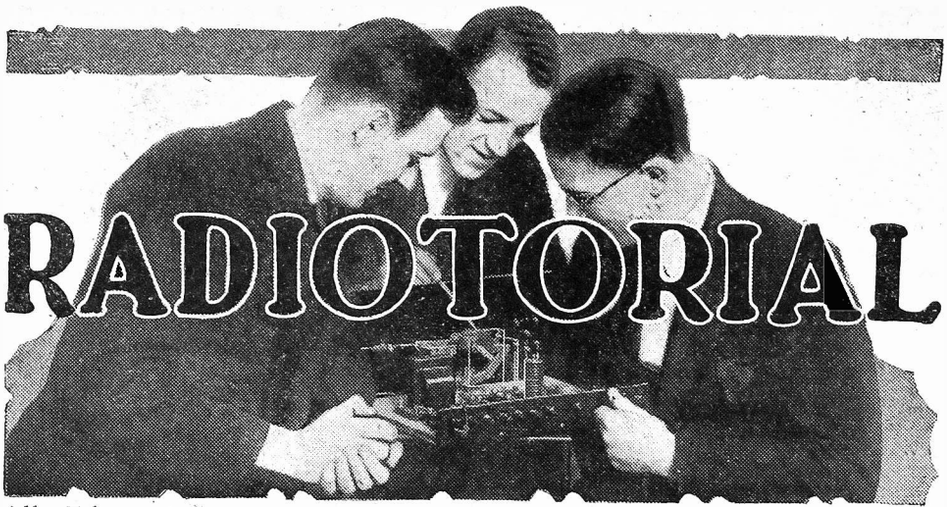
Broadcasting as a Career.

After my trip to Cologne I did a certain amount of concert work. Then there happened one of the luckiest incidents in my life. Because I did not wish to leave London, I refused an excellent offer with a travelling opera company. I was walking along the Strand, thinking that perhaps I had been rather silly about the business, when a man quite unknown to me touched me on the arm.

"You're Olive Groves," he said.

I admitted it, and he went on to explain that he was an official of the B.B.C. He had heard one of my performances at the Scala Theatre, Cologne, and somehow or other my voice and face had stuck in his mind. He invited me to an audition—which, I need hardly say, I gladly accepted.

I was found suitable for broadcasting, and I have appeared before the microphone ever since at a rough average of once a week. My work for the B.B.C. seems to have covered almost every field of singing—ballads, light opera, and musical comedy. And on one occasion I undertook the part of one of the Houston Sisters, with Mabel Constanduros as my "opposite." If ever there was a time when I wished to listen—as well as to perform—it was then!



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 specialties 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.

QUESTIONS AND ANSWERS

FIVE HOLES OR FOUR?

L. J. (Lowestoft).—"When the kit came the valve holders were different from the illustration. Each of them has five holes instead of the usual four, an extra hole in the middle being joined to an extra terminal on the stationary base. Does that matter?"

Not in the slightest. Treat them just like 4-pin valve holders, ignoring the central hole and extra terminal that is connected to it.

COIL UNITS AND THE "MODERATOR."

Many inquiries mention coil units, but give insufficient circuit details of these. In general, coil units can be modified easily if they have the aerial lead (or aerial-through-a-condenser-lead) *connected to a separate terminal on the coil unit.*

In such cases the following may be tried: Undo aerial from present terminal and join it instead to top terminal on Moderator coil. Join this end of Moderator coil to fixed vanes of Moderator condenser. Join other end of Moderator coil to moving vanes of Moderator condenser and to earth terminal.

Then place Moderator coil close up against medium-wave winding on coil unit, and try your luck.

If too powerful, space Moderator coil further from main coil. If insufficient power, vary position of Moderator coil till best coupling between this and main coil is obtained.

When a good position has been found, fix coil permanently in place. Note: The Moderator condenser must be mounted near the coil, as long leads to it may give rise to instability and other troubles.

HILVERSUM'S POWER.

"TOMMY" (Brightlingsea, Essex).—"We get the Hilversum programme very well here, and there is one point about it that has been puzzling me.

"As it is easily received we get it in daylight, and I have noticed that Hilversum seems to increase in strength far more than other stations, and quite suddenly round about tea time.

"Kalundborg, which also arrives with a good punch, seems to build up quite slowly from daylight strength to full evening strength. And so do Brussels and Hamburg, etc.

"But Hilversum seems to get stronger quite suddenly. Why is that?"

Probably you have been noting the change round about tea-time, when Hilversum increases his power. Prior to 5.48 p.m. only 7 kw. are used, but after that time the station uses an increased power of about 20 kw.

"MODERATOR" REPLIES IN BRIEF.

E. F. F. (South Norwood, S.E.25).—For the "Full Range" Junior you simply join one side of the Moderator condenser to one end of the Moderator coil; and the other side of the condenser to the other terminal of the coil (movable plug).

Then connect this latter terminal of the coil by clipping on to it the flex lead which formerly joined the aerial-series condenser to the PJ1 coil.

And connect the other sides of the Moderator coil and condenser to the earth terminal.

Push the Moderator coil up close to the centre coil of the PJ1, and adjust the condenser, finally noting the best permanent position for the Moderator coil in relation to the PJ1. Also try with and without the series-aerial condenser shorted.

K. R. (Olney).

It is very doubtful, as the real trouble is the out-of-date circuit, and not merely the degree of aerial selectivity.

L. E. (Twickenham); also F. F. W. (Wargrave), E. K. (Plumstead), A. N. A. (Buckhurst Hill), P. M. (Liverpool).

Your set is not suitable.

CONSTRUCTING THE "COSMIC."

G. W. (Stowmarket).—"Having become very interested in the 'Cosmic' and determined to get in on this short-waves-as-well racket as soon as I can, I should like to know details of the articles which I have missed. Can you give me a list of the 'Cosmic' articles, with numbers and dates of the 'P.W.'s,' in which they were given?"

The set was first described in the February 13th, 1932, issue of "P.W." (No. 506), and in this number there were special articles on "The Cosmic Circuit" and "Coils for the Cosmic." (A full-size blue print of the set was given away with every copy of "P.W." that week.)

The next week, February 20th ("P.W." No. 507), saw the description of the "Cosmic Star," and another free blue print of that set (showing the Ready Radio version) was given away. There were also "Valves for the Cosmic"; "Coils for the Cosmic Star" and "The Cosmic Three, Further Details."

Since then the following articles have appeared:

"P.W." No. 508 (February 27th, 1932).—"Accessories for the Cosmic," "Touring the World with the Cosmic."

"P.W." No. 509 (March 5th, 1932).—"Selectivity and Power on Your Cosmic," "Your Cosmic on Short Waves."

"P.W." No. 510 (March 12th, 1932).—"Pick-up Programmes on the Cosmic Three," "Finding Those Foreigners on the Cosmic."

(*Continued on page* 422.)

HOW ARE YOUR RESULTS NOW?

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 scales of charges, can be obtained direct from the Technical Query Dept., POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

A postcard 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.

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 and answer them you can compare your own solutions with those that appear on a following page of this number of "P.W."

* * *

(1) Who first used a valve in connection with a wireless receiver?

(2) About how many different types of receiving valves are now available in Britain?

(3) Which country in Europe has the greatest number of licensed listeners in proportion to population?

(4) Why an ohm is so called?

(5) How the voltage-drop across a resistance can be calculated if the current flowing is known?

ANSWERS to the above questions will be found on page 422.

"P.W." PANEL No. 75. ABOUT THE VALVE.—A.C. RESISTANCE.

In last week's "P.W." Panel, we mentioned that the A.C. Resistance—often called the "Impedance"—of a valve is not the same as its D.C. resistance. This latter is the opposition the valve offers to steady current from the H.T. Battery.

* * * * *

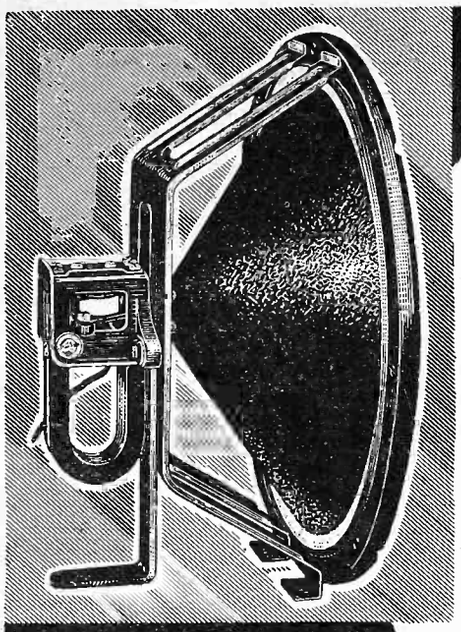
The A.C. Resistance or "Impedance" represents the opposition offered by the valve to alternating (or "A.C.") currents in its plate circuit.

* * * * *

If a valve with normal H.T. and G.B. has its H.T. increased slightly, there will be a small rise in plate current; a decrease of plate voltage to below the normal will result in a fall of plate current.

* * * * *

Dividing the difference in plate voltage by the difference in plate current will give the A.C. resistance or "impedance" of the valve with normal voltages.



HEARING IS BELIEVING

The amazing performance of BLUE SPOT Inductor Type 100U is difficult to credit—until you hear it for yourself.

It has all the sensitiveness of a *good* Moving-Coil Speaker. It has the same ability to reproduce the bass notes to perfection; but it goes one better, for it does not develop the lower notes at the expense of the higher. The whole musical scale is reproduced as clearly and crisply and correctly as in the original. 100U can be used with any receiver and also with Pentode valves since no matching transformer is required.

Test 100U with speech and song and music and you will be completely convinced. Test it against the dearest speakers you can find and you will realise what wonderful value you are being offered.

Write for illustrated Catalogue No. P.W. 38 U.

100D, an attractively designed Cabinet Speaker in Oak, 63/-.

100U

COMPLETE MOUNTED TO CHASSIS **39/6**

BRITISH MADE

All Blue Spot Products are now obtainable by Hire Purchase.

Blue Spot

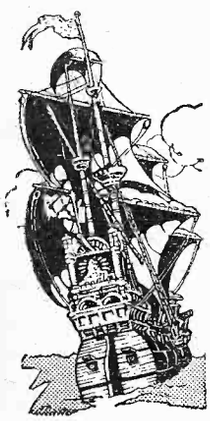
THE BRITISH BLUE SPOT COMPANY LTD

BLUE SPOT HOUSE, 94/96 ROSOMAN ST., ROSEBERY AV., LONDON, E.C.1

Telephone: Clerkenwell 3570. Telegrams: "Bluospot, Isling, London."

Distributors for Northern England, Scotland and North Wales: H. C. RAWSON (Sheffield and London), Ltd., 100, London Road, Sheffield: 22, St. Mary's Parsonage, Manchester: 37/38/39, Clyde Place, Glasgow.

The BEST Magazine value in the WORLD!



Such is the ARGOSY MAGAZINE, every issue of which is packed with a wonderful selection of the world's best fiction. The short story—highest form of prose-writing—is well represented. Every issue contains examples from the pens of the masters. The novel?—that, too, has its place in THE ARGOSY, for there is a complete book-length novel in every number. If you appreciate cultivated fiction you will appreciate

THE ARGOSY

Magazine - - *Monthly* - - 1/-

A.C. to D.C. BATTERY CHARGERS

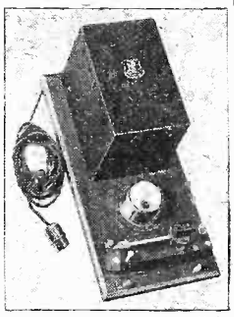
THE "N.P. SENIOR"

A Real Battery Charging Plant. Will do from 1 to 8 batteries at once. For Wall or Bench.

GUARANTEED

Fitted with Ammeter and Sliding Resistance. 14"×7" Polished Board.

METAL RECTIFIER



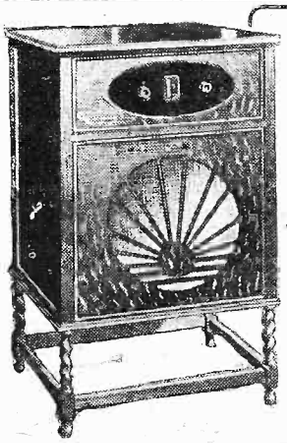
"Plug-in and Switch on"

75/-

Complete
3 Amperes Output
7 days' trial given
State Mains Voltage

Send for lists.

NASH PRODUCTS LTD., 93, Victoria Rd., Stechford, Birmingham.



"Made by Craftsmen for Particular People."

OSBORN RADIO CABINETS

A CABINET FOR EVERY TYPE OF SET.

Model No. 197. Jacobean Radio Cabinet in Figured Oak, 3 ft. 6 ins. high, 2 ft. wide, 1 ft. 4 ins. deep. Real twisted legs. Opening at back and top. Takes panel 21 ins. by 8 ins. or smaller. Baffle board 1 ft. 9 ins. by 1 ft. 6 ins. Ample room for any type of batteries in cabinet.

PRICES:

Machined Ready to Assemble, £1.15.0.

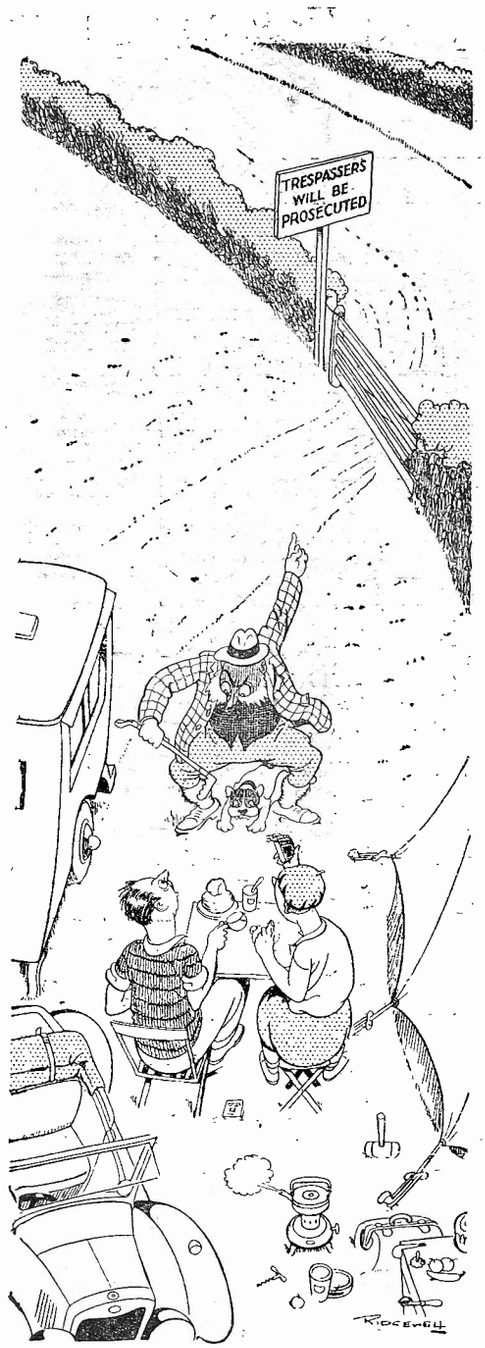
Assembled Ready to Polish, £2.10.0.

Assembled and Polished, £3.5.0.

All Models carriage paid.

SEND 3D. IN STAMPS FOR NEW 1932 BEAUTIFULLY ILLUSTRATED CATALOGUE.

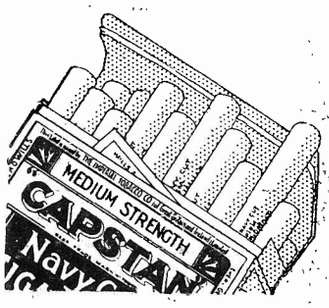
CHAS. A. OSBORN (Dept. P.W.), **The Regent Works, Arlington St., London, N.1.** *Telephone: Clerkenwell 5095. And at 21, Essex Road, Islington, N.1. Telephone: Clerkenwell 5634.*



Never mind—have a

CAPSTAN

they suit everyone



6D FOR 10
1½D FOR 20

CC3828

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 420.)

"P.W." No. 511 (March 19th, 1932).—"A Filter for the Cosmic."

Also, a two-valve version of the "Cosmic" was described in "P.W." No. 516 (April 23rd, 1932), and a one-valve "Cosmic" in "P.W." No. 521 (May 28th).

THE ANSWERS

—TO THE QUESTIONS ASKED ON PAGE 420 ARE GIVEN BELOW:

(1) Sir Ambrose Fleming, F.R.S.

(2) Over four hundred.

(3) Denmark.

(4) Because it was the scientist, Georg Simon Ohm, who first established the relation between Voltage, Current and Resistance in an electric circuit.

(5) By multiplying the number of ohms in the resistance by the number of amps. flowing through it.

DID YOU KNOW THEM ALL?

TROUBLE WITH AN OLD SET.

K. E. (Retford).—"When I was only thirteen I made up a two-valve set for my father from one of the original 'P.W.' blue prints (Reinartz reaction). He has always been very proud of it, and on no account would he let me replace it with a new one, as it was the first that I ever built and he says it sounds better now than any of the new ones.

"Goodness knows how many H.T. batteries have been worn out by it, and we have had four or five new valves with other odd replacements, but the last time I went over to see it he was in the middle of his first really serious patch of trouble. In fact, until it is put right he will not be able to use the set.

"The symptoms were very, very loud crackling when he was tuning, and I noticed that small sparks appeared on the reaction condenser every time this happened. Also his H.T. battery is running down much too quickly, so I concluded that the plates were shorting the battery, as there is only the reaction condenser between filament and the plate of the valve.

"I am taking him over a new reaction condenser and I want to ask you if I am doing right in suggesting another fixed condenser between this and its 'earth.' So if the plates of the new condenser get shorted in the same way there would still be an insulator between plate and filament to prevent the battery running down as well. Also, what value should this extra condenser be?"

It would certainly be a good opportunity to put a fixed condenser in series with the Reinartz reaction arrangement, and you will find that almost any value will do provided it is considerably larger than the value of the reaction condenser itself. Probably the latter is of the order of ·0003 mfd., in which case a ·001 or anything about that would be perfectly satisfactory.

A ·0005 mfd. *might* do, but in all probability the larger size would be much better, and less liable to affect reaction results.

HOT ACCUMULATOR PLATES.

B. C. N. (Hyde).—"Being of an enquiring and mechanical nature, I like to have my set and as many of the parts as possible taken to pieces when there is the slightest excuse! And, therefore, when the battery had to be topped up and vaselined again I seized the opportunity of undoing the top and pulling out the plates.

"I was doing this out of doors with the sun shining and was taking my time and doing the job carefully, as I had never tried it before. I stood the plates on an old wooden box beside me, whilst fishing for a lump of some kind of impurity, after which I was going to strain the acid, but I happened to turn round and find that the plates were 'smoking' and on touching them I found them to be quite hot.

"I was a bit windy as I was alone, and did not know what was the cause of this, but I took a chance on it and carefully put them back again in the cell as quickly as I could. To my relief nothing out of the way happened and after I had got it all fixed up and cleaned up again, I tried it on the set and it works O.K.

"What would be the cause of the smoking (which was very plain), and did it do any damage?"

The exposure to the air of negative plates will result in them getting quite hot owing to chemical action, and you did the right thing in getting them covered again quickly. Probably there is not much, if any, damage done, but it would be advisable to make careful hydrometer and voltage tests for a time until you are sure that the battery is not adversely affected.

IMPROVING SELECTIVITY.

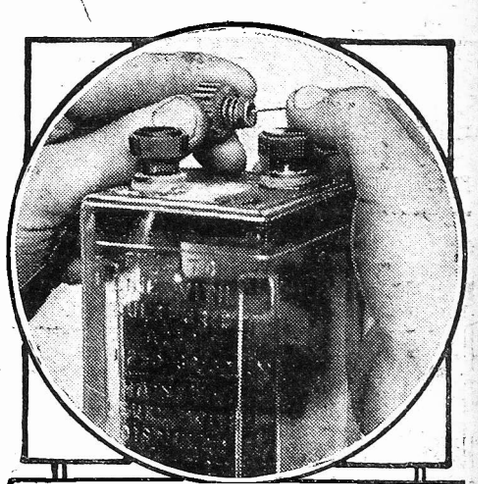
R. T. W. (Pembroke Dock).—"Not having tried this kind of work before, I do not see how to have the Moderator condenser *and coil* wired between aerial terminal and coil unit for medium waves, and Moderator condenser *only* for long waves. (To act as selectivity control.) Please explain how the coil is removed."

One *end* of the Moderator coil is joined to one of its terminals. The other *end* goes to the third socket, into which the plug can be fitted. And the second *terminal* is connected to the flex and plug, and to nowhere else.

So join one side of your Moderator condenser permanently to that terminal on the Moderator coil which goes to one end of its winding. And join the other side of your Moderator condenser to the remaining *terminal* on the Moderator coil (which has the flex and plug attached to it).

Now if you put the plug in one of the coil tappings your Moderator condenser will tune that part of the Moderator coil you have connected it across. Which is what you want for medium waves.

For long waves you need the Moderator *condenser* only—no coil. So you then merely take the plug out of the socket on the coil and let it hang loose.



YOUR ACCUMULATOR

Nothing much will go wrong with an accumulator if it is never allowed to remain "run down," but is re-charged promptly.

* * *

Occasionally the acid will need "topping up" with distilled water—it should never be allowed to evaporate below the tops of the plates.

* * *

The holes in vent plugs should be kept open, and a smear of petroleum jelly on the terminals will keep them O.K.

"THESE RADIO COMPONENTS."

Capt. Eckersley will continue his very popular series of articles—"These Radio Components"—next week, when he will deal with low-frequency transformers.

PILOT AUTHOR'S KITS

Exact to Specification

CASH—C.O.D.—H.P.—*Immediate Delivery.*

The DECADE

Described in last week's issue.

KIT "A" Author's Kit less valves and cabinet

CASH or C.O.D. **£3-9-5**

or 12 monthly payments of 6/5

KIT "B" Author's Kit with valves less cabinet. CASH or C.O.D. £4-15-5 or 12 monthly payments of 8/9.

KIT "C" Author's Kit complete with valves and cabinet. CASH or C.O.D. £5/10/5 or 12 monthly payments of 10/1.

KIT-BITS *Selected C.O.D. Lines—Post Charges Paid on Orders value over 10/-.*

t of Specified Valves	£1	6	0
ecified Peto-Scott Cabinet	15	0	
lvern Dual Range Coil, R.M.3	8	6	
ssen ·0005 Variable Condenser with Formo Slow-motion Dial	9	0	
oderator Coil	2	6	

COSMIC III KIT "A"

Author's Kit less valves and cabinet.

CASH or C.O.D. **70/-**

or 12 monthly payments of 6/5

Specified Valves, £1:6:0

Specified Cabinet, 17/6

COSMIC III STAR KIT "A"

Author's Kit less valves and cabinet.

CASH or C.O.D. **87/6**

or 12 monthly payments of 8/-

Specified Valves, £1:6:0

Specified Cabinet, 17/6

SELECTIVE FAMILY 3

SEND **1/-** ONLY

PILOT ENVELOPE, SELECTIVE FAMILY 3 containing FULL SIZE BLUE PRINT, 5 PHOTOGRAMS, and List of parts with details of newly invented Simplified System of Home Construction for an AMAZING 60-STATION 3-VALVE RECEIVER.

POCH "20 C" PERMANENT MAGNET OVING-COIL SPEAKER. With 3-ratio put transformer. This speaker will handle to 5 watts undistorted. Send **6/6** Only

Cash Price £1/15/0.

lance in 5 monthly payments of 6/6.

& A CHALLENGER PERMANENT AGNET MOVING-COIL SPEAKER. With cial Ferranti multi-ratio input transmer. Will operate from a 2-Valve set up a power amplifier. Cash Price £1/15/0. Send **6/6** Only

lance in 5 monthly payments of 6/6.

& A "100" PERMANENT MAGNET OVING-COIL SPEAKER. Complete with ulti-ratio input transformer, Send **5/4** Only

Cash Price £2/17/6.

lance in 11 monthly payments of 5/4.

SUNDAY EXPRESS A.C.3

FULL SIZE BLUE PRINTS "SUNDAY EXPRESS" A.C.3 th May, 1932), an A.C. Mains / Detector / Pentode Set, with lt-in moving-coil speaker. You build it in an evening. A nderful and unique receiver. SEND **2/-** ONLY

PETO-SCOTT CO. LTD.

77, CITY ROAD, LONDON, E.C.1.

Dear Sirs, Please send me CASH/C.O.D./H.P.

.....

.....

or which I enclose £.....s.....d.

CASH/H.P. Deposit.

NAME.....

ADDRESS.....

P.W.11/6/32.....

West-end Showroom:62, High Holborn, London, W.C.1.

MIRROR OF THE B.B.C.

(Continued from page 402.)

Bush (Krome); Prelude in G Minor (Rachmaninoff); A Hunting Fantasie, compiled by Joseph Muscant; Intermezzo, Lazy Pete (Werner-Kersten); Paraphrase, Old Folks at Home in Foreign Lands (Roberts); Trumpet Polka, Fine Star (Carter); Potpourri, Grieg's works, compiled by Joseph Muscant; Intermezzo, Tea Party of the Cockchafers (Kaike); Selection, The Fortune Teller (V. Herbert).

This broadcast from the Commodore Theatre, which lasts an hour and a quarter, will be followed by a recital of operatic gramophone records.

NEXT WEEK

THE 'DECADE' WITH SIMPLIFIED TUNING

EMPIRE BROADCASTING

(Continued from page 400.)

great extent, but this presents serious practical difficulties. These transmitters. therefore, will operate with about 15 to 20 kilowatts in the aerial.

It will take some months to determine the best schedule of wavelengths for the various zones. A comprehensive system for collecting data will be devised, to make certain that we are using the right wavelength in relation to the zone, the season of the year, and the time of the transmission.

The question is often asked whether the transmissions from this station will be audible in England. It is rather difficult to give a positive answer to this question. Most of the country will probably be in the skip distance for the shorter wavelengths, and therefore reception by the normal method for waves of this order, namely, the indirect ray, is almost certain to be very weak, or non-existent altogether.

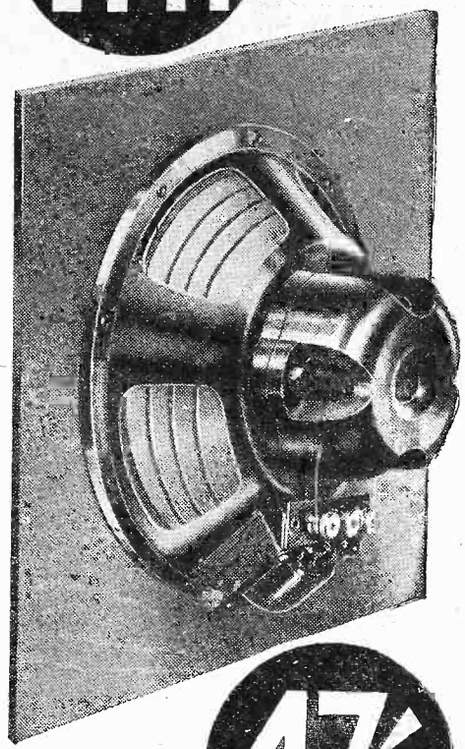
Local Reception.

Possibly, however, the two longer wavelengths, namely 32 and 48 metres, may be audible in certain districts at fair strength. In any case, reception is most unlikely to be of much value. Direct reception will, of course, be possible during both daylight and night conditions on some of the wavelengths within a radius of about 20 miles from Daventry, but the only use which could be made of this would be for experimental work on the design of receivers.

However, the reception of a direct ray on short waves is a very different thing from the reception of an indirect ray, and might therefore give misleading results.

Daventry has been chosen as the site for this station, partly for reasons of economy, and partly because it is highly suitable for a station of this kind. The work is now proceeding as rapidly as possible, and we expect to start transmitting before the end of the present year.

PPM PERMANENT MAGNET MOVING COIL SPEAKER



Supplied fitted to baffle ready for mounting into cabinet. Price includes transformer - - -

47/6

Designed by experts

. . . experts who have been responsible for some of the most outstanding loudspeakers of recent years—manufactured by a firm who specialise in the production of speakers that give unrivalled reproduction. These two facts have made this speaker the most outstanding achievement of the year. The P.P.M. Speaker incorporates an impregnated diaphragm, and a patented twin suspension permitting large cone movements without distress. The new patented cobalt content steel magnet produces a very high flux density.

Easy payment terms: 10/- down and 6 monthly payments of 8/-. Unless otherwise specified, standard transformer supplied.

CELESTION

The Very Soul of Music

CELESTION LTD., LONDON RD., KINGSTON-ON-THAMES

London Showroom: 106, *Victoria St. S.W.1*

New Times Sales Co

EVERYTHING RADIO EASIEST TERMS

COSSOR EMPIRE MELODY MAKER Model 234. With Valves and Cabinet. Cash Price **£6/8/6.** Balance in **11** monthly payments of **11/10.** With order **10/-**

COSSOR ALL-ELECTRIC MELODY MAKER, Type 235. Complete with Valves and Cabinet. Cash Price **£9/9/6.** Balance in **11** monthly payments of **17/4.** With order **17/4**

GRAHAM FARISH AMAZING 3. Less Valves and Cabinet. Cash Price **£1/18/6.** Balance in **6** monthly payments of **6/-.** With order **6/-**

COSSOR 2-VALVE ALL-ELECTRIC RECEIVER. A.C. Mains 200/250 v. 40/100 cycles. Moving-coil Speaker. Short and long waves. Complete with valves. Cash Price **£10/15/0.** Balance in **11** monthly payments of **19/9.** With order **19/9**

BLUE SPOT SPEAKER UNIT AND CHASSIS, TYPE 100U. Cash Price **£1/19/6.** Balance in **7** montbly payments of **5/5.** With order **5/5**

R & A "100" PERMANENT MAGNET MOVING-COIL SPEAKER. Complete with multi-ratio input transformer. Cash Price **£2/17/6.** Balance in **11** monthly payments of **5/4.** With order **5/4**

★**W.B. PERMANENT MAGNET MOVING-COIL SPEAKER P.M.3.** Complete with 3-ratio input transformer. Cash Price **£2/12/6.** Balance in **11** monthly payments of **4/10.** With order **4/10**

W.B. PERMANENT MAGNET MOVING-COIL SPEAKER. Type P.M.4. Complete with Transformer. Cash Price **£2/2/0.** Balance in **7** monthly payments of **5/9.** With order **5/9**

SUPER V.3. KIT for A.C. mains, including valves, cabinet, speaker, and mains equipment. Cash Price **£15/11/3.** Balance in **11** monthly payments of **28/6.** With order **28/6**

CELESTION P.P.M. PERMANENT MAGNET MOVING-COIL SPEAKER with impregnated diaphragm and dual-impedance input transformer. Cash Price **£2/7/6.** Balance in **7** monthly payments of **6/6.** With order **6/6**

ULTRA IMP PERMANENT MAGNET MOVING-COIL SPEAKER, with input transformer. Cash Price £2/15/0. Balance in 11 monthly payments of 5/-. With order **5/-**

BLUE SPOT PERMANENT MAGNET MOVING-COIL SPEAKER R.100, with input transformer. Cash Price **£3/15/0.** Balance in **11** monthly payments of **6/11.** With order **6/11**

EPOCH A2 PERMANENT MAGNET MOVING-COIL SPEAKER. Fitted with multi-ratio input transformer. Cash Price **£3/3/0.** Balance in **11** monthly payments of **5/9.** With order **5/9**

W.B. PERMANENT MAGNET MOVING-COIL SPEAKER P.M.1. Complete with input transformer. Cash Price **£6/0/0.** Balance in **11** monthly payments of **11/-.** With order **11/-**

ATLAS A.C.188 ALL-MAINS UNIT. 2 variable and 1 fixed tappings. Trickle charges 2, 4 or 6 v. at ·5 amp. Cash Price **£6/0/0.** Balance in **11** monthly payments of **11/-.** With order **11/-**

★**ATLAS A.C. ELIMINATOR, TYPE A.C.244.** Three tappings, S.G., detector and power. Output, 120 volts at 20 m.a. Cash Price **£2/19/6.** Balance in **11** monthly payments of **5/6.** With order **5/6**

GARRARD INDUCTION GRAMOPHONE MOTOR. For A.C. Mains. **Model 202.** Mounted on 12-in. Nickel Motor Plate with fully automatic electric starting and stopping switch. Cash Price **£2/18/6.** Balance in **11** monthly payments of **5/4.** Send only **5/4**

Any items advertised in this journal sent C.O.D. If value over 10/- sent all C.O.D. charges paid.

To NEW TIMES SALES CO.
56, Ludgate Hill, London, E.C.4.
Tele.: Central 2716.

Please send me (*a*) **Free 1932 Catalogue**
(*b*) .....

for which I enclose first payment of

£.....s.....d.

Name .....

Address .....

.....P.W.11/6/32.

THE LISTENER'S NOTEBOOK

(*Continued from page 402.*)

in a better mutual understanding. From the entertainment point of view, too, it would offer greater variety, giving us, at the same time, something which is really different.

The monotonous sameness of programmes, week after week, must in time foster in us something akin to contempt for certain items.

I even heard the Commodore Theatre Orchestra being abused the other night, for no other reason than that we hear them so often, and that they are always the same. Incidentally, I thought their programme on this occasion was as fresh as ever.

All the same, I see the dangers of oft-repeated items, and that is why I am all out for foreign relays, with a commentator whenever necessary.

"Mr. Bingham" Bungles.

Mr. C. K. Allen's observations on University discipline at Oxford and Cambridge must have sounded rather odd to American listeners, coming as they did at a time when American newspapers would be telling the story—with illustrations perhaps—of the latest undergraduate prank at Cambridge.

Americans have, I believe, a special interest in King's Chapel since the broadcast carol service at Christmas was inaugurated. I know that the last service brought a large batch of appreciative letters from across the pond.

The Review of Awe-ditions cast considerable light on the tribulations of the B.B.C.'s programme department, but why should they want to inflict some of "Mr. Bingham's" rejects on the poor public?

Nobody wanted to hear, for instance, Lena Bow's offspring make that awful row on a fiddle—it wasn't in the least funny! And he was allowed to go through a whole verse too. Really, this was very magnanimous of you, Mr. Bingham, but don't you think that some terse comment from you would have been more to the point?

You had a marvellous chance of producing roars of laughter, but you let it go. There's no doubt that Mr. Graham Squiers missed his way in this review. The best feature of the production was the piano accompaniment of Jack Venables.

Sickly Singers.

A newcomer to the microphone (to me, at any rate) is Mr. Charles H. Chandler, whose first talk, he says, brought him a record mail. In his second, on "Boscobel and Tong," he had a lot of interesting things to say in the kindliest and most intimate manner.

There wasn't the smallest suggestion of that intellectual aloofness which is rather *à la mode* at present. He seemed, however, to pay more attention to the historical associations of the country he discussed than to its natural beauty. Even so, he was thoroughly entertaining.

Strath Mackay seems to own quite a good singing voice, but I suppose it is with his double-voiced business that he hopes to achieve fame. I should enjoy this feature more if he didn't sound as if he were likely at any moment to be violently sick.

There were many excellent features about the Royal Command Performance. It was, firstly, non-stop variety, well thought out and well presented. Obviously, certain turns did not lend themselves to broadcasting so well as others. I have principally in mind Jasper Maskelyne, the illusionist, but even he was interesting, thanks to the able commentating of Leonard Henry.

Leonard, unlike his predecessors in this difficult job, really excelled himself. He just did all that was necessary, and no more. Never once did he intrude or attempt to steal the limelight of the artistes.

A Wise Selection.

It was interesting to find so many radio stars among the select body, although these are but a small fraction of all the B.B.C. vaudeville artistes. We should hardly expect to find the latter fraternity appearing exclusively in a Command performance.

I thought Jack Hylton's selection of popular melodies a very wise one and ideal for the occasion—a total absence of the hot variety was noticeable. I didn't think the comedians quite rose to the occasion. Of course we know they can't go all out, but their jokes were, on the whole, very feeble.

The Naughton and Gold turn was just a succession of crash, crash, wallop and bang. One could hear very little of their patter, but since they kept the audience in fits of laughter, there must have been more in their turn than the loudspeaker conveyed.

OFFICIAL "P.W." EXHIBITORS.

Readers are reminded that further information regarding the components for sets described in this journal can be obtained from official "P.W." exhibitors, who also display P.W. "Cosmics," etc. The latest additions to the list of Exhibitors are given below.

LONDON.
C. & W. Thew, 44, Blackheath Hill, S.E.10.

PENRITH.
A. B. Bowe, late Frank Smith, Cornay Square.

SWANSEA.
Dadem, Ltd., 206, High Street.

PORTSMOUTH.
Wild Bros., 60, Fratton Road.

BOLTON.
Olympia Radio, Ltd., 4, Bradshawgate.

BIRMINGHAM.
The Electrocet Radio Co., Solihull.

HALIFAX.
C. Kinder, 49, Saddleworth Road, WEST VALE,

HULL.

CHESHIRE.
R. Manning, Acton Bridge, Nr. NORTHWICH.

MAIDSTONE.
Cyco-Rado, Ltd., 3, Mill Street.

MAINS UNIT VOLTS

A REMINDER.

When considering the purchase of an H.T. mains unit to work with a mains set, remember that in the majority of this class of receiver the negative grid bias obtainable is subtracted from the maximum H.T. voltage obtainable, which in the case of a power valve requiring 25 or 30 volts bias becomes a consideration of importance.

TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio reception.

By Dr. J. H. T. ROBERTS, F. Inst. P.

Radio in the United States.

I happened to be looking through a number of Radio journals sent over to me from the United States a few days ago, and I noticed that the number of radio receiving sets in use there has now reached such a colossal figure that one out of every two homes has a receiver. The United States Census Bureau made an investigation into this matter and showed that about 12,000,000 out of 29,000,000 homes in that country, that is over 40 per cent, had a radio set.

That census was made about a year ago. In the time which has elapsed since the census was taken it is estimated by the radio trade that about 4,000,000 more radio sets have been sold, which brings the total to over 16,000,000 or more than 50 per cent of the total number of homes. The total radio audience represented by this number of instruments is reckoned at about 80,000,000.

Of course, what the radio trade in the States look at is not so much the fact that there are 16,000,000 homes in the States which possess a radio set, but rather at the fact that there are still some 14,000,000 homes which do *not* possess a radio set, and therefore constitute a potential market yet to be explored!

The Little Troubles.

Have you ever noticed how it is the little things which seem to cause the most trouble, not only in the every-day affairs of life but also in regard to radio matters.

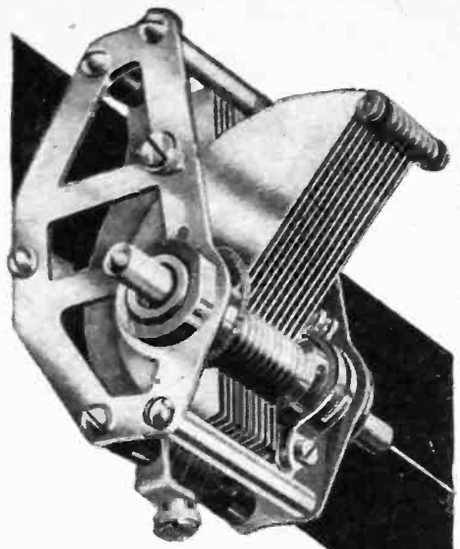
If you are an experimenter you know full well that you have more trouble over a pander-plug which simply won't stay in the socket of a high-tension battery, or which has to be rammed in with a bit of fine wire alongside of it and is liable to jump out at any moment, than you may have over a loudspeaker or even a valve.

This only goes to show that it is really economical to do every part of the job right in the first instance. In the particular case mentioned above, the proper thing to do is to make a satisfactory connection to the pander-plug and then to make sure that the prongs of the plug are widened until it fits tightly in the socket.

I have seen really experienced experimenters fiddle about with a complicated experimental layout, whilst the connections to the high-tension battery consisted of bare ends of wire resting precariously in the battery sockets with the doubtful aid of broken match-sticks. The slightest movement of anything on the bench was liable, if not to pull one of the high-tension connections entirely out from the battery, at any rate to shift it about so as to cause the most frightful crackle in the speaker.

In a sense, this kind of thing is a pardonable fault because I know only too well that

(Continued on next page.)



BUILT TO AN EXACTING STANDARD

- Unusual adaptability — can be ganged, mounted with either end next panel or screwed to baseboard.
- Left- or right-hand mounting—the panel-fixing bush screws into either end of condenser.
- Ball-bearing steel centre spindle adjustable for length—particularly useful for ganging and for fitting Thumb or Drum Controls.
- Extremely low-loss yet rigid construction.
- Adjustable tension to centre spindle.

J.B. UNIVERSAL LOG

Frame and vanes of extra hard brass. One-hole fixing. Takes any panel up to ¼ in. Pigtail to rotor.

·0005 .. 9/6 ·00025 .. 8/9
·0003 .. 9/- ·00015 .. 8/9

4-in. J.B. Bakelite Dial
Black - 1/6 extra
Mahogany 2/- extra

PRECISION INSTRUMENTS

REG. TRADE MARK

Advertisement of Jackson Brothers, 72, St. Thomas' Street, London, S.E. 1. *Telephone: Hop. 1837.*

PATENTS, TRADE MARKS.
"Advice Handbook" and Consultations FREE.—B. T. KING, C.I.M.E., Regd. Patent Agent (G.B., U.S. and Canada), 146a, Queen Victoria Street, London, E.C.4. 45 years' references. *Phone: Cent* 1682

"ENGINEERING OPPORTUNITIES." This is a book you must not miss. It contains brilliant articles by Prof. A. M. LOW, our Employment Supdt., etc., shows how to pass A.M.I.Mech.E., A.M.I.C.E., A.M.I.A.E., I.E.E., M.I.M.T., Matric., G.P.O., and all other Exams, and outlines over 100 Home-Study Courses in all branches of Engineering. Send for your copy to-day. FREE and without obligation. We alone guarantee—"NO PASS — NO FEE." **BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY, 401, Shakespeare House, 29, Oxford Street, London, W.1.**

EXACT TUNERS

250 to 2,000 metres.
Thousands of these tuners are in use, and we can strongly recommend them. No further coils are required. Send P.O. for particulars and circuits—FREE.
THE EXACT MANUFACTURING CO.,
Croft Works, Priory Street, Coventry.

Make
THE DAILY SKETCH
YOUR Picture Paper

EASY PAYMENTS

"There's no place like HOLMES."

The first firm to supply Wireless parts on easy payments. Seven years' advertiser in "Popular Wireless." Thousands of satisfied customers.

		Deposit	Monthly Payments
TELSEN VICTOR 3 KIT	39/6	5/5	7 of 5/5
COSSOR KIT	£6/8/6	10/-	11 of 11/11
OSRAM KIT	£10/15	19/6	11 of 19/8
METEOR 3 KIT	£3/15	6/10	11 of 6/10
EXIDE H.T. Accum., 120v.	£3	6/-	9 of 6/8
BLUE SPOT 66R & CHASSIS	£2/2/6	5/6	9 of 4/5
BLUE SPOT 100 U	39/6	5/8	7 of 5/4
AMPLION M.C.6	67/6	7/5	9 of 7/5
CELESTION M.C.	47/6	5/3	9 of 5/3
EKCO Eliminator A.C.18	67/-	7/5	9 of 7/5

New Goods Obtained for Every Order.
Send us a list of the parts you require and the payments that will suit your convenience, and we will send you a definite quotation. Anything Wireless.
H. W. HOLMES, 29, FOLEY STREET, Great Portland Street, London, W.1.
'Phone Museum 1414.

WE invite readers to support our Advertisers, —care being taken to accept only announcements of reputable firms!

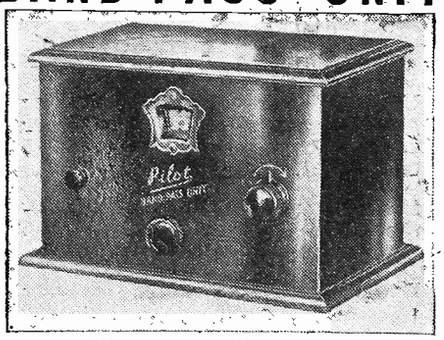
DON'T RISK IT! **GARD** TRADE MARK Pat. App. For

Lightning strikes through wireless aerials. Make YOUR home safe!

No need to switch off. Listen through the worst of storms. Fix a 'Gard' between Aerial and Earth lead-in. Does not affect reception, but provides constant and absolute protection at all times against lightning and static interference.

From all Radio Dealers or Post Free from GRAHAM FARISH, BROMLEY, KENT

PILOT
BAND-PASS UNIT



Instantly converts any set to Band-Pass Tuning

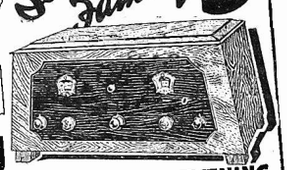
UNDER modern Broadcasting conditions your Set must be equipped with this New and amazing selectivity Unit. Then—*and only then*—will your selectivity problems be completely solved once and for all. Whether your set is Mains or Battery operated, the PILOT BAND-PASS UNIT cuts out programme interference effectively and sharpens tuning to needle-point selectivity. It is simple to attach and can be operated by anyone without technical knowledge. It's complete; no valves required; no extras of any kind. **25/-**
Obtainable from all branches of Messrs. Curry's Ltd., and all Radio Dealers. In cases of difficulty sent direct.

YOU, TOO CAN BUILD
SELECTIVE FAMILY 3

An amazing 60 Station Set described by "Maxamp" in "Tit-Bits," May 7th, 1932.

AN AMAZING 60 STATION SET

The Selective Family 3



as described by MAX-AMP in TIT-BITS MAY 7th 1932

YOU CAN BUILD THIS SET IN AN EVENING with this PILOT RADIO ENVELOPE containing FULL SIZE BLUE PRINT, 5 PHOTOGRAMS, COMPLETE LIST OF PARTS AND FULL ASSEMBLING AND WIRING INSTRUCTIONS. complete 1/-

PETO-SCOTT CO. LTD. 77 CITY RD. LONDON. E.C.1.
PIONEERS OF CONSTRUCTOR KITS IN 1919

EASILY BUILT IN ONE EVENING

PILOT ENVELOPE

Contains Full-size Blue Print, 5 photograms, List of Parts with newly invented, Simplified System of Home Construction and easy to follow operating notes. Get your copy of the PILOT RADIO ENVELOPE TO-DAY and build this wonderfully simple family Receiver.

Obtainable from Bookstalls and shops of Messrs. W. H. Smith & Son, Newsagents, and Radio Dealers.

1/-

PETO-SCOTT CO. LTD.
77, CITY ROAD, LONDON, E.C.1.
Dear Sirs, Please send me:
1 PILOT BAND-PASS UNIT 25/-
1 PILOT SELECTIVE FAMILY 3 ENVELOPE 1/-
for which I enclose £.....s.....d. CASH
NAME.....
ADDRESS.....
P.W. 11/6/32.
West-End Showroom: 62, High Holborn, London, W.C.1

TECHNICAL NOTES

(*Continued from previous page.*)

it is due to the impatience of the experimenter, who is anxious to get on and test out the circuit, or whatever it may be, that he hasn't the time to go methodically over all his little bits of arrangements at the start. But, as I said, it pays both in time and temper to do the job right in the first instance.

Locating Cracked Joints.

The other day I had a case where a set was working very badly, although apparently everything seemed to be in order, and it turned out that one of the plugs in the grid-bias battery was not making electrical contact at all, with the result that there was no G.B. applied to the valve in question—and the effect you can perfectly well imagine! Not only was the quality very poor, but the valve must have been passing a much heavier high-tension current than it was intended to do, and was liable to be damaged in the process.

Another thing which I have many times found to be quite a trouble to experimenters is a cracked soldered joint, the separation of the two parts being sufficient to make an electrical disconnection, but too small to be noticed except by very careful scrutiny. You can generally find a thing of this sort by trying the various busbars or wire conductors in the set, but be careful not to use undue force or you may cause trouble where none existed before.

Broken Spaghetti Resistances.

I don't know whether you have ever had trouble with a broken spaghetti resistance, but I have seen two or three cases of this. The spaghetti resistance, as you probably know, is wound with fine, high-resistance wire upon a soft, flexible core of insulating material and covered with an insulating sleeve.

Knowing this, many people treat it in the same way as the spiral springs used for hanging curtains, and imagine that it can be pulled out to any desired length. This is not the case at all, and a spaghetti resistance should not be stretched or pulled in any way, nor should it be twisted round very sharp bends, otherwise the high-resistance wire, which is usually quite brittle, will be broken.

Incidentally, a break inside a spaghetti resistance is often very troublesome to find because, owing to the relatively high resistance, the ordinary test is not easy to make, and there is no outward and visible sign of a mechanical fracture. I had one case recently where a lot of trouble was caused in a set due to a broken spaghetti resistance and this, as a matter of fact, was the very last thing which the owner of the set looked for.

It Won't Stretch.

If you want to use a spaghetti resistance between two points which are too far apart for the resistance to stretch across—an unusual situation, by the way—you should add a short length of insulated conductor to the end of the flexible resistance and complete the job in that way. Usually the trouble is not due to *stretching* the resistance, however, but to allowing it to become *kinked* as, of course, spaghettis are generally used in a bent or looped condition.

The good ones are really quite strong and robust, and if treated properly should give no trouble at all. But, like anything else, if they are subjected to drastic ill-treatment they kick.

Two-Band Tuning.

When using coils and frame aerials for two different wavelength ranges, an arrangement often used is to connect the long-wave coil across the tuning condenser and to have the medium-wave coil adapted to be switched in or out of circuit in parallel with the long-wave coil. With this arrangement, when you wish to receive on the medium wavelength band, you switch in the medium-wave coil and so use the two coils in parallel.

The question is whether this arrangement is efficient. Obviously the efficiency of the whole arrangement is limited by the efficiency of the long-wave coil, since this is in circuit all the time, and therefore it is important to avoid losses as far as possible in the long-wave coil.

A good deal depends upon the design of this latter coil and upon the arrangement of the two coils together. It is obvious, however, that if there are any serious losses in the long-wave part, this will have a very adverse effect upon the efficiency of the whole combination, altogether irrespective of the efficiency of the medium-wave coil taken by itself.

Searching for Weak Stations.

I have often noticed people—and not always amateurs—endeavouring to tune-in comparatively weak stations, and frequently enough they twiddle about with the tuning-dial, moving this over quite a large number of degrees and probably passing over the very station they want to get. If you are out for very loud or powerful stations, which can scarcely be missed however badly you tune, then, of course, it is all right, but if you are looking for weak or distant stations, the longest way round is the shortest in the end.

What you want to do is to move the tuning-dial a very small amount each time—in the region, of course, of the position where you *expect* the station to come in—and to follow up with the reaction control so as to keep up the strength of reception to the maximum for the particular tuning position. In this way, working the two controls together, you will be much more likely to find the station you are looking for and then, holding it with the tuning, bring it up to maximum strength with the reaction. But to go shooting about all over the tuning-dial, without any regard for the corresponding adjustments of the reaction, is simply a waste of good time.

A Loud Speaker Tip.

Following my remarks in these Notes a little time back on loudspeaker units, I have had several very interesting letters from readers telling me of various dodges which they employ and the sort of results they get.

One letter, from a London reader, I think might be useful to pass on. He asks: "Is the cone the last word in diaphragms?" His letter goes on to say: "Personally, I have always preferred the pleated paper diaphragm, owing to the sweetness of the tone.

"I know one could get very little power from it in its old form, owing to the way it was attached to the frame and unit. But I have overcome this difficulty by attaching it in the baffle by a ring of linen about half-an-inch wide. This is tightened (the

(*Continued on next page.*)

TECHNICAL NOTES

(Continued from previous page.)

doesn't let me into the secret, but possibly by means of a dope) until it is as taut as a drum, and the results are very good indeed."

"At present I have two of these working in series, the first with a 12-in. diaphragm operated by a Blue Spot 66P, the second with an 18-in. diaphragm operated from a Ferranti Inductor Unit."

Have You Any Ideas?

There are so many little dodges which readers find out for themselves, especially with regard to loudspeakers, that it is always very interesting to have notes of them, and I shall be very pleased to hear at any time from those of you who care to send me any hints which you think may be interesting to pass on to fellow readers.

Pentode Detectors.

I have a letter from a Northampton reader who says that although he has been a careful reader of these Notes for a long time, he doesn't remember having heard of a pentode valve being used as a detector. If I remember rightly, however, I mentioned this particular matter a little while back. In fact, I am sure I did, because other readers have mentioned it in their letters to me from time to time.

However, the letter I have before me goes on to say that he has used a pentode detector with great success, the best results being obtained when the grid leak is connected to filament positive with extra grid voltage the same as that on the anode. The reaction, he says, is remarkably smooth and permits of a tighter aerial coupling with a consequent increase of signal strength and incidentally of X's). He adds that in this way he has logged a large number of stations, and that the arrangement has been very satisfactory.

Indirectly Heated Valves.

Although mains valves have many advantages over the battery-operated type, they have certain disadvantages, an important one being the fact that they do not commence to operate the moment they are switched on. The time required for the cathode to heat up varies with different valves, but is always very considerable compared to that required for a battery-operated valve which, indeed, is practically instantaneous.

A good deal has been done lately by valve manufacturers to reduce the "lag," that is, the time between switching on and the set "coming to life," but nevertheless there is, and I suppose there must be, quite an appreciable time-interval.

Where Battery Valves Score.

Whether the lag causes any serious inconvenience to the user of the set depends a good deal on circumstances. I had a case just recently in which I wanted to use

(Continued on next page.)

Tunewell All-Purpose H.F. Choke.
Wound on hollow-cored moulding. Capacity reduced to absolute minimum. Results unequalled by any other. Range 20 to 2,000 metres. 3/6.

Tunewell Volume Control.
Logarithmically wound with double silk-covered wire. Paper laid between windings. Type V, 50,000 ohms, 5/6.

Type P. Variable Resistance or Potentiometer. Equal resistance between studs. Max. dissipation 3 watts. 5/6.

"Guide to SUPER RADIO" with 8 BLUE PRINTS FREE!

This interesting Guide has proved amazingly popular. Thousands have been applied for in response to our recent advertisement. The Guide incorporates 8 Blue Prints (Band Pass All-Mains 3, Kit Eliminator, etc.) and details of the NEW Range of Tunewell Super-Radio Components. If you have not applied, send the coupon now for a FREE copy.

Fill in and Post this NOW!

Send me "Guide to Super-Radio" to

Name .....

Address .....

.....

My nearest dealer is .....

..... *P.W.2*

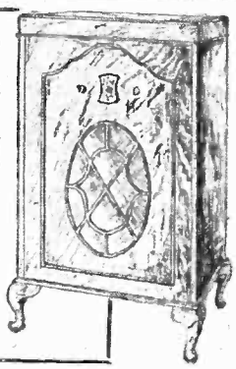
Post in unsealed envelope, half-penny stamped, to:—
Tunewell Radio Ltd. 54, Station Road, London, N.11.

TUNEWELL

BRAND NEW MANUFACTURERS' TYPE SURPLUS.—Magnavox X Core Moving-Coil Speakers (U.S.A.), D.C. Field, Resistance 2,500 ohms, Speech Coil 8 ohms, Transformer 35-1, list £6, 26/- each; Pick-up Heads, Websters 50/-, each 15/-; Igranic Phonovox, 15/- each; Condensers: G.E.C., Siemens, Standard Telephones, etc., 800 D.C. test, 1-mfd., 10d. each 9/- doz.; 2-mfd., 1/10 each; 4-mfd., Bakelite, 2/9 each; ·1 —·0005, etc., all values, 1/- each; Polar 3-gang Condensers, with slow-motion drive, 9/6; Claude Lyons 4-gang, Carr. paid, C.O.D., or call.—**NEWTHS RADIO SERVICE**, 32, Wardour Street, London, W.1.

FREE A Luxury Wireless Set
or components of equivalent value
Wonderful offer to introduce the Radialaddin Club. Write for particulars.
Radialaddin Club (Dept. P.W.), 47/48 Berners Street, London, W.1. Museum 1821.

The ACME of CRAFTSMANSHIP
High Grade
RADIO GRAMOPHONE CABINET
of exclusive modern design, hand-made and polished, on Queen Anne legs.
Figured Oak, £4.12.6.
Figured Walnut or Mahogany £5.10.0.
carriage paid.
Illus. Catalogue Free.
Cabinets made to order a speciality.



GILBERT
Cabinet Maker,
SWINDON
Estimates Free. Est. 1866.

The Super Paper of the FILMS
All Photogravure with Pages in COLOUR
Film PICTORIAL
Every Thursday - - - - - - - - - 2d.

OHMITE RESISTANCE

Better than Wirewound
All values from 300 ohms to 5 megohms.
Accurate and Constant
1/6 each. Holder 6d.

Made by GRAHAM FARISH Bromley Kent.

THE
LONDON RADIO SUPPLY COMPANY
FOR
QUICK EASY PAYMENT SERVICE

We supply all good quality Radio Receivers, components and accessories on deferred terms. Large stocks are carried and orders are executed promptly. Send list of requirements and a quotation will be sent by return of post. Price list free on request.

"The OUTDOOR THREE," complete Kit with valves and good quality cabinet. Cash Price £8/7/0. With 12/6 order
And 11 monthly payments of 15/6.

NEW EPOCH A2 PERMANENT MAGNET MOVING COIL UNIT. Cash Price £3/3/0. With 5/9 order
And 11 monthly payments of 5/9.

ATLAS ELIMINATOR, A.C.244. 3 H.T. Tappings. 20 M/A output. Cash Price £2/19/6. With 5/- order
And 11 monthly payments of 5/6.

ORMOND PERM. MAGNET MOVING COIL UNIT. Cash Price £3/5/0. With 5/- order
And 11 monthly payments of 6/-.

MARCONIPHONE PICK-UP AND TONE-ARM, still the finest pick-up available. Cash Price £2/5/0. With 5/- order
And 9 monthly payments of 5/-.

NEW R & A "CHALLENGER" PERM. MAGNET MOVING COIL UNIT. Cash Price £1/15/0. With 5/- order
And 6 monthly payments of 5/8.

SET OF THREE NEW VALVES, MULLARD or COSSOR. S.G., Detector and Super Power. Cash Price £1/15/6. With 5/6 order
And 6 monthly payments of 5/8.

12 EXIDE HIGH-TENSION ACCUMULATORS (120 volts WH-10 super-capacity, 5,000 milliamps). The cheapest form of high-tension supply where electric light mains not available. Cash Price £3/15/0. With 6/6 order
And 11 monthly payments of 7/-.

NEW W.B. PM4 PERM. MAG. MOVING COIL UNIT. Cash Price £2/2/0. With 5/6 order
And 7 monthly payments of 5/9.

To avoid delay will customers kindly send deposit with order.

THE
LONDON RADIO SUPPLY COMPANY
(*Established* 1925)
11, Oat Lane, Noble St., London, E.C.2
'Phone: National 1977.

LOUD SPEAKERS REPAIRED, 4/-
(*Blue Spot a Speciality,* 5/-)
Transformers 4/-, Headphones 4/-, all repairs magnetised free. Eliminator Repairs quoted for. 24 Hours Service.
Discount for Trade. *Clerkenwell* 9069
E. MASON, 44, EAST ROAD, N.1.

ADVERTISERS PLEASE NOTE!
The Rate for a one-inch Single Column Advertisement is **30/-**
Minimum Space accepted:
Half-an-inch .. **15/-**
Send Remittance with instructions to:
JOHN H. LILE, LTD.,
4, LUDGATE CIRCUS, LONDON, E.C.4

TECHNICAL NOTES

(*Continued from previous page.*)

some mains valves for a special purpose—not for an ordinary receiving set at all—and it was essential for this particular purpose that the valves should commence to operate almost instantly.

So far I have been unable to obtain any mains valves which meet this case, although they are eminently suitable in other respects, and I have been obliged to fall back to battery valves.

An Effective Screen.

The metal-coated valves having a coating sprayed on to the bulbs show a good deal of improvement since the coating is connected to the cathode pin of the holder and so forms a shield which reduces pick-up and improves the operation of screen-grid valves.

This means that extra stability is obtained and the valves are quieter in operation.

That Dial Light.

I wonder how many of you use a dial light for illuminating the dial of your set? This is often regarded by owners of battery sets as rather an expensive luxury, not in first cost but in maintenance, since the pilot lamp consumes probably more current than an extra valve. But with a mains set no such consideration arises, and a pilot light is often very handy as well as adding a touch of distinction to the appearance of the receiver.

Sometimes readers complain that the lamps burn out very quickly but, if so, it must be due to poor lamps being used, or to the voltage of the lamp not being suited to the voltage of the receiver. Incidentally, you will often find that you can use a higher voltage lamp which, therefore, burns rather dimly, but nevertheless gives sufficient light for what you want.

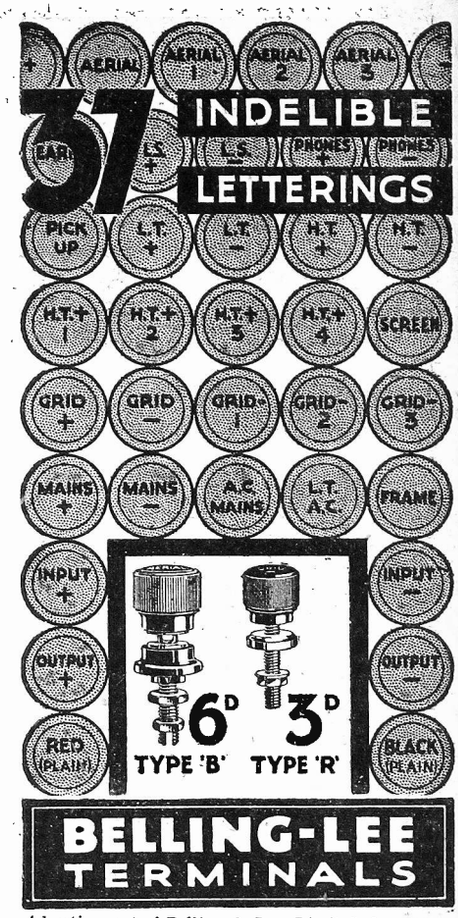
In fact, a dim light is really preferable to a bright one as it enables you to see the controls, but does not dazzle your eyes. If a higher voltage lamp is used it will naturally last very much longer. In fact, a 6-volt lamp running at 4 volts ought to last almost indefinitely.

Summer Reception.

At the time of writing these Notes we are enjoying brilliant sunshine, and there appears to be every prospect of a real summer; perhaps by the time you read them it may be different! But nevertheless we have the summer before us, and with it a falling-off in the number of stations, especially distant ones, which will be received on most sets. If you are specially keen on long-distance reception, now is the time to get busy with a suitable receiver, because the time of testing will be during the next three or four months.

It is surprising what a difference there is in the station-getting properties of a set in the daytime and during the night, especially in the summer months. If you can receive a fair number of stations during the day you can be quite certain that while the hours of darkness persist you will have no difficulty in receiving quite a bunch.

Notwithstanding all the claims which one hears, there are precious few types of sets, apart from super-heterodynes, that will bring in really satisfactorily as many as a dozen or twenty stations during the daytime. At night, however, it is a totally different matter.



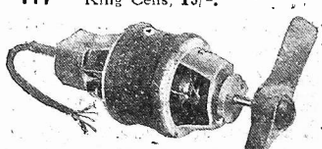
Advertisement of Belling & Lee, Limited, Queensway Works, Ponders End, Middlesex.

ELECTRADIX BARGAINS

LOUD SPEAKERS. New 2,000 ohm Horn Silvervox as illus. by Silvertown Co. A two-guinea speaker for 11/6. Limited number. **Moving Coil** 4/6 volt Kolster, 20/-; Jensen 6 volt, 25/-; 6 volt Dynoplus, 25/-; B.T.H. 100 volt Speaker Pots., 10/-; R.K. 220 volt big Cinema Speakers, 45/-; A.C. Speakers, 120 to 250 volt four-guinea Jensen for 55/-.

TRANSFORMERS. Intervalve Ericsson, 2/6; Sifam, ditto, power, 4/9; Western Electric, 2-1 ratio, 2/6; Mains Parmeko, big power H.T. & L.T. £4 10s. type for 45/-; B.T.H. Panatrope, ditto, 45/-; Mains 220 v. to 8 v. 1 amp., 6/6; to 20 v. 2 amp., 15/-.

PHOTO CELLS, 25/-. Genuine U.X.867 as illustrated, made famous by the well-known R.C.A. Talkies. Faithful light to sound reproduction with a 50 watt lamp only. Every radio user should have one of these £7 photo cells whilst available at 25/-; B.T.P.-King Cells, 15/-.



H.T. & L.T. DYNAMOS
A Bargain

To clear our surplus we are offering these £15 Double Current Generators at less than a twelfth cost. They have two comms. for D.C. 6/8 volts at 3/5 amps. L.T., 400/600 volts 100 m/a H.T. 12" long, 17 lbs. weight, 3500 revs. Ball bearings, carbon brushes. Clearing surplus soiled stock at sacrifice price of 22/6. Each machine tested and guaranteed. Carriage 2/6. Propellor 2/6 extra.

Write for new Sale List just published.

ELECTRADIX RADIOS
218 UPPER THAMES STREET, E.C.4

HAVE YOU GOT IT?—THE JUNE NUMBER

OF

MODERN WIRELESS

ON SALE EVERYWHERE PRICE ONE SHILLING

FOR THE SET-OWNER

Many valuable features:—

Using Indirectly-Heated Valves.
Underloaded Mains Units.
Behind the Scenes of Broadcasting.
etc., etc., etc.

FOR THE MUSIC-LOVER

Do Listeners Really Want Opera?

And articles on gramophone topics:

Round the Turntable.
Recent Record Releases.

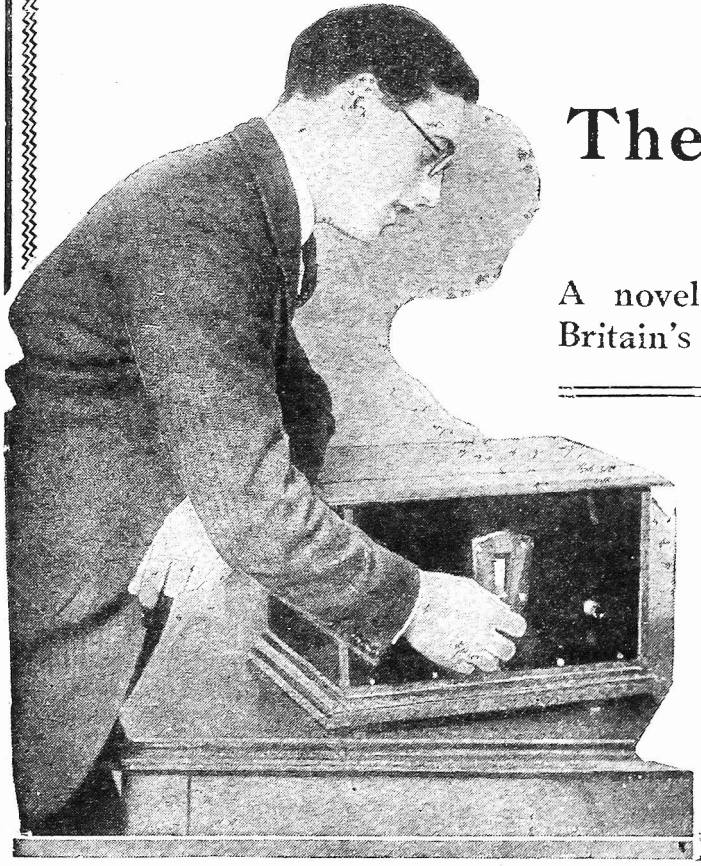
FOR THE CONSTRUCTOR

A Mains Unit Conversion.
Trouble Tracking.
and two magnificent sets to build, including
The "M.W." D.C. Three.

THE WORLD'S PROGRAMMES

are fully and fascinatingly dealt with in a special supplement.

Wireless and World Peace.
"Radio Nations."
For the Short-Waver.
Germany's New Sets.
All about Athlone.
Station Alterations.
Interesting New Stations.
On the Medium Wave-band.
Station Information.
Leipzig's Latest.
Short Waves in Summer.
What the Distant Stations are Doing.



also in the June number:

The "W.L.S." Three-Band Two

A novel all-wave design fully described by Britain's most popular short-wave expert.

OTHER FINE ARTICLES INCLUDE:—

The Long Arm of Coincidence.
Stopping Fading.
How Valves Are Made.
On the Short Waves.
Controlling the New Studios.
etc., etc., etc.

ON SALE EVERYWHERE——PRICE 1/-

THERE'S MORE IN LOW ANODE CONSUMPTION THAN JUST SAVING YOUR BATTERIES

The low anode consumption of P.M.1HL means this, too. There is no risk of saturating the intervalve transformer, and in consequence, quality is improved. Again, the effective inductance of the transformer is not impaired, which means an increase in stage gain.

The P.M.1HL is also built on the new RIGID UNIT PRINCIPLE, which renders it absolutely free from microphony.

Apart from these advantages, you are always glad to save your H.T. So use the P.M.1HL, the valve that combines efficiency with economy.

Price 7/-

MADE IN ENGLAND

OPERATING DATA

Filament Voltage	2·0V
Filament Current	0·1A
Max. Anode Voltage	150V

CHARACTERISTICS

(At Anode Volts 100; Grid Volts Zero)

Anode Impedance	20,000 ohms
Amplification Factor	28
Mutual Conductance	1·4 mA/V

Mullard

THE·MASTER·VALVE

Advt. The Mullard Wireless Service Co., Ltd., Mullard House, Charing Cross Road, London, W.C.2. ARK8

Printed and published every Thursday by the Proprietors, The Amalgamated Press, Ltd., The Fleetway House, Farringdon Street, London, E.C.4. Advertisement Offices: Messrs. John H. Lile, Ltd., Ludgate Circus, London, E.C.4 (Telephone: City 7261). Registered as a newspaper for transmission by Canadian Magazine Post. Subscription Rates: Inland and Canada, 17/4 per annum; 8/8 for six months. Abroad (except Canada), 19/6 per annum; 9/9 for six months. Sole Agents for Australia and New Zealand: Messrs Gordon & Gotch, Ltd.; and for South Africa: Central News Agency, Ltd. Saturday, June 11th, 1932. S.G. S.S. S.L.

POPULAR WIRELESS. June 18th, 1932. REGISTERED AT THE G.P.O. AS A NEWSPAPER.

CAPT. ECKERSLEY writes on L.F. TRANSFORMERS

Popular Wireless

Every Thursday PRICE 3d.

No. 524. Vol. XXI. INCORPORATING "WIRELESS" June 18th, 1932.

This week our cover picture shows a typical scene in one of those popular holiday camps where the radio set is always a good entertainment stand-by—wet or fine.

DESCRIBED INSIDE:— THE "DECADE" WITH SIMPLIFIED TUNING

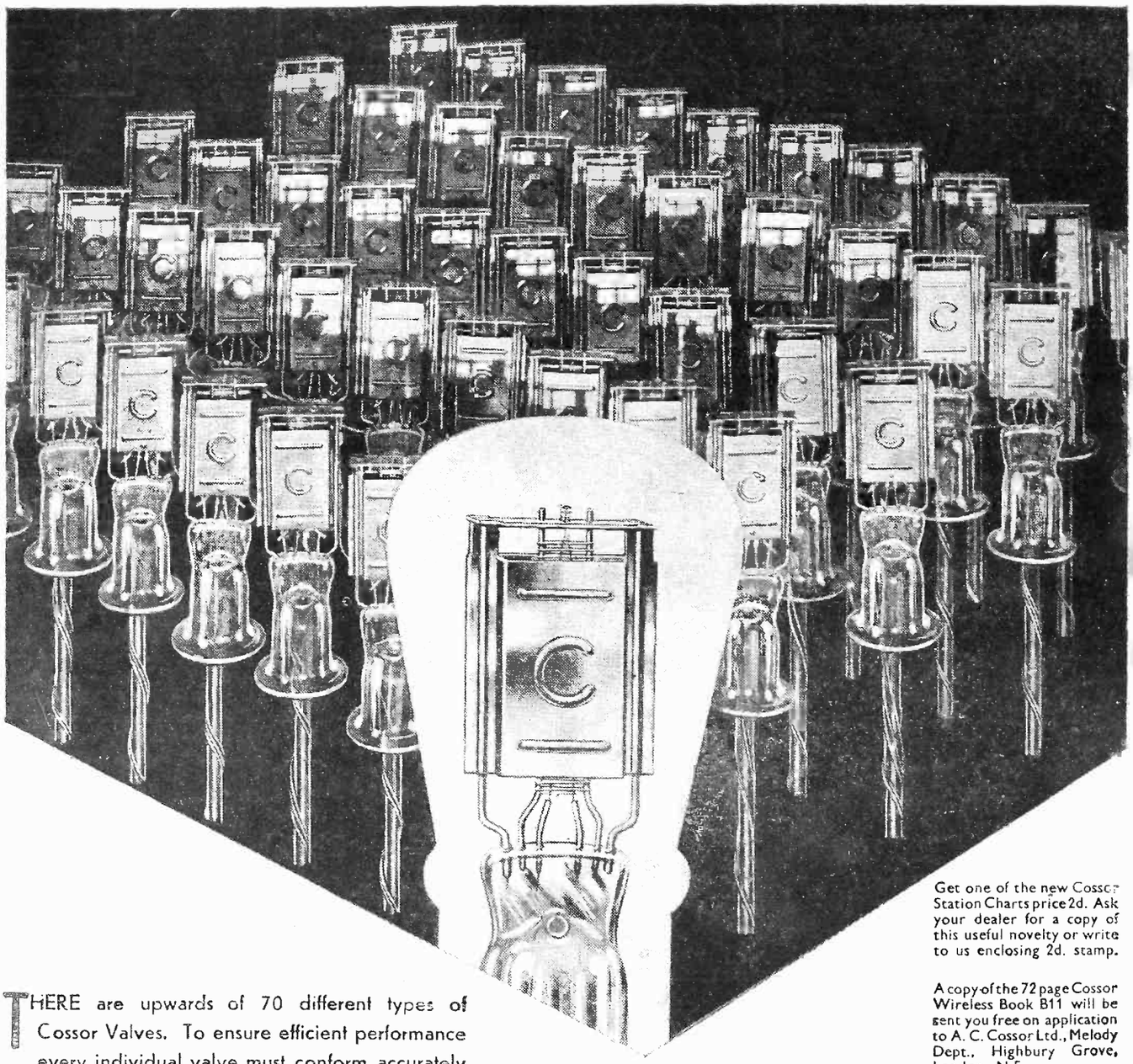
RADIOGRAM REMINDERS ¤ A NEW TYPE MAINS SET ¤ NOTES FROM THE MIDLANDS ¤ A PROGRAMME EXPERIMENT

The GREATEST READY RADIO Kit & Component Suppliers in the World!

Head Office: Eastnor House, Blackheath, London, S.E.3.
'Phone: Lee Green 5678. Showrooms: 159, Borough High Street, London Bridge, S.E.1.

Advt.

UNIFORMITY



THERE are upwards of 70 different types of Cossor Valves. To ensure efficient performance every individual valve must conform accurately to the characteristics of its type—absolute uniformity is essential. In Cossor Valves uniformity is obtained by the famous Mica Bridge, which ensures microscopic accuracy in the spacing of the elements—the factor that determines the characteristics of a valve. Thus, no matter where you buy it every Cossor Valve is an exact counterpart of the original design that was developed in the laboratory.

Get one of the new Cossor Station Charts price 2d. Ask your dealer for a copy of this useful novelty or write to us enclosing 2d. stamp.

A copy of the 72 page Cossor Wireless Book B11 will be sent you free on application to A. C. Cossor Ltd., Melody Dept., Highbury Grove, London, N.5.

COSSOR

ALL-BRITISH VALVES

A. C. COSSOR, LTD., Highbury Grove, London, N.5. Depots at Birmingham, Bristol, Glasgow, Leeds, Liverpool, Manchester, Newcastle, Sheffield and Dublin.

78

Popular Wireless

LARGEST NET SALES

Scientific Adviser:
Sir OLIVER LODGE, F.R.S.
Chief Radio Consultant:
CAPT. P. P. ECKERSLEY, M.I.E.E.
Editor: NORMAN EDWARDS.
Technical Editor: G. V. DOWDING, Associate I.E.E.
Assistant Technical Editors:
K. D. ROGERS, P. R. BIRD,
A. JOHNSON RANDALL.

A SEA SERPENT!
PUBLIC TASTE
ANTI-PIPS
PUNCTUALITY CRANKS

RADIO NOTES & NEWS

PLAIN WORDS
COMPLETELY BANNED
A FINE CHANCE
NO DECEPTION

Don't Leave Your Licence at Home.

THE portable radio seems to be even more popular with the river lovers than with motorists and campers, though the last-mentioned brand are very keen. A London radio man reports that during the Whitsun vacation about one in four of the pleasure boats on the Thames sported a portable receiver.

And by the way, let us remind ourselves that when the portable travels its licence must go with it, lest there be a P.O. inspector, a summons, and a fine.

The Sea Serpent of Radio.

IT was bound to come, just like the first cuckoo, the largest strawberry, the giant gooseberry, and the sea serpent of the silly summer season. I refer to the "wireless causes rainy weather" letter.

This time a Bristol paper has got it first. Hark!

"Surely the tremendous amount of electricity emanating from hundreds of radio stations is bound to affect the weather. Since the advent of wireless we have hardly had any decent or seasonal weather." Isn't that lovely?—as the sweet young things say. A perfect specimen, true to type; not a spot or blemish of any kind.

A Few Questions.

WHAT is a "tremendous amount" of electricity? Does a "tremendous amount" of it emanate, etc? How does the writer of the letter know what amount of electricity emanates, or even that it is "tremendous? What *is* electricity, and does he really believe that it emanates from radio stations?

Why should electricity, even if it emanates copiously from radio stations, make rain? Why should it not make sour milk and dry weather. (Oh yes! I have heard about the condensation of moisture by electrical means. Me and Millikan are like father and son!) Haven't we had any decent weather since the "advent" of radio? When does he think radio "advented"?

Evidently not a reader of "P.W."!

Television.

IN a lecture delivered at University College, under the auspices of the Television Society, and entitled "Seven Years' Experimental Research and Investigation of Television," Mr. R. W. Corkling, F.P.S., A.M.I.R.E. (Fellow), recently stated: " . . . in spite of the vast amount of very excellent work that has been achieved during the last few years we must all agree that television has not yet arrived."

He considers that the Baird method has reached its practical limit, with the possible exception of detail improvements.

THE POPE AND THE 'PHONES

When Marchese Marconi was demonstrating his new ultra-short-wave transmitter to the Pope in the grounds of the Vatican, His Holiness was greatly interested in every detail, and is shown here as he is being handed the telephones used in the test.

Not a Bad Idea.

SPEAKING at the Royal Institution last month Sir J. Reith brought up his heavy oratorical artillery in order to prove that the constitution of the B.B.C. is the best in this best of all possible worlds.

The association of elected representatives with the management of public utility services, he thundered, is fundamentally unsound. Government department methods are inapplicable to the conduct of public services.

I smile at the picture of Sir John pretending to pretend to believe that the B.B.C. is not run like a Government department—and pass it over. What I want to know is, would he not be a fine Minister of Broadcasting and Television?

The Public Taste.

HERE is a sentence from his speech which set me thinking. "If any will have it that the B.B.C. has been arbitrary, even drastic if they like, in declining to accept and be guided by a kind of lowest common denominator of public taste, then I reply that the great mass of listeners has approved and encouraged the Corporation."

He is right, I verily do believe, and if only the film-exhibiting industry could be placed under his control England would be a cleaner place; slightly less arresting films would be shown, but the slimy suggestiveness which sickens the soul would be absent. I will say, however, that all the English-made films I have seen were clean.

My Anti-Pip Campaign.

IS there no *artist* at the B.B.C. to tear his hair and throw the Time Signal Controller down the ash-lift? Did you notice that organisation was carried so far that those petulant "pips" were allowed to wrench us back from the nether world just in the tensest moment of "The Turn of the Screw"?

It was utterly inexcusable! But list! I have a comrade in the fight—no less a

(*Continued on next page.*)

"ARIEL'S" RUNNING COMMENTARY ON RADIO *(Continued)*

person than Hilda Matheson, who was until recently, a B.B.C. "Talks" expert.

Punctuality Cranks.

DESCRIBING her impressions of "The End of Savoy Hill," Miss Matheson imagined that she was listening in the company of an explorer who had been absent for ten years.

"He winced, I am glad to say, at the six barbarous 'pips' superimposed on no matter what programme, even after I had explained that it was for the sake of the punctuality cranks for whom Big Ben was not precise enough."

I do beg of Sir John to see what can be done to remove this blot on some of his choicest items

Plain Words About the B.B.C.

IF the B.B.C. could hear what the fellows in the "9.3 up" say about them they might—but certainly wouldn't—shrivel up. I say but little; my job is to "mark, learn, etc."

When I was tackled by the big man in the corner seat — smokes Burmah cheroots and has a son in the Indian Civil —as to why I never cuss the B.B.C., I replied that although I loathe some of the B.B.C.'s activities I consider that for ten bob they give me and my household about £100 worth of entertainment per annum, and that I regard that as a fairish return—very fairish indeed.

Note for Resurrectionists.

TO "Gentle" (Huddersfield), and any other readers who are serious in their desire to resurrect the "Unidyne" circuit, be it known that Mr. F. W. White, 33, Lewis Flats, Hackney, London, E.8, is willing to help them. Meet Mr. White! And don't forget postage stamps!

Apart from his hankering after "Unidyne," Mr. White is a "Cosmic" user, having replaced his "Reinartz" by it. We think that he is a nice, kind man, with excellent taste in circuits

"The Tryer."

THIS gentleman, of Ashton-under-Lyne, who has conceived the idea of writing his pseudonym from right to left, as it would come out on blotting paper—(made one blink for several minutes)—sends me his log for May 8th to 16th, though he omits to state details of his receiver.

He does, however, make a remark which interested us, for he says that he received a station called "The Colombia Broadcasting System," and adds that it is new to him. What a very receptive receiver he must possess, for that system is a great chain of American stations. A very nice log otherwise; U.S.A., Spain, Russia and Italy on L.S.; 5 S W on 'phone!

The Complete Canned Concert-Outfit.

I HEAR that at the Amsterdam International Exhibition there appeared a combined all-electric piano, radio receiver and radio-gramophone. Of course, a really complete job would have been made of it if the layout had included a miniature cocktail bar and a musical vacuum cleaner!

However, the basis of the outfit is a Bechstein Baby Grand, and as its keys are struck the music is electrically reproduced through an amplifier and a moving-coil loudspeaker. There is included a microphone for making announcements. Is there enough free money in Europe to buy this?

"SHORT WAVES"

"I bought a three-valve set a week ago, and I am now a rabid wireless enthusiast."—Provincial Paper.

"His wife has gone back to her home, where she can hear herself speak."—"Humorist."

* * *

A.: "Will you come and spend the evening with us? We're trying out our new wireless set, and at ten o'clock we shall have supper."

B.: "Thanks, old man. I'll be there sharp at ten."

* * *

FATHER'S PART.

The very modern child was looking through his father's book of Great War photographs.

"Dad," he said presently, "what were you in the war?"

Father smiled proudly.

"Why, my son, your father was a battery sergeant-major," he replied.

"High or low tension, dad?" asked the boy.—"Answers."

* * *

Cookery expert (broadcasting for the last time): "And when all these instructions have been carefully followed, go into the tool-shed and bring in a cold chisel, sledge-hammer and pick-axe; or, as a last resource, plug with dynamite!"

* * *

CONTROVERSY!

Just take the case of Mr. Jones,
Who casts abroad his home-made verses
(Of course, you're free to drop the 'phones
And miss the hot stuff he rehearses;
But that won't stop him mouthing there
Into the vast, defenceless void of air).

Take, as I said, the case of Jones,
Who thinks (and means us all to know it,
Such deep conviction marks his tones)
That what he spouts proclaims him poet.
This private view of his own patter
Surely amounts to controversial matter?

* * *

BITTER.

When we're freed from the day's toil and strains,
We switch on for some charming refrains;
Then we hear that sweet voice
Say: "We'll now broadcast the noise
Made by lorries and hooters and trains."

A Fine Chance For Britain.

NOW! This All-British Exhibition at Copenhagen; September 24th to October 9th. The largest All-Brit. exhibition ever held across the North Sea, German Ocean and English Channel! What a chance for our radio manufacturers, eh?

Denmark holds the world's record as a radio user, with about 134 sets per 1,000 head of population. (By the way, the U.S.A. comes second, with 98; Great Britain third, with 92½.)

When I say that we export to Denmark only 3 per cent of that country's radio imports you will understand why I describe the above-mentioned exhibition as "a fine chance."

There is No Deception.

KNOWING that you are all as alive-oh in the top storey as could possibly be, I am moved to anticipate, and squash, a little idea which may perchance germinate in your roof-gardens—as follows. You know that our P. P. Eckersley has gone to Australia to advise the government there about broadcasting. You may have observed, moreover, that his articles for the *Daily Mail* have temporarily ceased. Right!

Now, let me assure you that every reply to queries, as published in his "Corner," is written by him. Genuine P. P. E.!

If you want confirmation of this—ask our comps! In order to be able to set up his manuscripts they have to go through a course of algebra, Braille, sky-writing and Egyptian hieroglyphics. (Comes in useful, too, for dealing with our Mr. Dowding's MSS!)

Tired of Evolution.

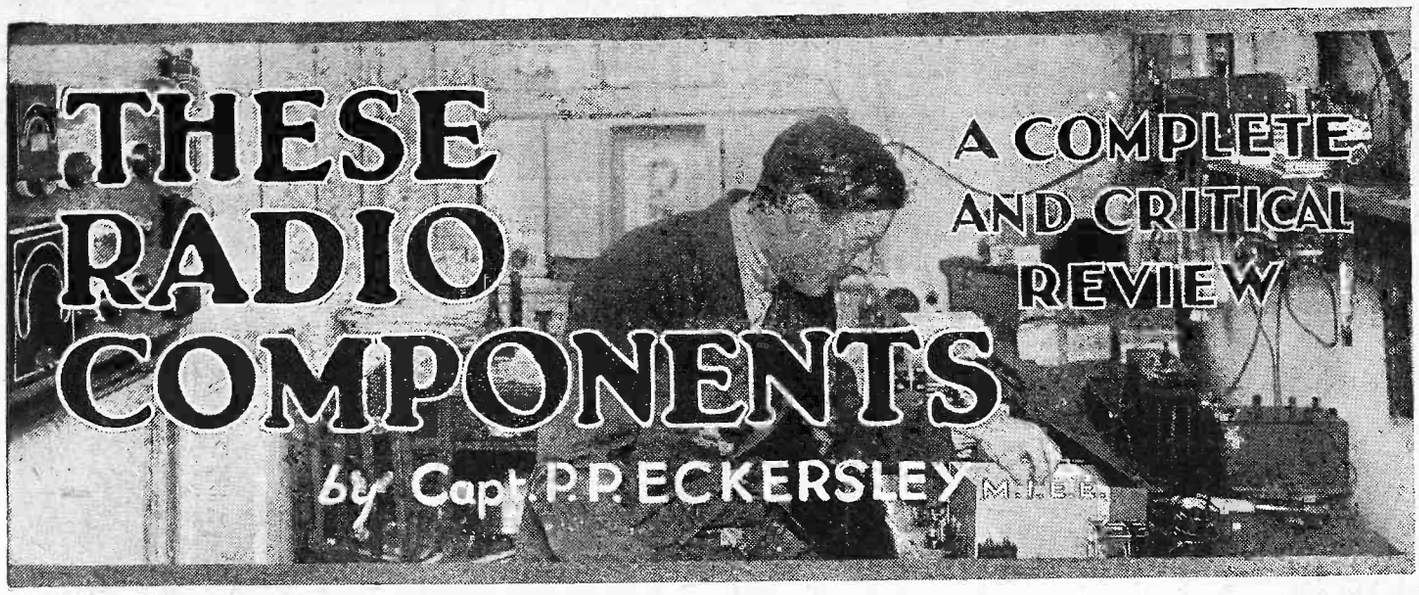
B. M. (near Halifax) writes an interesting letter, but nevertheless that of a fellow who is wearying of "the game." He feels that the "home constructor" is being pushed out of the picture and that he must bow before the "all-metal, all-mains, all-goodness-knows-what, on one dial." I advise him to wait till after his summer (Ha!) holiday and then to think the matter over.

"P.W." has a lively, keen, scientifically-directed technical department, whose efforts are directed solely to the achievement of some progress, some step, in the evolution of radio reception. Let him stagnate and turn into a mere listener if he chooses. But there are always fresh worlds to conquer and, if he be a genuine radio enthusiast, he will follow "P.W." like a bloodhound.

Chris. and the Pips.

MUCH gratified to notice that during Chris. Stone's gramophone recital the other night, which was most vilely disturbed by those absurd Greenwich time "pips," he was moved to remark: "Hum! I *thought* that would happen!"

In a good-natured fellow, such as Stone must be, that is to be appraised as a caustic remark. Frankly, I think the B.B.C. is an *ass* to allow scientific chronology to obtrude its obscene hiccoughs while music holds the stage. **ARIEL.**



A TRANSFORMER is a very pleasant help in trouble. It raises volts without consuming appreciable power. It is an important component and in certain cases its use is imperative.

For all that, I predict that in time to come no one will even use transformers unless absolutely forced to do so.

There are two ways in which to look at wireless—one as a hobby, the other as a means to extend one's powers of hearing. You may use wireless in both of these forms if you will.

Difference in Outlook.

The hobby of wireless is building new sets and circuits and pulling in more and more distant stations. The other side of wireless lies in the possession of a set which gives a truly clear sound picture of an event broadcast.

The hobby side may well take liberties with quality and go for sensitivity, selectivity, and a sufficient economy of material. The extended-hearing side discards anything which may even theoretically affect the "pleasingness" of the result.

Let us first discuss the transformer, then, in terms of its convenience as a means to eliminate perhaps a whole valve stage, as a means to "step down," to "match up impedance," and so on.

We do not use iron in H.F. circuits, and so the first time we meet the L.F. transformer is in the detector stage. Now, a detector of the "power" leaky-grid type requires a full and overflowing measure of H.T. upon its anode, otherwise surely you get distortion.

Saving the Volts.

If you use resistance in the anode of the detector you have to use a very high H.T. voltage, and that is expensive if you use the mains, or almost prohibitive if you use the dry battery. So a transformer is a low D.C. resistance impedance and very useful. But so is a choke a low D.C. resistance impedance. But the transformer can actually step up the volts from (detector) primary to secondary, and so many people like to use it because of this gain.

Inter-valve transformers are excellent in that they economise H.T. and step up the volts between stages.

Output transformers allow either a very high-impedance valve—e.g. a Pentode to work into a relatively low-impedance (moving-iron) speaker, or an ordinary valve to work into a low-impedance speaker (moving-coil), etc., etc. In this last case you gain nothing in "binge"; you merely use the transformer as an efficient means to transfer power from one type of circuit to another.

L.F. TRANSFORMERS

Our Chief Radio Consultant continues his striking series this week, by throwing new light on a much misunderstood component, and on its claims when compared with R.C.C.

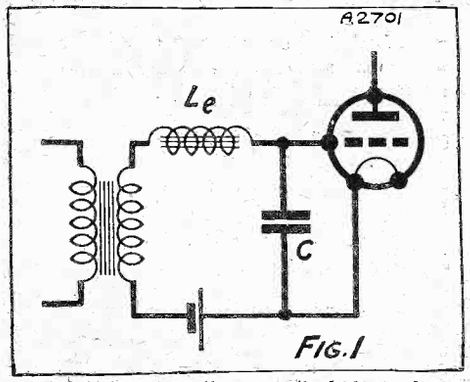
What is there to look for in a transformer?

Firstly, the frequency characteristic must be reasonably good.

Secondly, the expense must not be absurd.

Now you cannot really talk about the frequency characteristic of a transformer without a more concise definition. It's the characteristic of the transformer plus valve and surrounding circuits which matters.

AS IT SHOULD BE SHOWN



What is known as the magnetic leakage of a transformer can be considered as an inductance in series with the secondary winding. Unless properly used, this inductance can completely spoil the response curve of a transformer.

Every transformer has what is called some magnetic leakage. This means that the primary cannot be 100 per cent coupled to the secondary, and a few lines of force escape and do not do a mutual embrace of both windings.

This means that the transformer ought to be drawn, as in Fig. 1, where Le is an inductance introduced outside the secondary in series with the load. Now, if this load is a valve, then it has in effect a capacity C, as shown. This capacity, in series with an inductance, may have an effect. Thus, when at some frequency resonance occurs, and (relatively) large circulating currents are set up, and the voltage across C may rise above normal.

This effect is often usefully used by those who know how to tame it—it is terribly effective in producing bad humps in frequency characteristics to those who don't!

Plenty of Iron.

My advice to you, when choosing an inter-valve transformer, is to get one which has a decent amount of iron in it, which has a decent reputable name behind it, and I should try and be sure to ask the makers for frequency characteristics, stating the makes of valves with which such characteristics were obtained.

But now for the "quality" merchant. Why do I not like transformers? Now look at it like this. I have taken two loudspeakers—one we will call M.C., and the other M.I. M.C. had a really quite good frequency characteristic, M.I. had a worse frequency characteristic.

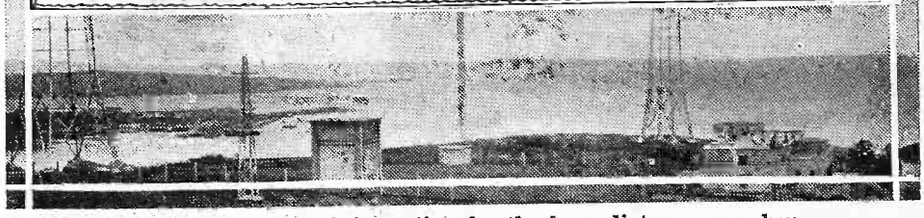
I played those two loudspeakers from a flat characteristic amplifier fed by broadcasting or by direct speech into a high-quality microphone or by first-class gramophone pick-up. And I found that I, and others with ears, and ordinary people with ears, and musicians, preferred M.I. So I said with justification, frequency characteristic is not everything.

Resistance-Capacity Coupling.

I then produced the very finest result I could by using a resistance-capacity push-pull technique throughout my chain, using no iron anywhere except in the speaker M.I. mentioned above. I then began to introduce transformers, having, to all intents and purposes, perfectly straight-frequency characteristics between 50 and 10,000 cycles. You could remark the introduction of transformers; each time the introduction of transformers made the result worse.

(*Continued on page* 456.)

STATIONS WORTH HEARING



Up-to-the-minute information for the long-distance searcher.

THE crashes and bangs with which atmospherics are still providing us are cramping the long-distance man's style, since only the more powerful of the foreign stations are really worth listening to on evenings when these natural nuisances are in evidence. Luckily the number of powerfully received stations is considerable and except on the very worst of nights the long-distance set can do useful work in bringing in alternative programmes from abroad.

Looking through the records in my log for several weeks past, I am able to give the reader a list of the stations which never seem to falter and whose strength is generally such that there is no need to make more than moderate use of reaction. These are generally receivable with good quality and without undue interference unless atmospherics are exceptionally violent.

A Long List.

The list of medium-wave stations is surprisingly large. Starting near the top of the band and working downwards it reads: Brussels No. 1, Florence, Prague, Langenberg, Beromunster, Rome, Toulouse, Strasbourg, Brussels No. 2, the Poste Parisien, Hilversum, Heilsberg, Turin, Gleiwitz, and Trieste. The list includes no less than fifteen stations, which is not too bad for the summer, when you come to think of it.

There are many others, too, which just fail to find a place in the list, since on certain nights they are apt to be a little below par. These stations are always worth going for, since on their good nights they are quite as well received as any of those in the main list.

WHO IS IT ?

These listeners certainly seem to have struck something good ! Perhaps it is one of those fascinating Continental accordion bands, which are now "all the go."

Several Surprises.

The secondary list of "almost first-raters" includes Vienna, Stockholm, Belgrade, Katowice, Frankfurt, Lwow, Berne, Milan, Breslau, Genoa, Bratislava, Nurnberg, Horby and Leipzig—a total of fourteen. We thus have twenty-nine stations on the medium waveband within the compass of any reasonably good set, and save on a very bad night good reception is to be looked for from about twenty of them.

One of the interesting points about reception just now is that if you make a careful search over the medium waveband you are almost sure to come across some surprises. Lyons Doua, for instance, recently broke a silence extending over several weeks, and on one evening provided loudspeaker reception at full strength.

Another surprise was furnished by Rabat, who was received strongly and perfectly clear of interference. On a few evenings Marseilles was found coming in finely, though for a long time his line in the log had contained hardly an entry.

Higher Up the Scale.

Bratislava is one of those stations which you may not hear for a week, and then suddenly find coming in at fine volume.

On the long waves when the ether is clear of atmospherics very fine reception is possible by day or by night. The star stations there are Huizen, Radio-Paris, Zeesen, Warsaw and Kalundborg. Motala varies a good deal and Oslo is at the moment nothing like so strong as he was recently.

R. W. H.

NOTES FROM THE MIDLANDS

News about programme activities in this important area.

NEGOTIATIONS have been carried out for broadcasts this summer in the Midland Regional programme from Skegness and other resorts. It is hoped that Fred Clements' Concert Party from the Arcadia, and De Mond's Party from the King's Theatre will be relayed from Skegness.

The land-line from Skegness to Birmingham is rather a long one, the distance between the two places being about 100 miles, but the engineers do not anticipate any difficulties. Land-lines of much greater length are, of course, regularly used by the B.B.C. nowadays.

There are also several inland resorts on which the Midland Regional Director intends to draw. Relays of bands and concert parties have already taken place several times this season from Cheltenham and Leamington.

Out of Bounds !

On the east, the Midland Regional station can draw on Skegness and possibly one or two other resorts, but Yarmouth and seaside towns further south belong technically, I believe, to the London Regional area. Similarly, relaying from coastal towns on the west is out of the question as there is nothing nearer than Welsh resorts, and in many cases these are the preserve of the B.B.C. West Regional administration at Cardiff.

To avoid overlapping of activities, England and Wales were recently divided up roughly between the various regional administrations, and the boundaries decided upon gave the West Regional station the whole of Wales and a large part of the south-west of England.

The four corners of the Midland region according to this division are Shrewsbury, Mablethorpe, south of Skegness, and Swindon. London administrates the rest of the south and south-west of England as far as Lyme Regis. Cornwall comes under the Plymouth station. The Northern Region is bounded by Berwick, Grimsby, Stoke, Chester and Carlisle.

A First Relay.

Outside broadcasts by Midland Regional are averaging over fifty a month. Two rather unusual O.B.'s during June are the first relay ever carried out from Pershore Abbey, Worcestershire (June 29th), and the running commentary on the motor-car hill-climb at Shelsley Walsh (June 25th).

In addition, studio activities continue vigorously, though the absence of a really good-sized orchestra at Birmingham prevents the production of ambitious musical programmes in the studios, and it is on the dramatic side that the greatest activity is to be found.

A very interesting experiment was made on June 15th when a broadcast version of the Leicester Pageant was produced in the Birmingham studios. Mr. Percy Edgar, the Midland Regional director, and his principal assistant, Mr. Charles Brewer, did not consider that a relay of the Pageant at Leicester would be a satisfactory broadcast. A special adaptation was, therefore, made and the cast came over from Leicester to act in the Birmingham studios.

Talented Officials.

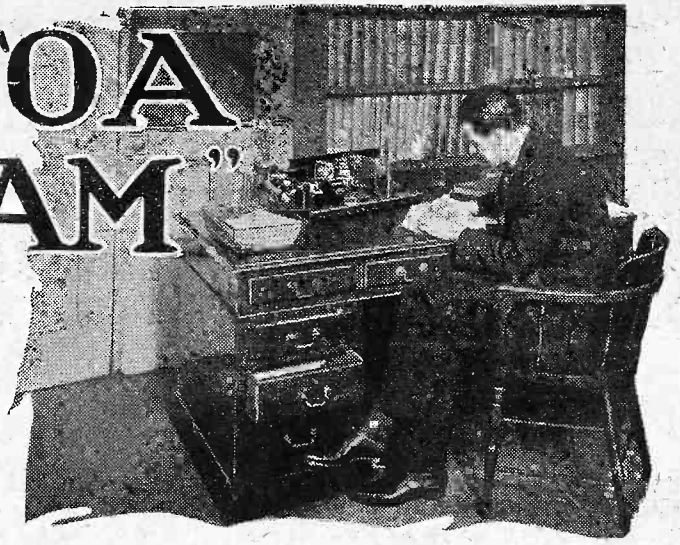
Miss Gladys Ward, who is an official of the Midland Regional station and is the liaison in Birmingham between the B.B.C. and the Press, was the authoress of a play called "Love in Idleness," which was broadcast from Birmingham on June 2nd.

When, as in this case, a B.B.C. official takes a personal part in the programmes, his or her name goes before the public (though, curiously enough, this does not apply to announcers). Mr. Percy Edgar is well known in the Midlands, both as a performer and in his capacity as the B.B.C.'s principal official in these parts. Mr. Brewer's name appears so frequently as author and producer of programmes that it is probably better known than any other.

L. W. A. B.

LETTERS TO A YOUNG "HAM"

by ARIEL



In his second bright epistle, "Uncle Ariel" takes his young nephew seriously to task for preferring model railways to modern radio! As he points out, it is much better to get Sydney on one valve in daylight than to know whether the 6.45 from Lower Pudlington runs on Sundays!

My Dear Young Ham,—Since I last addressed you Time has plucked you from the perambulator and deposited you in Miss Sniffer's Juvenile Academy for Grown-up Post-War Products. Your pa and ma tell me how clever you are; that's why uncles leave their money to Dogs' Homes! But I never did like too clever nevvies. You doubtless recall your cousin Edwin. He was so clever that I never missed my cheroots till his ma told me that he had developed a liver. Poor little fellow! He might have been anything—even a member of the A.R.R.L.—had not Mr. Bright and his Disease intervened!

"Puff and Whistle Business."

I observed the other night, when I was visiting your "old man" in a vain attempt to sway his mind in favour of screened-grid valves, that you possess an extraordinarily fine set of rolling-stock. Perhaps it was not necessary—or discreet—for you to have left the entire railway system, together with your boots and half your school cap, on the floor of the lounge-hall: but, leaving that on one side—I'm sorry that I trod on two leaden porters and most of a tunnel!—tell me, in confidence, do you really feel that this puff and whistle business is the whole cheese—I mean, is it in this that you, Horace Snock-Portle, have found your soul? Because, if so——

"As Man To Man!"

What I am driving at is—*where do you stand in relation to radio?* There! I put the point to you, bluntly, frankly, as man to man! Is the loco. biz. the be-all and end-all for you, or is it merely a blind? You see, I lay the cards on the table! Face up—and no conjuring! Come on, what do you say? Is it to be grades or kilo-cycles? Porters or portables? Bogies or billifarads? I can't say fairer than that.

I do not think that the Snock-Portles would be happy to have a member of their clan in Rails, especially with Great-Uncle Timothy in Overseas Air Lines. Moreover, Rails have had a depressing effect upon the clan's expectations since Grandpa invested so much in San Matadorian rails—said rails being blown up quarterly by the revolutionary party and the only locomotive having a boiler like a colander! No, Horrie, do not nourish an anachronism in your young bosom. You are of the Radio Age!

It is true, as you point out, that from the railway emerged a Jimmie Thomas. That was lucky for him! He might have been there still! But the question is, if Horace Snock-Portle once submerged himself in railways, *would he ever emerge?* Once get the smell of the tunnel and the greasy overalls into your blood—and who can eradicate them? Not Milton; not Pears!

"A Future Devoid of Radio?"

Can you, without a shudder, contemplate a future devoid of radio? Young rip as you are, even you would blench at the necessity of telling some boon companion (who comes leaping up, artlessly inquiring whether you can "get" South Pole Radio on 0·3 metre) that the slush-lamp and the ticket-clipper are for you the acme of delight, and that they are going to add two coaches to the 4.37 from Bungalow Park to Allotment Junction!

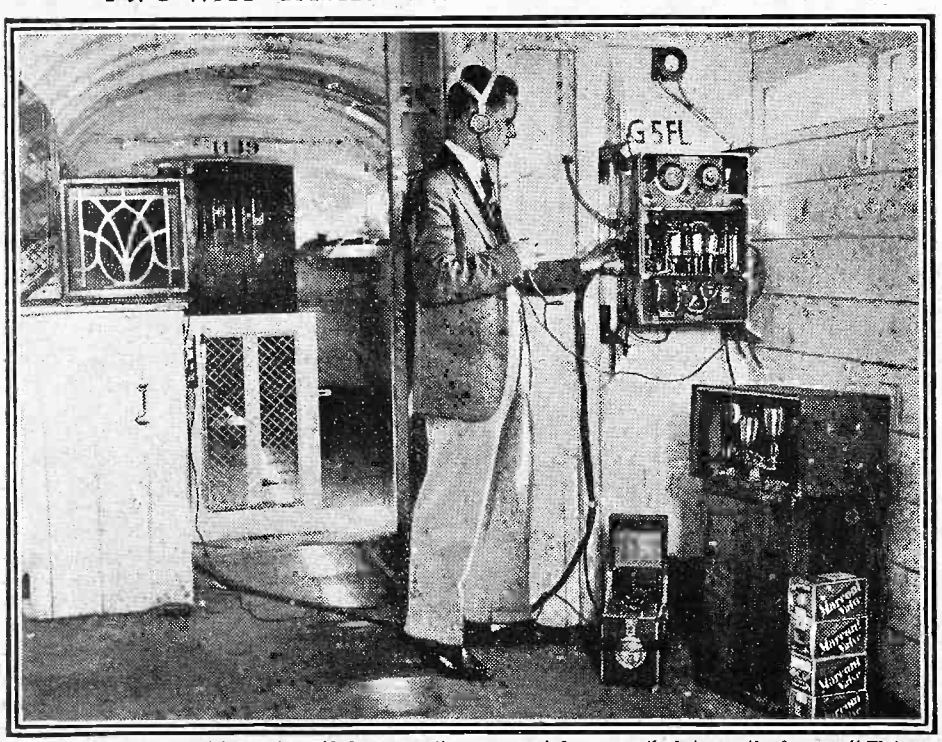
Here's the lining of your cap. You've been cleaning toy engines with it. Nice thing to do to a cap, I must say. Are there no table-napkins in the house? Let me tell you that a really nice radio "fan" knows the resources at his disposal down to the last screw in his pa's tool-chest and the smallest bit of junk in the kitchen dresser; nor does he disdain the assistance of selected portions of ma's sewing-machine, sister's typewriter and brother's ukulele. Get Sydney Radio? Why, a clever "fan" gets all he wants, even if, as a last resort, he has to buy it.

But just think over what I have said, in the light of the fact that I refuse to give you a model of Elephant and Castle station for your birthday. (*Do they really make such loathsome things?*) I will give you a 2-volt accumulator if your pa gives you a receiver. Failing that, I suppose it must be another trip to the Zoo, *avec* tuck.

Your affectionate

UNCLE ARIEL.

TWO-WAY TALKS 'TWIXT TRAIN AND 'PLANE



For the first time in history a two-sided conversation was carried on recently between the famous "Flying Scotsman" and the air liner "Heracles" while both of them were travelling at full speed. Here is the compact apparatus which was installed on the train for the experiment.

THE MIRROR OF THE B.B.C. By O.H.M.

A "WAR" IN SCOTLAND!

THE KING AND MILITARY BAND MUSIC— B.B.C. AND CARL ROSA —FOREIGN OPERA RELAYS, etc.

THE trouble about the Highlands has been overshadowed by the new conflict between Sir Daniel Stephenson, on behalf of the Glasgow Choral and Orchestral Union, and Mr. David Cleghorn Thomson, the B.B.C. Director for Scotland.

Glasgow has never forgiven the B.B.C. for moving its Northern Headquarters to Edinburgh. But the present crisis is concerned with the formation of the new Scottish National Orchestra, which the B.B.C. is sponsoring.

Sir Daniel Stephenson takes the view that the attitude and action of Mr. Cleghorn Thomson make the co-operation of the Glasgow Union difficult, if not impossible. There have been some very angry public exchanges.

The balance of the argument seems to rest with Mr. Thomson, although he, in the opinion of many, might have dealt with some aspects of the situation on rather different lines.

The King and Military Band Music.

Apparently His Majesty is a great enthusiast for Military Band Music, and is an assiduous listener to Mr. Walton O'Donnell's Military Band. Indeed, this liking by the King is so widely known that the absence of Mr. O'Donnell's name from the Birthday Honours List caused some comment.

I believe, however, that more will be heard about this next January.

B.B.C. and Carl Rosa.

The Carl Rosa Opera Company has been suffering from the hard times common to all artistic enterprises except the B.B.C. It is understood that the B.B.C. has actually stepped in to help the Carl Rosa Company round a difficult corner in the last fortnight of its present season.

If this is so, it reflects great credit on the B.B.C., which has come in for some very hard knocks from spokesmen of the Carl Rosa interests. It has always been a cause of complaint that the Opera Subsidy should be administered by the B.B.C. in the interests of only the Covent Garden Syndicate.

The Carl Rosa Company has a warm place in the hearts of thousands of music lovers up and down the country. It has, indeed, contributed far more to spreading the love of Opera than any other organisation.

If the B.B.C. can so contrive matters that the Carl Rosa Company is able to go on permanently without too great a drain on B.B.C. finance, there will be general public approval.

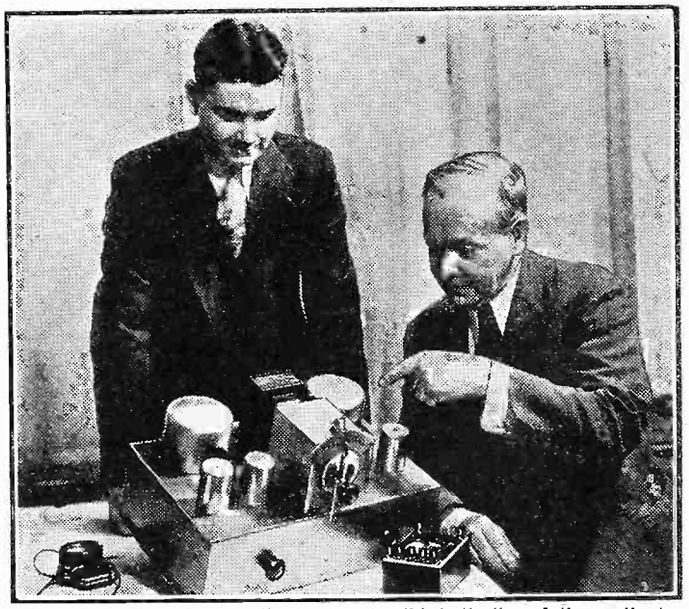
Foreign Opera Relays.

The nations are certainly getting together with sensible plans for programme exchange, and nothing, I think, could be more acceptable to English listeners than some forthcoming opera relays from Germany.

Following so close upon the all-too-short Covent Garden season, will be the relay on Wednesday, June 22nd, of the second act of "Samson and Delilah" to London listeners from the Berlin State Opera, followed on Friday, July 1st, by the first act of Verdi's opera, "The Sicilian Vespers."

Another relay is arranged for Friday, July 8th, of Weber's "Euryanthe," which has been specially abbreviated for broadcasting; while I understand that negotiations are in progress for a relay, on Wednesday, July 27th, of the first act of Mozart's "Don Giovanni," from the Residents Theatre, Munich, where it will form part of the Munich Festival.

IT CAN'T BE THE VALVE!



It can't be the valve he is indicating, for this is the "revolutionary" set invented by a 21-years-old U.S. electrical genius, and it uses no valves at all. They claim it ropes in the foreigners with amazing ease.

Eighteen Microphones for Five O.B.'s.

No fewer than eighteen microphones will be required for five outside broadcasts which are to be included in the afternoon programme on Saturday, June 25th.

The "O.B.'s" begin at 1.30 p.m., when a break is to be made in the Commodore Grand Orchestra Concert for a brief switch over to Lord's Cricket Ground, where Mr. Howard Marshall will give some up-to-the-second details of the England—All-India Test Match.

Half-an hour later we take a trip to the Midlands to hear the running commentary on the Open Hill Climb for Racing and Sports Cars up the famous Worcestershire hill called Shelsley Walsh, and then come back to London to listen to Colonel Brand and Captain H. B. T. Wakelam describing the Centre Court games at Wimbledon.

By 3 o'clock it will be time to link up with Liverpool to hear the departure of the M.V. "Georgic" on her maiden voyage across the Atlantic, following close upon which we are to hear an account of the Royal Air Force Display, relayed from Hendon.

Of the eighteen microphones required for these relays, four are wanted at Shelsley Walsh, nine at Liverpool, two each at Hendon and Wimbledon, and one at Lord's Cricket Ground.

Two Peak O.B.'s.

The Prince of Wales' speech at the Annual Dinner in Celebration of Dominion Day (July 1st), relayed from the Savoy Hotel, on Thursday, June 30th; and a running commentary by Captain E. H. Robinson on the Final of the King's Prize, relayed from the 1,000 yards range at Bisley Camp on Saturday, July 16.

THE LISTENER'S NOTEBOOK

A rapid review of some of the recent radio programmes.

MR. ERNEST NEWMAN must have delighted all Wagner enthusiasts with his plea for more tolerance on the part of anti-Wagnerians.

I must confess I thought his argument very sound, and his remark on the popularity of the long opera as shown by the fact that people can and do enjoy five hours of Wagner was really unanswerable.

It is quite true that we must allow the artiste to do his own job in his own particular way. "We must try and cultivate an open mind, endeavouring to understand what is in the artiste's mind," said Mr. Newman.

The thought struck me, how much of this reasoning was applicable to the B.B.C. and its critics. A good deal, I think.

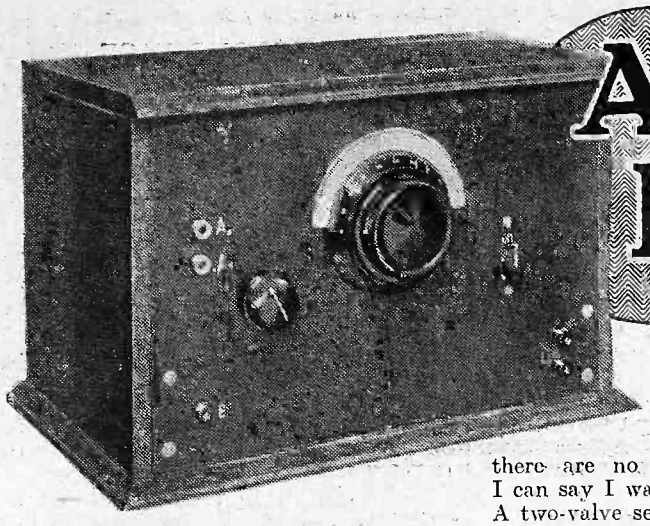
Although Mr. Lyle was more restrained this year in his running commentary of the Derby, one could sense that he wasn't entirely free from excitement.

I suppose that the majority of listeners (and it would be a record "house" for this commentary) were anxious to hear but one thing, viz. the result; but I always feel that, on the occasion of the Derby broadcast, there's a good deal of really interesting matter left unsaid.

* * *

Don't you think that excellent comedy team, Alexander and Mose, would improve their turn if the more gloomy of the two (I don't know whether it is Alexander *or* Mose) would cheer up just a little bit,

(*Continued on page* 456.)



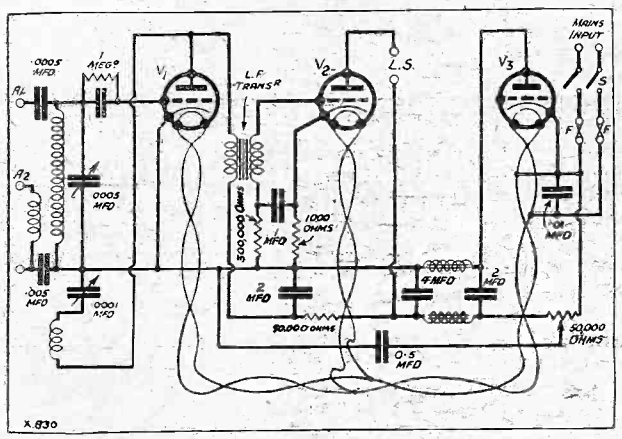
A NEW TYPE MAINS SET

By K. D. ROGERS.

The high-voltage, indirectly-heated-cathode valve is a particularly interesting newcomer to the ranks of the mains valves. Here are some details of its practical application.

THE development of the indirectly-heated-cathode valve has been remarkably rapid. It is only a comparatively short time ago, since the first 1 amp. A.C. valves made their appearance, and since then we have been led rapidly through steadily improving types to the ·5, ·25, and (shortly to be released) the ·1 amp. valves for use with D.C. mains.

SIMPLIFIES THE CIRCUIT



This circuit is complete, and will operate on either D.C. or A.C. Note the absence of the usual mains transformer.

All these valves have been of the comparatively low-voltage heater type, the ·1 amp. with their 40 volts, or thereabouts, being the highest. There are rumours, however, that use is to be made, for both D.C. and A.C., of the high-voltage type of heater, and it is said that at least one large British valve concern is interested in the prospect of turning out a British version of the Austrian Oster-Ganz full voltage mains valves.

Agreeably Surprised.

These, it will be remembered, I mentioned in a recent article in "P.W.," and since then I have been carrying out some extensive tests.

The valves are on the market, being sold at prices round about the normal, and I have had under observation some of these valves operating in a set specially designed for them.

As to their "life," I cannot yet say anything. They seem to last all right, but it requires a long series of tests before adequate details as to lasting power are collected.

As regards results, remembering that there are no S.G. types yet available, I can say I was most agreeably surprised. A two-valve set using these valves is just about as good as one using the lower voltage types we have in this country.

But it is at the same time not only very much easier to build, it is cheaper, and it can be used, *without change*, on either D.C. or A.C.

This seems absurd, I know, but it must be remembered that as the heaters of the valves take the full mains voltage across them they need neither a breakdown resistance (in the case of D.C.) nor a step-down transformer (where A.C. is concerned).

No Voltage Regulation.

Illustrating this article are photographs of the two-valve Oster-Ganz receiver (the third valve is a rectifier) and the circuit on which it is based.

From this it will be readily seen that the fact that the heaters need no voltage regulation greatly simplifies things. The rectifying valve can, if desired, be used on either D.C. or A.C. In the former case it is a passenger, while in the latter it is essential to provide smooth anode current for the rest of the set.

Smoothing is carried out by means of a specially round double choke, and apart from this everything in the set is perfectly standard. The choke, I understand from the valve people, is obtainable, or will shortly be obtainable, from Messrs. Igranic Electric, and from Ormond.

D.C. or A.C.

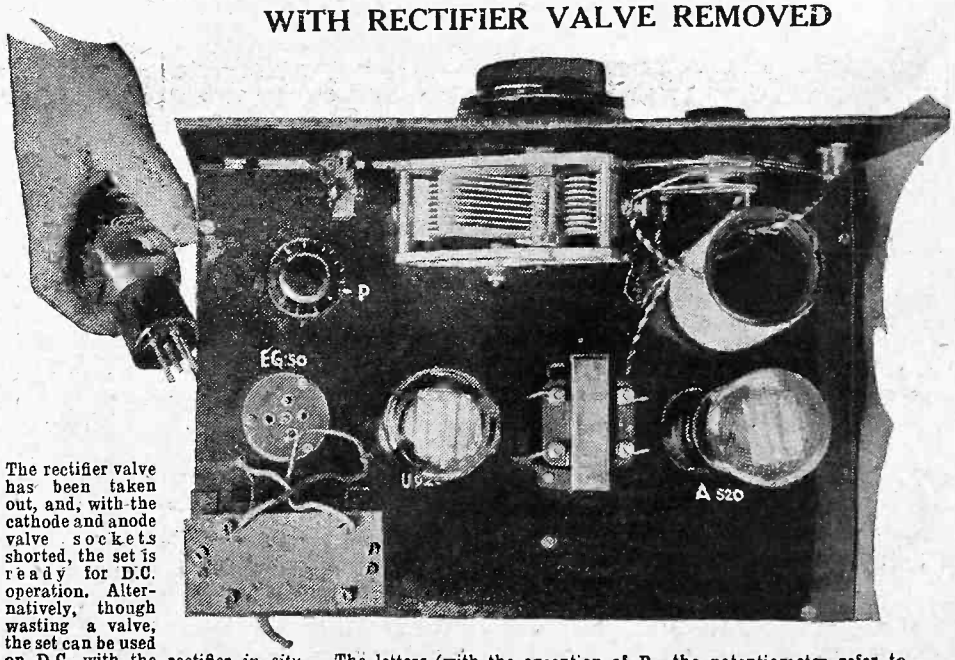
Apart from the choke the set is perfectly normal and resembles the usual D.C. receiver (minus the heater resistance) with which we are familiar. Where it does differ is in its application to A.C., for it is decidedly novel to be able to operate the same set on either D.C. or A.C., and the lack of mains transformer in the latter case is very striking.

Naturally one is limited in the available H.T. to the voltage of the mains, and any step-up that could have been arranged by the transformer has to be foregone. But this is important only in cases of low-voltage mains, such as the 105-volt supply at Hampstead and other places, and where it is desired to use very big power.

For all ordinary cases the 200–240-volt supply is ample, and users of the Oster-Ganz circuit would be as well off from the voltage point of view as they would with the standard set.

(*Continued on next page.*)

WITH RECTIFIER VALVE REMOVED



The rectifier valve has been taken out, and, with the cathode and anode valve sockets shorted, the set is ready for D.C. operation. Alternatively, though wasting a valve, the set can be used on D.C. with the rectifier *in situ*. The letters (with the exception of P., the potentiometer refer to the types of valves used in the set. Note the copper "fishing net" over the bulb of the detector.

THE NEW TYPE MAINS SET

(Continued from previous page.)

Naturally the lack of the transformer provides very much easier construction, more compactness, and a great saving in cost. The rectifier is simply in series with the mains, with its heater across the mains, and that is all there is to it.

In constructing a D.C. set the rectifier would usually be left out, its cathode and anode connections being joined together. The potentiometer, which is essential on A.C. for balancing out hum, would also be omitted in the case of D.C. Otherwise there is no difference between the two circuits.

Metallised heater wiring is advisable, though the ordinary twisted flex is suitable in many cases.

Wire Mesh Screen.

The characteristics of the various valves so far available are very good, and no doubt these will be improved as time goes on. The screened-grid valve has already passed its experimental stages, and I am daily expecting to hear that it is released for "general consumption."

lack of the usually necessary mains components makes the set almost ridiculously light and compact.

The circuit shown in the theoretical diagram is quite complete. Should enthusiastic readers wish to hook up a set of this description, the choke has the usual inductance, but must be properly balanced, and will be obtainable as mentioned, while the other values are marked on the diagram.

Only a very simple tuning circuit is shown, and naturally this is not as selective as it should be for use close to broadcast stations, but obviously any type of tuning system can be employed, and the one chosen was used because of its extreme simplicity, as the tests the set was subject to did not include selectivity or anything to do with the tuning system.

Order Your Voltage.

Should you want to get hold of these valves (they will probably be generally available before long), they can be obtained from the agent, Eugen Forbat, Farnham, Surrey.

A number of voltages are available, for it must not be forgotten that these valves, unlike the types we have been accustomed to, are sold like electric lamps, for the particular voltage of the mains on which they will be used. Thus you can get them in practically any voltage from about 150 to 250 volts, and when ordering you must specify the voltage you require.

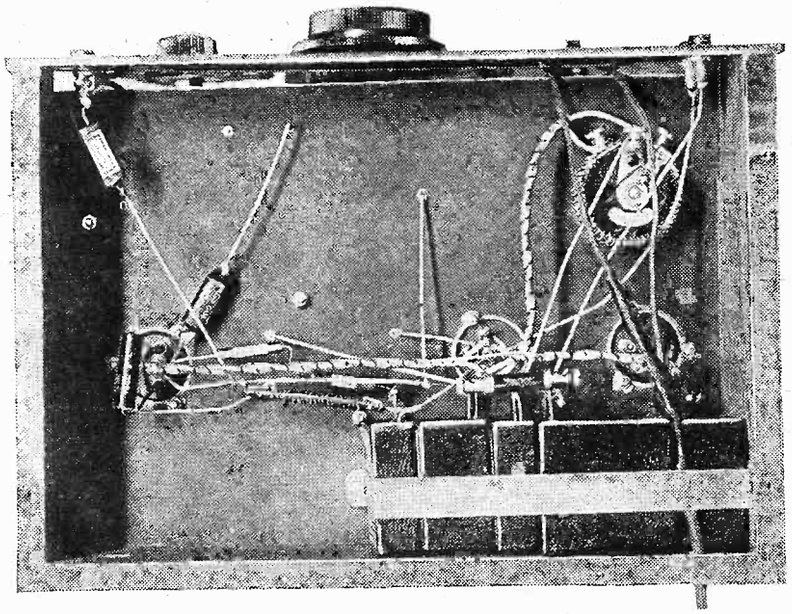
The usual detector and various L.F. and power types of valves are available, and details will be readily sent upon application.

Naturally, whether or not this type of valve becomes popular in this country will depend upon the attitude of our valve manufacturers. A "full voltage" valve seems to me to be a much needed aid to radio, for although we can get down to ·1 amp. on D.C. sets, there is still a great waste of voltage in breakdown resistances for the heater circuit.

The Ostar-Ganz valves have a current consumption of something like ·03 to ·05 amp., giving them a wattage on 200 volts of round about 6 to 10 watts, so that the drain on the mains is practically negligible until a very large multi-valve set is considered.

With 200 volts and ·1 amp. valves the wattage is, of course, 20 watts up to the maximum number of valves available, while for the ·5 amp. type it is 100 watts. I shall await the future of the new valves with the greatest interest.

HARDLY ANYTHING IN IT!



The simplicity of the set is remarkably striking when you compare it with the average D.C. or A.C. receiver of standard type. This is all the wiring—underneath the baseboard.

An interesting feature in the case of the detector is the wire mesh that is fixed over the bulb of the valve to act as a screen. This is in lieu of the zinc metal coating which we give our valves, it being "earthed" to the cathode in just the same way.

No Mains Hum.

During the tests with the set illustrated here, it was noticeable how free from either D.C. or A.C. hum was the reproduction, while the set could be handled in exactly the same manner as the normal two-valver of British design.

Most of the wiring, as you can see, is carried out under the baseboard, and the

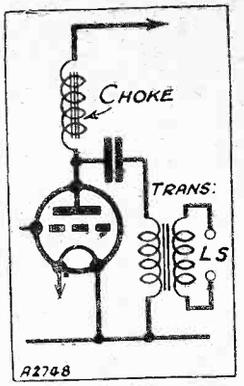
CORRESPONDENCE

UNTAPPED CHOKES—AN EXCELLENT RECORD—DELIGHTED L.S. BUILDER.

DECOUPLING FOR YOUR SET.

The Editor, POPULAR WIRELESS.

Dear Sir,—With reference to my article, "Decoupling for Your Set," in the issue of May 21st of "P.W.," I should like to point out, in order to correct a possible wrong impression, that although a transformer or a tapped choke is as effective for an output filter as a simple untapped choke, the latter is far and away better when viewed purely as a "decoupler."



Note how choke and transformer both play their part in this Speaker coupling recommended by Mr. Rampton.

Where a tapped choke or a transformer is necessary to ensure adequate matching of valve and speaker, in order to obtain the best results from them, there is a solution to the difficulty in that adopted with some moving-coil speakers (see diagram).

In this case the speaker is both choke and transformer coupled, and the transformer will be quite cheap as no D.C. has to pass through its primary. Readers who have a tapped choke or output transformer in their possession should try decoupling earlier valves, when they may find that these can still be used without ill-effects. If trouble is experienced the above scheme should be tried.

2, Bromley Grove, Shertlands, Kent. Yours faithfully, H. A. RAMPTON.

LONG DISTANCE RESULTS IN AUSTRALIA.

The Editor, POPULAR WIRELESS.

Dear Sir,—For some years I have intended writing you, re the excellence of your paper. I mostly use a One-Valve "Magic," and have enclosed a ticked off list of stations receivable almost nightly.*

6 F W, Perth, can be raised as soon as 2 F C closes down. J O A K (Winter) after 2 B L closes down. New Zealand depends more on one's skill in tuning.

As a railway night officer my hours of duty are somewhat erratic, also my hours of listening-in, but last Oxford and Cambridge Boat Race night I arrived home about 11.45 p.m. and proceeded to tune 6 W F. I found other stations on the air, and found all four of the N.Z. stations on for a special broadcast of the Boat Race, via 5 S W.

It came back to me very well. We were in time to hear the announcer board the launch. After the race was finished the station gave a detailed description as received by them.

I have not tried the short waves to any extent, but last winter made up a couple of coils and received a number of N.Z. and Australian amateurs. One night I tuned-in a station giving records. The announcer gave his call sign "California." I have mislaid the code letters, but some weeks later in W.L.S.'s Notes he mentioned this station.

Also, almost any night about 8.30 p.m. it was possible to raise a Russian (?) station at fair 'phone strength on about 80 metres, with a man and woman announcing alternately in different languages.

I must say that the air in Australia is getting somewhat crowded, and with more stations to come one can only wonder how we will manage. I suppose we will all have to fit up Captain Eckersley's Tuners.

By the way, I noticed in yesterday's paper that he is going to give us a visit (to learn things?) I will try to see what he looks like, anyhow!

I think this is about all. Wishing your paper every success.

I remain,
Yours faithfully,
N.S.W., Australia. A. VENEN.

* ED. NOTE.—The ticked-off list is too long to reproduce, but it shows well over fifty stations—and some as far away as Japan! Excellent work for a one-valver.

AN INEXPENSIVE LOUDSPEAKER.

The Editor, POPULAR WIRELESS.

Dear Sir,—I am writing just to thank you for giving me the opportunity of constructing an inexpensive loudspeaker.

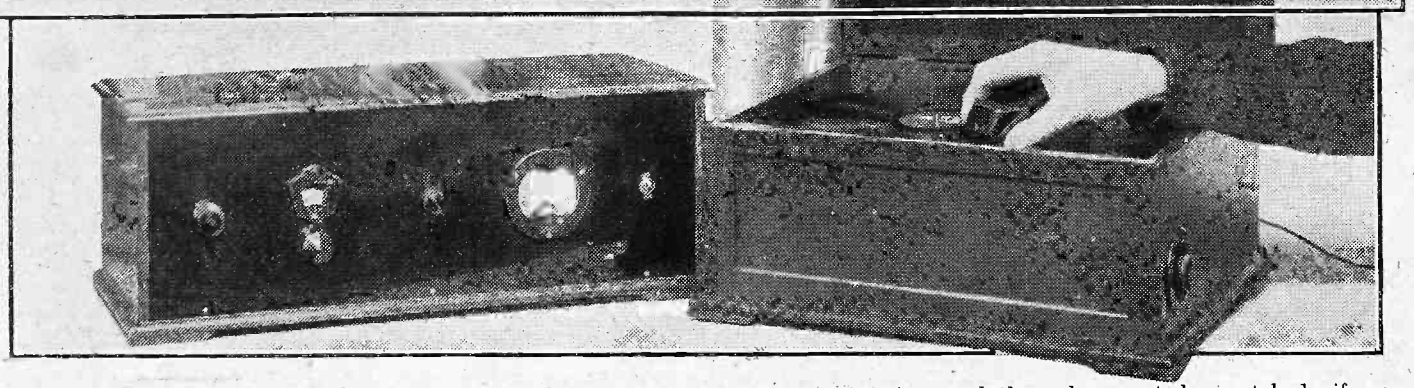
It was published in No. 489 of POPULAR WIRELESS, October 17th last, and I decided then to make it at the first opportunity apart from Sets.

I have now completed it, and am delighted with the result. It is really better than my £2 . 2s. 0d. speaker. I could not keep strictly to your instructions. The plywood was ⅜ in. instead of ¼ in. I could not get Kraft paper and made the Cone with Six-Sixty.

It is quite O.K., and I am proud to show it to my friends. Again thanking you.

Yours faithfully,
Whitstable, Kent. R. J. KEASDALE.

RADIOGRAM REMINDERS



THE question of operating a radio-gramophone from batteries is always cropping up, and last time in these notes I mentioned that there were two ways out of the output voltage problem—to use either push-pull or one of the new pentodes.

In either case the consumption of current from the anode power source will be high, but the need for high voltage is obviated. How much power you are going to dissipate in your radio-gramophone depends upon several factors. These include whether or not you have a mains unit for the H.T., what loudspeaker you desire to use, and most important of all, how loud you require the reproduction to be.

Select a Sensitive Speaker.

This latter is the deciding factor in every case, for upon the answer to that question depends the size of the output valve or valves, the type of loudspeaker, and therefore the power consumption of the set.

The degree of loudness will depend upon the sensitivity of the loudspeaker (given a definite output wattage), and it is best, when designing a radiogram that is to have limited power, to pick a really sensitive speaker. There are several on the market, and recently there have been brought out some remarkably cheap, efficient and pleasing moving-coil speaker units that are well worth considering.

But even with a sensitive speaker you will be surprised at the amount of power

The question of the battery-driven radiogram will always be a vexed one, owing to the difficulty of getting adequate power without prohibitive cost due to battery energy expenditure.

that is required to give anything like a good punch to gramophone reproduction, for the use of a very sensitive pick-up will probably not help you.

This does not mean that a sensitive pick-up should not be used, but if one of exceptional sensitivity is employed, the detector (or first L.F. valve when used as a gramophone amplifier) will probably be badly overloaded on loud passages, unless the sensitivity of the pick-up is offset by means of a volume control.

Thus, you can start with a big input from the pick-up and hope to get a big output that way. The size of the output valve is the main consideration, and it is upon this that the success or failure of the receiver rests.

Something Up Your Sleeve.

Obviously, if your room is very small, you will not need so big an output to "fill it" comfortably as when the room is large.

The average room requires, with a sensitive speaker, at least 500 milliwatts to give the slightest safety margin on overloading, in my opinion. Actually, I would rather see 1,000 milliwatts' output available, in order to have something up my sleeve as a safety factor. The easiest way to obtain this is to use one of the new pentode valves but it cannot be obtained without the consumption of a considerable amount of current. You cannot get something for nothing, and if you want a largish output, you must be prepared to give an adequate input.

With the Mazda Pen. 220A the total consumption of a three-valve radio-gramophone would be in the order of 20 to 25 milliamps at 150 volts H.T. Thus, for a dissipation of 3,000 milliwatts you will get about 1,000 milliwatts of useful A.C. "speech" energy. Not bad going, that! But your speaker and the valve must be matched, if you are to get anything like the maximum undistorted power output of the valve.

There are speakers on the market now that are designed to work on 500 milliwatts or so. They are admirable for the small battery radiogram, for they ensure that the most will be made of the energy passed on to the speaker.

A Cheap Battery Model.

Where a set is to be used only occasionally as a full-blooded gramophone, and will normally be employed as a radio receiver at moderate volume, it is worth considering the substitution of the Pen 220A type of valve by the Pen. 220, which is a much "smaller" valve, though it is capable of giving an output of 500 milliwatts. But it takes very much less than the 220A from the H.T. battery.

This valve is sufficient in some cases for the gramophone side of the set, where only small volume is required; but, as I said before, it leaves very little for safety.

For those who are interested in battery radio-gramophones, a simple, cheap home-constructor's design will appear in the July issue of "Modern Wireless." Here the larger pentode output valve is used, and one of the sensitive loudspeakers I have mentioned.

K. D. R.

HAVE YOU HEARD THESE?

RECORDS FOR YOUR RADIOGRAM.

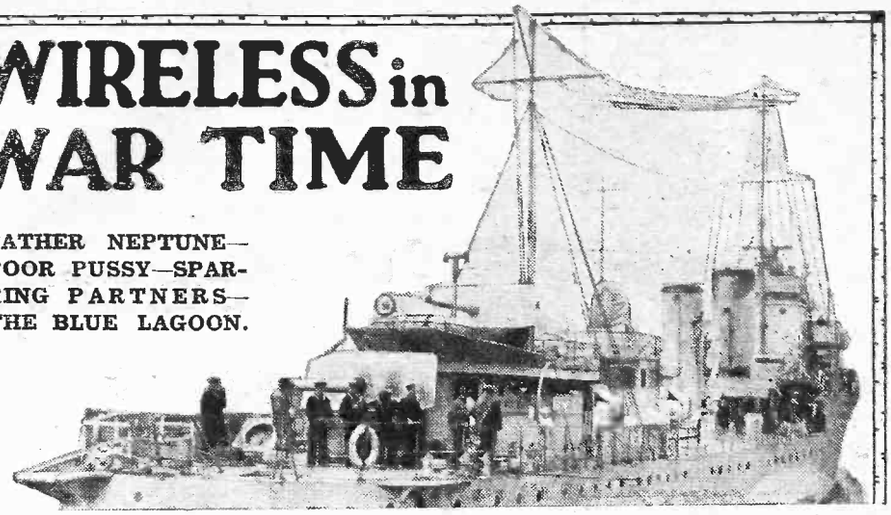
"Home" GRACIE FIELDS - *H.M.V.*
"What Would You Do?" - *H.M.V.*
MAURICE CHEVALIER.
"Oi!" FLANNAGAN AND ALLEN *Col.*
"Turkish Delight" - - - *H.M.V.*
RAY NOBLE AND HIS NEW MAYFAIR ORCHESTRA.
"Where'er You Walk" - - *H.M.V.*
MASTER DEREK MIDDLETON.
"Auf Wiedersehen" (my dear) *H.M.V.*
AMBROSE AND HIS ORCHESTRA.
"Rain on the Roof" - - - *H.M.V.*
SAVOY HOTEL ORPHEANS.
"Snuggled on Your Shoulder" *H.M.V.*
SYLVIA FROOS.

NO MORE PRICKED FINGERS

Here is the latest automatic needle-holder which obviates the need for fiddling about in a box of needles, with the usual physical discomfort from the sharp points. By pressing down the cylinder a needle is brought up on a horizontal "lift," while used needles are deposited in the large container surrounding the central cylinder.

WIRELESS in WAR TIME

FATHER NEPTUNE—POOR PUSSY—SPARRING PARTNERS—THE BLUE LAGOON.



Extracts from the diary of a wireless operator at sea, 1916-1918.

JULY 7TH.—The actual ceremony of "Crossing the Line" seems more amusing to look back upon than it did when I was figuring as one of the "victims."

A procession was formed, headed by Father Neptune wearing a cloak, a string beard and a crown, and carrying a large wooden sword with jagged edges. Next came the barber with a wooden razor about two feet long, and the barber's assistant, the soap boy, carrying a pail of muck which could be smelt from one end of the ship to the other.

The rear was brought up by four policemen and the rest of the ship's company, including the captain, who on such occasions has to take a back seat and put up with quite a lot of nonsense from the crew.

Arrived on the lower deck, where there was a large canvas tank full of dirty water, Father Neptune ordered me to be shaved. While this was being done he began a long speech

Beer All Round!

One has to be sensible on these occasions, and if one wants to be let off lightly it's best not to struggle or make a fuss, but I must admit that it was difficult not to resist the barber's boy slapping me all over with a whitewash brush well supplied with such filthy muck.

After a short respite, I was eventually thrown into the canvas tank and ducked several times. What was left of the soap and other stuff in the pail was then slapped over my head, and I received Father Neptune's blessing. At last the ceremony was over. Neptune stood beer all round, and everything became normal again.

Nine Lives?

JULY 11TH.—There is not much doing in the ether just now. In fact, there's not much doing anywhere; and life on board is inclined to be monotonous. There was one little incident yesterday, however, which disturbed our daily routine. The ship's cat got in the propeller tunnel and, having regaled itself on bilge water, promptly went mad. An expedition armed with revolvers explored the tunnel with the idea of putting it out of its misery, but at the moment of writing the cat is still at large, despite the expenditure of some twenty rounds of ammunition.

Last night I had little sleep because I had to send a message to Durban and had a terrible job to get a reply. I can understand why.

This ship, being a captured German, has a Telefunken quenched gap transmitter. The note in the 'phones is very distinctive, and as there is a raid reported in these waters, the Durban operator seems to be very loath to reply to my call!

However, I sent out an explanation in code and eventually got an answer. I am

A DEEP SECRET!

This picture shows the scene when listening for submarines with a "hydrophone"—the ingenious electrical ear which picks up the regular thump of the engines, and thus discloses the presence of an under-sea enemy.

going to fix up a "stand-by" "spark" set, to avoid trouble in the future.

JULY 14TH.—Durban. We anchored in the harbour of Durban yesterday alongside The City of Lahore. After dinner I went ashore with V——. Durban strikes me as a splendid city, miles ahead of Bombay. The streets are beautifully clean and broad, and the whole place is laid out in an ideal way. I took a car ride down to the beach and found a fine parade and hundreds of people about. Although it is rather late in the season, the weather is good, and people from all parts of South Africa are here for their holidays.

JULY 24TH.—We caught sight of Table Mountain on the 22nd, but we did not call at Cape Town. Atmospheric conditions are good to-night. I have heard Durban quite loudly, although the station is about 1,000 miles away, and the normal range is 300 miles.

JULY 25TH.—Each day at lunch and dinner the captain, the chief officer and the chief engineer get up some discussion. In the morning the talk is usually about the press messages I pick up.

Doubtful Darwinism!

At dinner to-night we had an exposition on the Darwinian theory from the captain—at least, he thought it was about the Darwinian theory, but I have my doubts.

JULY 26TH.—More remarks about the Russians at lunch to-day, and many bitter allusions to the air raids, of which I receive lurid accounts in the press messages. The subject of drink also cropped up as a topic for discussion, and the chief officer spoke of its influence on matrimonial bliss, which naturally was followed up by a short dissertation on marriage itself.

We understand that liquor once played a leading part in his life, but a recent marriage saw the spell broken, and now he ostentatiously refuses brandy sauce and port wine pudding at meals. Later on the discussion veered round to windjammers. This made an interesting discussion, for here they were all on their own ground and knew what they were talking about.

JULY 27TH.—The breakfast topic this morning was boxing and boxers. This was well worth listening to. The chief officer appears to have been a bit of a boxer in his day and, in the course of his travels, sparred with Sam Langford and Bob Fitzsimmons. Once when slightly mellow he rashly challenged Langford, but Sam took it in good part, and patting him on the cheek, said: "That's all right, old man. You go home and iron your shirt."

JULY 30TH.—They were talking to-day about their early days at sea, and all agreed that in those times food was poor and meagre. The captain related with considerable humour how one day a stoker came up to him with a pot of tea in his hand. "Look here, sir," he said. "This tea is so —— weak that it won't run aht the spaht."

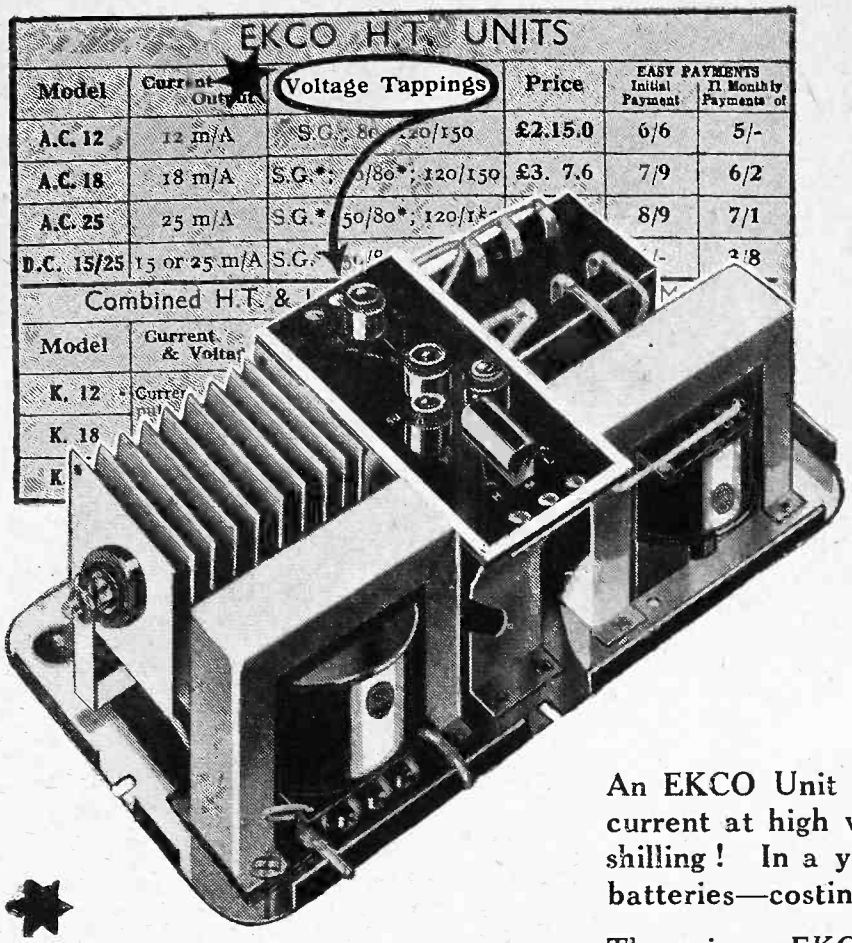
Masses of Monkeys.

AUGUST 4TH.—Sierra Leone, West Coast of Africa. We arrived here just in time to cross the boom before sunset. As we steamed slowly up to our anchorage, V—— and I, standing on the boat deck, noticed a small promontory. As we passed by, we both exclaimed in one voice, "The Blue Lagoon!"

Certainly the effect was indescribably lovely, for the promontory was covered with masses of palm trees, and as we passed by we could see that they were alive with parrots and monkeys. The water of the bay was perfectly calm and, to complete the beauty of the scene, the beach was of a deep orange colour, fringed with palm trees and great masses of flowering shrubbery.

Particularly noticeable was the brilliant yellow of the mimosa. We eventually anchored off this little town, which nestles at the foot of a range of tall, luxuriantly covered hills, the tops of which are often hidden by clouds. Dotted over the face of the hills are dozens of little villas, and from the sea they look just like dolls' houses.

(To be continued.)



50/- worth of H.T. for one shilling!

An EKCO Unit will give you ample, silent, unvarying current at high voltage for one year at a cost of one shilling! In a year you would buy at least four H.T. batteries—costing at least 50/-!

There is an EKCO Unit for every type and size of set. Just connect the appropriate model in place of your usual battery—then switch on—that's all!

Choose the Unit suitable for your set from the Table below or post coupon for full details.

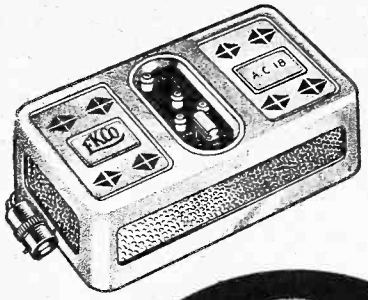
All Ekco Units are obtainable on Easy Payments.

The Unit Control Panel, showing :—

Top : The S.G. Plug, with its three alternative voltage tappings ; 80-90 ; 70-80 ; 60-70 ; up to 3 m/a.

Centre : Negative Plug.

Bottom : The 50/80 v. Plug, adjustable in three positions, High, Medium and Low, up to 3 m/a ; and the 120/150 v. Plug—120 volts at approximately 21 m/a up to 150 v. at approximately 11 m/a.



All models are similar in external appearance. Size, 9×5×3½.

EKCO H.T. UNITS					
Model	Current Output	Voltage Tappings	Price	EASY PAYMENTS Initial Payment	11 Monthly Payments of
A.C. 12	12 m/A	S.G.; 80; 120/150	£2.15.0	6/6	5/-
A.C. 18	18 m/A	S.G.*; 50/80*; 120/150	£3. 7.6	7/9	6/2
A.C. 25	25 m/A	S.G.*; 50/80*; 120/150	£3.17.6	8/9	7/1
D.C.15/25	15 or 25 m/A	S.G.*; 50/80*; 120/150	£1.19.6	6/-	3/8
Combined H.T. & L.T. Charger Units (for A.C. Mains)					
Model	Current & Voltage	L.T. Output (*for charging accumulators*)	Price	EASY PAYMENTS Initial Payment	11 Monthly Payments of
K.12	Current Output and Voltage Tappings same as Models A.C.12, A.C.18 and A.C.25.	¼ amp. at 2, 4 or 6 volts	£3.19.6	9/-	7/3
K.18		½ amp. at 2, 4 or 6 volts	£4.12.6	10/3	8/5
K.25		¼ amp. at 2, 4 or 6 volts	£5. 7.6	11/9	9/10

Tappings marked * are adjustable.

EKCO POWER UNITS

To E. K. Cole, Ltd. Dept. A.12, Ekco Works, Southend-on-Sea.

Please send me full details of Ekco Power Units

Name.....

Address.....

.....

Woburn

Can the microphone give us an adequate presentation of a full-scale drama from history, such as the Battle of Waterloo? That is the bold experiment which is to be tried by the B.B.C. and judged by listeners at the end of this week.

TO attempt a literary reconstruction of any historical incident or period is always a risky proceeding. To attempt such a reconstruction in a medium as comparatively experimental as broadcasting still remains, and of an episode so generally well-known as the Campaign of Waterloo, may seem almost unjustifiably audacious.

But to those who maintain both interest and belief in the possibilities of radio as a medium, the idea of making use of it as a means of historical reconstruction has been present for a considerable time.

A few weeks ago, the author of an article in the "Radio Times" made an eloquent plea for such reconstructions, and an actual example of a programme of this kind has already been broadcast in "Crisis in Spain," which was composed last year by Mr. E. A. Harding. It may be objected that, as far as the Battle of Waterloo is concerned, the last word must already have been said.

"The Battle of Waterloo."

In the eyes of a good many people items in radio programmes approximate far more nearly to contemporary and journalistic activities than to historical treatises, to novels, or to plays. And while "Crisis in Spain" can be justified rather on the lines of a Radio Topical Budget—an illustration in sound of contemporary happenings—a reconstruction by wireless of the Battle of Waterloo immediately puts itself into competition with such well-established competitors that its hopes of success appear slight indeed.

It is, of course, true that few of the decisive battles of the world have so much literature to their credit as Waterloo. It has been treated in almost every conceivable way; by purely popular writers such as Fitchett and Sir Edward Creasey; by military experts of every nationality such as Sir John Fortescue or Captain Becke; in the most sonorous prose of fiction by Victor Hugo, and the equally sonorous verse of Thomas Hardy, Lord Byron and Sir Walter Scott.

In addition, almost all of the stupendous literature devoted to the career of Napoleon deals with it in greater or lesser detail. What then remains?

It is the modest hope of the authors of the programme that is to be broadcast on June 18th this year, that by means of the particular medium in which they are interested a reconstruction of certain aspects of Waterloo can be achieved, which shall be more vivid than any stage representation can be, as their medium is not subject to the stage limitations of space and time. And possibly more satisfactory than even any film can be.

In the strictest sense of the word, this

DIRECTOR OF PRODUCTIONS

This is Mr. Val Gielgud, the author of the accompanying article and part-author of "The Battle of Waterloo," a radio drama to be broadcast on Saturday, June 18th.

programme is no contribution to the literature of the Drama. It cannot be called a play in the true sense of that word.

In the first instance a draft was made, composed of a certain number of scenes during the Hundred Days, written in dialogue form, but based almost entirely upon facts and conversations for which a reasonable degree of documentary historical authority exists.

The main problem was how to make all these comparatively disconnected episodes a coherent whole, and to solve this problem the authors fell back upon the method which was first used in broadcasting by those who first brought adapted versions of novels to the microphone. Once the prologue is over, the scenes of the panorama are held together by a double thread of narrative briefly and concisely written.

The double thread of narrative was chosen because it has been proved by experience that the effect of a single narrator is apt to become boring; while by means of two voices a certain effect of balancing rhythms can be achieved, which is very helpful to the flow and rhythm of the programme as a whole.

At Least Five Studios.

For this type of programme, the Dramatic Control Panel and its attendant multiple-studio system is, of course, vital, and for "Waterloo" at least five studios will be employed. Each of these studios has its own acoustic properties, and by dividing the cast between them for the various scenes making up the panorama it should be perfectly easy immediately to establish the considerable changes of place that are the vital element in a programme which begins in Vienna and ends on St. Helena.

When dealing with so extraordinary a personality as that of Napoleon, there is an almost irresistible temptation to indulge in the picturesque, to call upon the Effects Department for every shot in their lockers, every cannon in their armoury and every coconut shell in their cupboards!

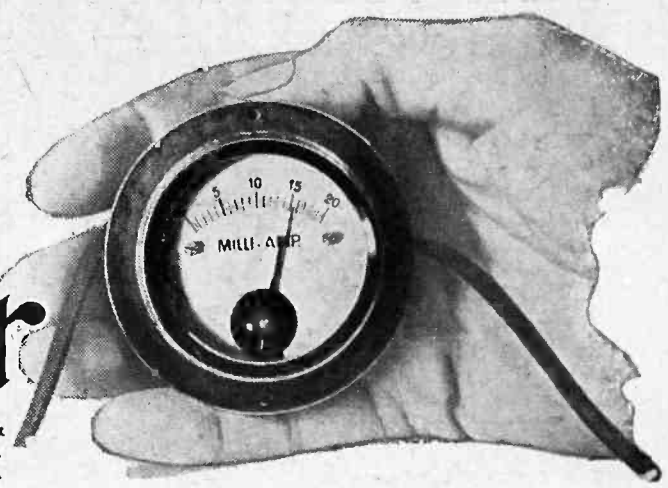
Every attempt has been made to envisage this temptation clearly, and to avoid it in proportion, for to reproduce the sound of a heavy cavalry charge—if such a thing were even remotely possible—would be a very poor substitute for reading Hugo's description of the battle. And the sound of Mercer's, or, alternatively, General Gourgaud's, cannon would be very much the same as the sound of the cannon in any other engagement of that twenty years' war.

Establishing a Precedent.

So, for the most part, the characters will speak for themselves. And the listener who agrees with the prevailing view that war has become permanently unfashionable and out of date, need not be deterred by any fear that in the course of this programme he will be brought too close to the grisly realities of the battle-field. The battle itself is handled strictly from the points of view of the two staffs concerned, and, as the Duke of Wellington remarked on the morning of that famous Sunday, "Generals have better things to do than to shoot at each other"; thereby establishing a precedent most satisfactory for staffs in later and less romantic campaigns.

In sum, the programme is an experiment, and its main interest probably lies in whether it gives any clue to the possibilities of the reproduction in sound of the equivalent of an historical document. For if any degree of success, however small, can be found in the broadcasting of "Waterloo," an immediate and almost illimitable prospect of similar programmes, expertly contrived and skilfully written, will be available, on the one hand, for the listener to hear, on the other for the radio dramatic author to exploit.

Making the most of a Milliammeter



Here you will find some very helpful information on choosing a suitable instrument, as well as hints on using it in the most effective manner in order to check overloading, to test circuits, and to discover leaky insulation.

By H. A. RAMPTON.

MANY amateurs do not feel the need for a meter as they would for a dual-range coil or an anti-motorboating unit. Yet a meter does help to get better quality, it helps to ensure that the valves are working efficiently and are not overrun.

There need be no fear that a meter will lead you into a mass of highly technical figures. When using it as an indication of the power-handling capacity of the output valve, one simply ignores the scale readings and just sees how much the needle "kicks!"

But I will deal with its uses at the end of this article. Let us consider the best instrument to choose for ordinary home use —the milliammeter.

Read the Current.

If a valve passes 5 milliamps at 100 volts it will probably pass 7 or more at 120 volts. If, therefore, a current-measuring instrument is inserted in the anode current, it will be possible to tell from the *current reading* whether the valve is receiving its correct *H.T. supply*.

A good milliammeter may cost anything from twenty-five shillings upwards. As a rule one of this class will be all right, though if you pay more the results will, of course, be somewhat more accurate.

As the output valve takes considerably more current than any of the other valves in a set, the scale reading of the meter should be slightly greater than this figure. In this way readings are easier as the whole scale is in use.

Locating a Leak.

In general, you will find that for battery-operated sets an instrument with a range of 0–20 milliamps will be suitable. For mains-driven receivers 0–30 or 0–50 milliamps, according to the type of valve used, will be necessary.

The idea in getting an instrument that registers slightly more than the current taken by the output valve is so that it will serve to measure the total current taken by all the valves.

The easiest way to do this is to put it in the H.T. *negative* lead before this reaches the connection to L.T. negative. (This point is important. If the L.T. current is allowed to pass through the meter, it will probably be irretrievably damaged.)

If you leave the meter in this position it will be possible to check up whether the current increases at any time. Another point is that the efficiency of the by-pass condensers can be checked by assuring yourself that no H.T. flows when the set is switched off.

If there is an indication of current it is an easy matter to connect the meter in the anode lead of each valve in turn in order to trace the culprit.

By connecting a milliammeter in the lead to the anode of the output valve it is possible to check whether it is being overloaded. In normal practice the needle should remain almost steady. If it swings about when loud passages are received, the volume should be reduced, otherwise there is bound to be distortion of the received signals.

Try This!

Or you can get over the trouble by increasing the H.T. voltage, and, of course, the grid bias to correspond.

If the grid bias is not correct the needle will not kick evenly both ways. If it kicks upwards, the G.B. is too high; if downwards it is too low.

Don't forget to disconnect the H.T. plug before altering the grid bias. If you have an old partly worn-out valve you do not want, plug it in the last valve holder in place of the usual one and try altering the G.B. with the H.T. connected up.

Watch the milliammeter as you do so. Note the tremendous increase in current while you are altering the bias (that is, while the plug is out), and you won't try it with your best valve!

With the correct value of bias the current registered should agree fairly accurately with the figures given by the makers.

Fix a Fuse.

In tracing troubles in a receiver that refuses to work, the meter may again be connected in the anode lead of each valve in turn. If the normal current is registered, you will have proved (a) that the valve is getting its correct L.T., H.T., and G.B., and (b) that there is no break in the anode circuit, such as a burnt-out transformer, or in the circuit that passes the grid bias to the valve. (In a detector circuit this means the grid leak connections and not the tuned circuit.)

But by proving that there is no break, it does not prove that the circuit is completely O.K. There may be a short-circuit somewhere. This is not unlikely in these days of all-metal receivers, fixing screws and screening cans being frequent offenders.

A final hint. It is best to use a low-resistance fuse in series with an expensive meter. It should be rated to blow at a current slightly greater than the maximum reading of the instrument.

ANOTHER BRANCH OF SCIENCE!

The instrument in the tree is certainly not a milliammeter, but it is very closely allied, for it is an outside broadcast microphone, and if it picks up a bit too much energy the milliammeter needles will "dance merrily" unless the control engineer is very slick with the volume control.

SHORT-WAVE NOTES

By W. L. S.

Who has many interesting tit-bits for readers, including preliminary details of the newly-discovered potentialities of the waveband around five metres.

THE little private "competition" arranged between M.S., of Harlow, and F.N.B., of Hale, Cheshire, has fizzled out rather tamely, since M.S. has failed to send me any details at all! F.N.B., on the other hand, turned in a wonderful log of 120 amateurs *on telephony*, during the one period of twenty-four hours.

A Formidable List.

The list of stations includes "hams" from Spain, Portugal, Belgium, Germany, Denmark, France, Holland, French Morocco, Czecho-Slovakia, and U.S.A. The only reader to challenge him at all was V.H.C. (Northfleet), who sent in a good list of British amateurs, but was not nearly so successful with the foreigners. This being the case, F.N.B. scores a walk-over!

Next time we organise a listening competition, I really shall have to enter myself. The only trouble is that, being a journalist, I should have great difficulty in persuading people that I was telling the truth.

The week's news is fairly scarce, conditions remaining dull in spite of greatly improved weather. P. R., of Sheffield, remarks that they suddenly bucked up during the competition week-end; F.N.B., however, in spite of his tremendous list of stations, definitely says that things were not good. That, I suppose, is purely a local difference between Sheffield and Hale.

Concerning Bandoeng.

The only Americans that readers mention specifically as being at all good are W 2 X A F and W 2 X A D. What we should do at this time of year without the latter station to cheer us up I really don't know.

F.D.T. (Redhill) passes on the following information, received direct from Bandoeng on their QSL card. Five transmitters are active—P M B (14·60 metres), P L E (15·93 metres), P M C (16·56 metres), P L V (31·86 metres), and P M Y (58·3 metres). The regular Tuesday afternoon broadcast (14.40–16.40 B.S.T.) is taken always by P L E and P L V, and sometimes by P M Y.

Incidentally, another good Tuesday programme is that broadcast by Poznan (Poland) on 31·35 metres from 18.45–21.45 B.S.T. E.H. (Bristol), among others, reports this as a good R8 on one valve. Yes, E.H., the high-power C.W. signal on 50·26 metres is the Vatican, H V J.

That Mystery Station!

I find that the station just above the 20-metre amateur band that I mentioned last week was not W A J, but our old friend W I Y, who is usually to be heard all day on C.W. How long his irregular musical broadcasts will continue I cannot say.

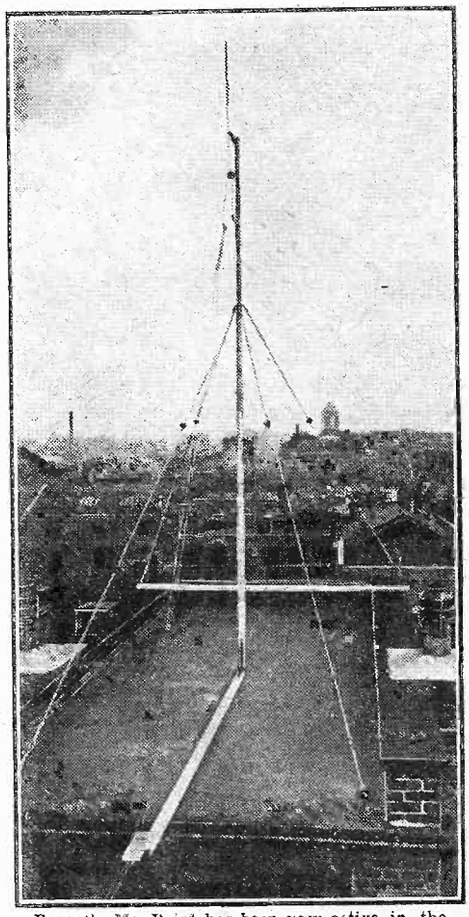
We hear the term "epoch-making" applied to lots of things these days, but I do not think Q.S.T. is far wrong when it describes the recent developments in 5-metre work by that term. The tale of the amateur transmitters' steady "downward trek" from 440 metres to 20 metres, and even 10 metres, is ancient history; but everyone did think that 20 metres would be about the shortest wave that was of any practical use to them.

Now, however, thousands of American hams are working on the unexplored territory of 5 metres, and are obtaining all the thrills once more. In this country, too, we are not by any means asleep. There are probably at least fifty active stations on 5 metres in London alone, and the chief craze appears to be "duplex" telephony. The band is of such an enormous width that broadly-tuned, frequency-modulated telephony can be tolerated until the transmitters are improved.

Great Strides in the States.

Only short-distance work has been possible as yet over here, but in the States they have erected transmitters on the top of skyscrapers, fire-towers, and even in aeroplanes, with the result that communication up to 150 miles has been established with "vest-pocket" transmitters and minute inputs.

A FIVE-METRE AERIAL



Recently Mr. Baird has been very active in the region of 5 metres with his television experiments, and it seems highly probable that there will be some interesting developments in the near future. This photograph shows the ultra-short-wave aerial on the top of the Baird premises in Long Acre, London.

Busy Times Ahead.

I predict some great developments in this work, and hope to be "first with the news" when they occur, as I shall be well in the swim by the time you read this.

One thing seems certain—that the super-regenerative receiver has all the others beaten for 5-metre work. It is so simple to make and operate that it looks to me as if it will be the ideal gear for the 7-metre broadcast when that starts. One rather surprising feature of the circuit is that the tuning strikes one as being quite broad. Imagine a 5-metre receiver w[illegible] a ·0001 condenser and a direct-drive dial!

EVERY MONTH

YOU CAN READ MORE ARTICLES BY OUR POPULAR CONTRIBUTOR, "W.L.S.," IN

MODERN WIRELESS

ON SALE

1st of the Month. *Price* **ONE SHILLING.**

In response to the many readers who are not content with the "tame" one-valver that I recently described, and who insist on a description of my own "hot" set, I have said all that I can think of about this "hotting-up" process in a separate article, now in the hands of the Editor.

Much Useful Data.

My recent article on "Location" has brought forth some interesting experiences from readers. One man receives the whole world with the exception of Nairobi; another in the same town finds Nairobi his star station. Another complains that W 2 X A D is always weak, although W 2 X B J, W A J and W I Y (none of them far off in wavelength) are always good when they are on.

A Wolverhampton reader mentions one of the most peculiar effects that I have met—that of receiving practically everything that is going, but at the *wrong time*. He gets Sydney, for instance, when others find that he is on the point of fading out. He gets W 2 X A D when I find him weak, and when he should really be coming up well this man finds him going off! This short-wave business certainly is a big freak!

An Interesting Band.

Soon after this I hope to have my own station going again with telephony on 42·25 metres, the usual times being Sunday mornings, and sometimes Saturday afternoons.

The worst of 20-metre work is that the DX work down there tempts one to forget all about one's friends in the same country, who can only be heard on "40."

Judging from last Sunday, all the old friends are still there—and very much there! Unfortunately, the B.B.C.'s longer Sunday programme will probably have the effect of cutting down the "'phone" time for the amateurs.

They are quite within their rights, of course, to work there at any time of day, but most of them become martyrs to the cause of broadcasting.

"ATLAS" POWER COSTS LESS & GIVES MORE!

. . . There's no cheaper source of H.T. Power than an "ATLAS" Mains Unit. First cost is low, outputs are higher and fully up to rating, and running costs are less than one penny a week. A model incorporating a L.T. Trickle Charger makes any battery receiver all-mains operated without alterations to set or valves.

That "ATLAS" Mains Units are emphatically the finest in value and performance is proved by their winning the Olympia Ballots in 1930 and 1931.

Post the coupon for a FREE Booklet, ask your dealer to-day for a demonstration, and be sure to insist on "ATLAS" All-British Mains Units, the Expert's choice.

SPECIFIED FOR THE "DECADE" DESCRIBED IN THIS NUMBER

10/- DOWN AND BALANCE IN EASY MONTHLY PAYMENTS

D.C. Models from 39/6, A.C. Models from 52/6, or with Trickle Charger from 77/6. Westinghouse Rectifiers. Guaranteed for 12 months.

"CLARKE'S ATLAS" MAINS UNITS

H. CLARKE & CO. (M/CR.) LTD., OLD TRAFFORD, MANCHESTER.

'Phones: Trafford Park 1744-5-6.

Southern Offices: BUSH HOUSE, W.C.2. *'Phones:* Temple Bar 3862 and 7130.

POST THIS COUPON NOW!

H. CLARKE & CO. (M/cr.) LTD., Old Trafford, Manchester.

Please send me FREE copy of your Booklet, "Power from the Mains."

Name.....

Address.....

30/18/6 .....

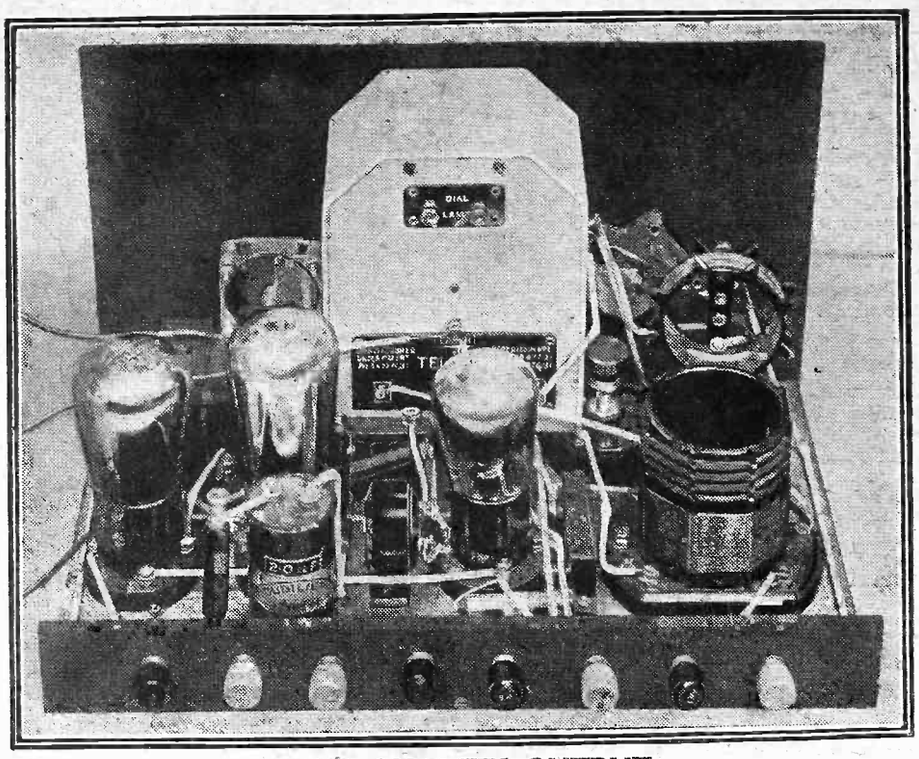
Those who use these Two Valves will get more stations and get them louder!

LISSEN METALLISED S.G. VALVE will give you much higher amplification without instability. Lissen research has succeeded in reducing the inter-electrode capacity of this Screen-Grid Valve to the minute figure of ·001 micro-microfarads. (Inter-electrode capacity causes instability and howling.) The magnification figure of this valve has been increased to 1,000. To get immensely increased range, ask for Lissen S.G.215. Price **12/6**

LISSEN POWER PENTODE The Lissen Power Pentode Valve—P.T.225—converts any set with one stage of L.F. amplification into a fine, full-volume "Pentode-output" receiver. This valve puts new power into your loud-speaker, and new brilliance of tone, too. Use it instead of a power valve and at once you get an amazing step-up in volume. Where before you got a whisper, now you get a torrent of pure sound, and it takes no more current than the power valve it replaces—its H.T. consumption is only 7 m/A. Ask for Lissen P.T.225. Price **12/6**

LISSEN VALVES

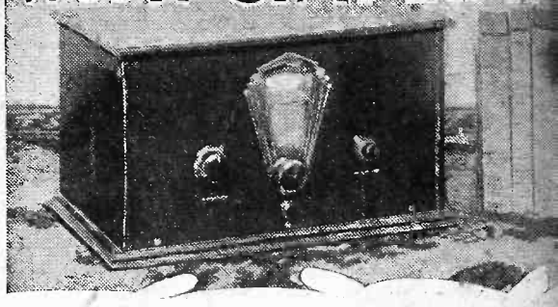
LISSEN LIMITED, WORPLE ROAD, ISLEWORTH, MIDDLESEX



HIGH QUALITY OUTPUT

You do not have to push the reaction in order to obtain great volume with the "Decade," and this, together with a carefully stabilised L.F. section, ensures a perfect quality output.

The "DE
WITH SIMPLIFIE



By G. V. DOWD

Who describes a "P.W." set which represents no doubt read about the first model of "P.W. all the features found i

HAVING closely examined the "Decade" —at least, by means of the published specification—readers may wonder how this set could possibly be simplified without sacrificing some of its outstanding qualities.

But it can; and the simplification isn't theoretical, or even insignificant.

It is achieved by the introduction of an Extenser. Most of the Extensers cost a few shillings more than ordinary condensers; but against this can be credited the fact that, instead of the rather elaborate control switch, we now need nothing more than a simple push-pull on-off type.

Automatic Circuit Control.

So in this new model of the "Decade" the single switch has only one job to do, and that is to switch the set on and off. The Extenser automatically does the wave-changing. Its dial is numbered from 0–100 and 0–200, and rotates through 360 degrees instead of the normal 180. And, as you twist it from 0–100, so you tune in the medium-wave stations. From 0 to 200 the long-wave stations come in, the change-over from the one band to the other being absolutely automatic.

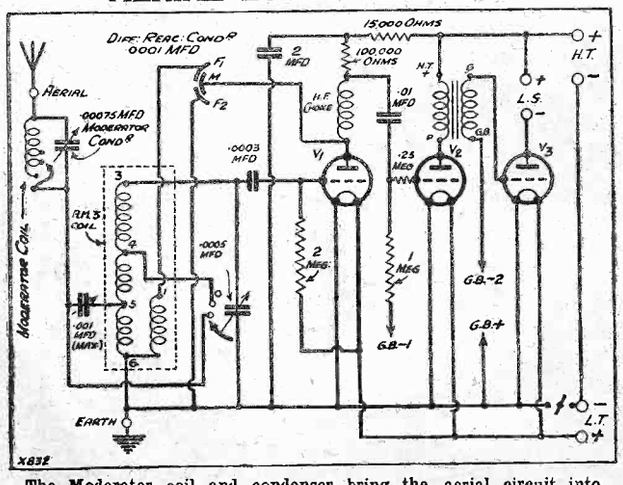
Also, the Extenser automatically carries out the necessary Moderator circuit rearrangement which was, in the first model, accomplished by the rather complicated control switch. From the household's point of view the Extenser is pure gold, for the Daventry's, Radio Paris, London Regional, Northern Regional, and so on are all, in effect, welded into the one tuning band.

And it must be admitted by all that it is no small advantage to have the one switch which figures on the panel doing the one "stop–start" job.

The Extenser not only simplifies, but it also tends to increase a set's operating efficiency because it reduces and simplifies the wiring.

These facts will, of course, be well known

AERIAL LOSSES AVOIDED



The Moderator coil and condenser bring the aerial circuit into resonance at "medium-wave" frequencies, and thus enable the maximum of power to be developed.

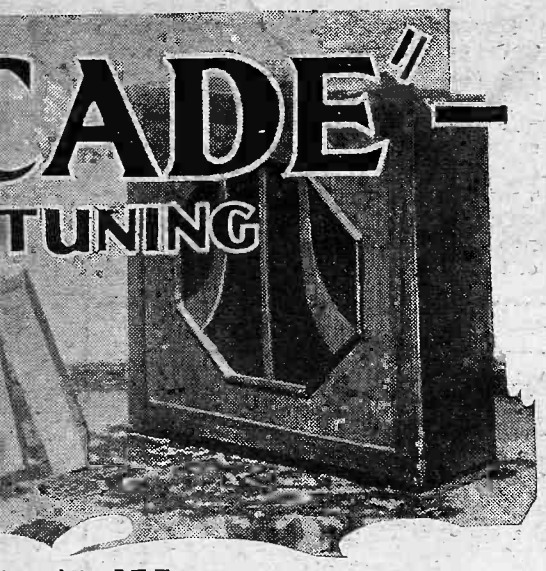
YOUR SHOPPING LIST FOR THIS

1 Panel 12 in. × 7 in. (Peto-Scott, Permcol, Ready Radio, Wearite, Lissen).
1 Baseboard, 12 in. × 7 in. × ¾ in.
1 Cabinet to fit above (Peto-Scott).
1 ·0005-mfd. Extenser with disc drive (Telsen Telexor, Cyldon, Wavemaster, Formo).
1 ·0001-mfd. differential reaction condenser (Lotus, Ready Radio, Telsen, Cyldon, J.B., Polar, Wavemaster, Magnum).
1 ·00075-mfd. solid dielectric condenser (Magnum, Polar, Telsen, Ready Radio).
1 Push-pull on-off switch (Bulgin, Lissen, Telsen, Ready Radio).
3 4-pin valve holders (Lotus, Lissen, Telsen, Graham Farish, W.B., Tunewell, Igranic, Clix, Benjamin, Bulgin).
1 Dual-range coil (Colvern R.M.3).
1 Moderator coil (Ready Radio, Peto-Scott, Sovereign).
1 ·001-mfd. max. compression condenser (Lewcos, Sovereign, Goltone, Graham Farish, Formo, Polar).
1 ·01-mfd. mica condenser (T.C.C., Dubilier, Telsen, Lissen, Graham Farish).
1 2-mfd. condenser (Dubilier type 9,200, Telsen, Lissen, T.C.C., etc.).
1 ·0003-mfd. fixed condenser (Lissen, etc.).
1 H.F. choke (Lissen, Lewcos, Telsen, Atlas, Tunewell, Graham Farish, Ready Radio, Varley, R.I., Peto-Scott, Sovereign).
1 2-meg. leak, with holder if required (Igranic, Lissen, Telsen, Graham Farish, Ready Radio, Loewe, Dubilier).
1 15,000-ohm resistance (Graham Farish Ohmite, etc.).
1 100,000-ohm resistance (Graham Farish, etc.).
1 ½-meg. resistance (Graham Farish, etc.).
1 1-meg. resistance (Graham Farish, etc.).
1 L.F. transformer (Lissen Torex, R.I., Graham Farish, Telsen, Varley, Lot
Ferranti).
1 Terminal strip 12 in. × 1½
1 Block of wood for mounti

NO WAVE-CHAN

The Telexor covers both mediun and long-wave stations in the or complete rotation of its dial.

A SET WHICH UNIF



Associate I.E.E.

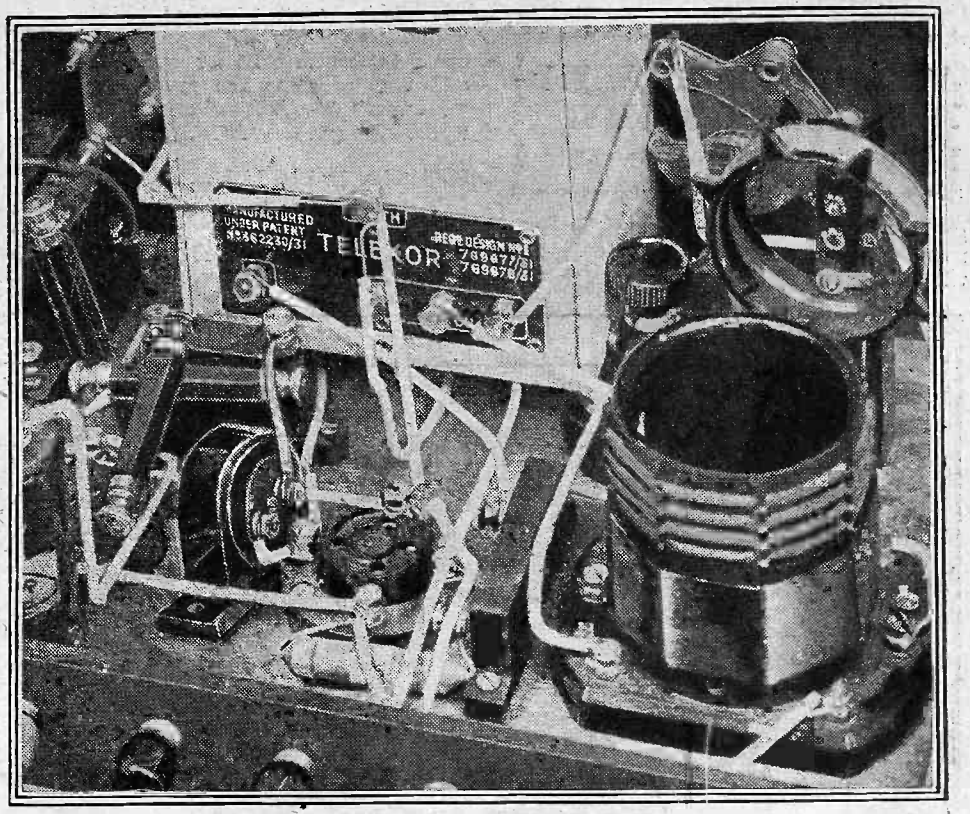
ltimate in simplified effectiveness. You have iversary receiver—well, this model embodies plus Extenser tuning!

to regular readers of "P.W.," and we have summarised them for the benefit of an ever-increasing circle of new readers.

A further advantage which accrues from the use of an Extenser in this particular receiver is that a very attractive panel appearance is obtained.

This is particularly the case with the Telsen "Telexor," for that component has a handsome escutcheon, and there is also a panel light for illuminating the dial, although the use of this is quite optional.

The "Telexor" retails at 12s. 6d., and at this figure it is an excellent investment.



A MINIMUM OF WIRING

The "Telexor" not only reduces the wiring, but many of the remaining leads are considerably shortened owing to the placing of the Telexor terminals, with a consequent increase in the set's efficiency.

All the other components are perfectly conventional and are easily obtainable at any radio store.

We would, however, advise constructors to select their makes with due consideration of both performance and price. A few pence can be saved here and there by going outside our recommendations, but this is the kind of economy which, in the long run, is not likely to pay.

Take the L.F. transformer, for instance. It is possible to pick up L.F. transformers for three or four shillings these days, but while all of these may not be hopeless "duds," the fact remains that many are.

And of those which will give passable results, a proportion may, and probably have, very low reliability factors, and be liable to early breakdowns.

Using Existing Parts.

Care should also be taken that the selected components are not "outsizes," and cannot be built into the set without materially altering the layout—a fatal variation from the specification.

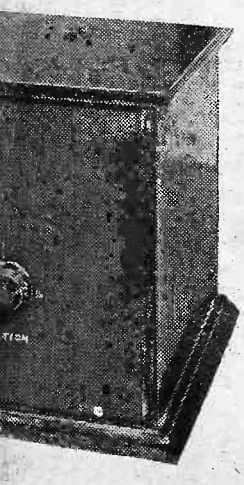
We mention this because we fully appreciate that most constructors desire to use as many existing components as they can in their sets; indeed, we bore this in mind when designing the "Decade," as you will

(*Continued on next page.*)

R-ATTRACTIVE RECEIVER

c, Tunewell, Slektun,
Scott, etc.).
ator coil, 1¾ in. high.

SWITCHING



8 Indicating terminals (Bulgin, Belling Lee, Eelex, Igranic, Clix).
18-gauge tinned copper wire and sleeving (Wearite or Quickwyre, Jiffilinx, Lacoline).
Flex, screws, etc.
Battery Plugs (Belling Lee, Eelex, Clix, Bulgin, Igranic).

ACCESSORIES.

LOUDSPEAKER.—Blue Spot, Celestion, H.M.V., Marconiphone, B.T.-H., Epoch, R. & A., Cossor, Graham Farish, W.B.

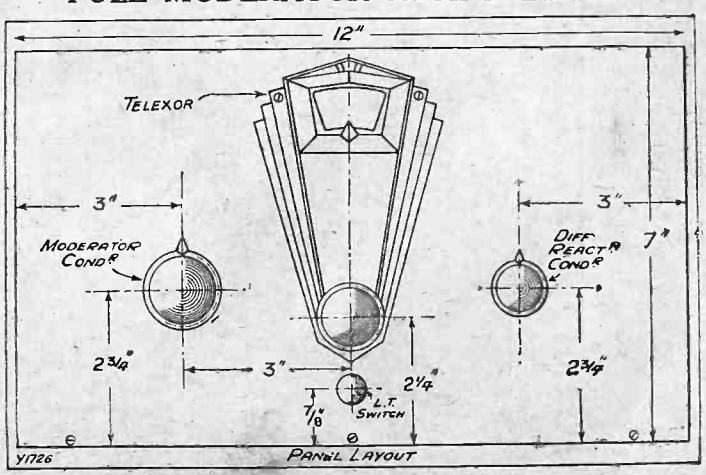
VALVES.—For use with battery H.T.—Detector: Marconi H.L.2, Mazda H.L.2, Mullard P.M.1H.L., Cossor 210H.L., Osram H.L.2, Tungsram H.210, Eta B.Y.2020, Lissen H.L.2, Six-Sixty 210 H.L., Triotron H.D.2, Dario H.F.
1st L.F.: Cossor 210 Det. or 210L.F., Mullard P.M.1L.F. Marconi L.2/B, Osram, L.210, Mazda L.210, Tungsram L.210, Eta B.Y.1210, Lissen L.210, Six-Sixty 210L.F.
Power: Mullard P.M.2A., Mazda P.220, Marconi P.215, Osram P.215, Cossor 220P., Eta B.W.604, Tungsram P.220, Lissen P.220, Dario S.P.
For Use With Mains Unit: As above with following additions, Mullard P.M.202, Mazda P.220A., Marconi and Osram P.2, Cossor 220P.A., Eta B.W.602, Six-Sixty 220S.P., Lissen P.220A., Dario H.P., Triotron U.D.2.

BATTERIES.—H.T., 120 to 150 volts (Lissen, Pertrix, Ever Ready, Drydex, Siemens, Cossor). Super capacity should be used.
G.B., to suit output valve (Ever Ready, etc.).

ACCUMULATOR.—2-volt (Exide, Pertrix, Lissen, Ever Ready, G.E.C., Ediswan).

MAINS UNIT.—To give 30 milliamps, at 120 volts (Atlas, Heayberd, R.I., Tunewell, Tannoy, Regentone, Formo, Lotus).

FULL MODERATOR ADAPTABILITY



The flexibility and adaptability of the three panel controls will amaze those unacquainted with the potentialities of "moderated" sets.

THE WAVEBANDS

THE "DECADE" WITH SIMPLIFIED TUNING.

(*Continued from previous page.*)

gather from the rather unusually large number of component alternatives given in the accompanying list.

In the assembly of the set there is only one point which calls for special mention, and that concerns the mounting of the "Telexor." The L.T. switch must be wired up before the "Telexor" is finally in position.

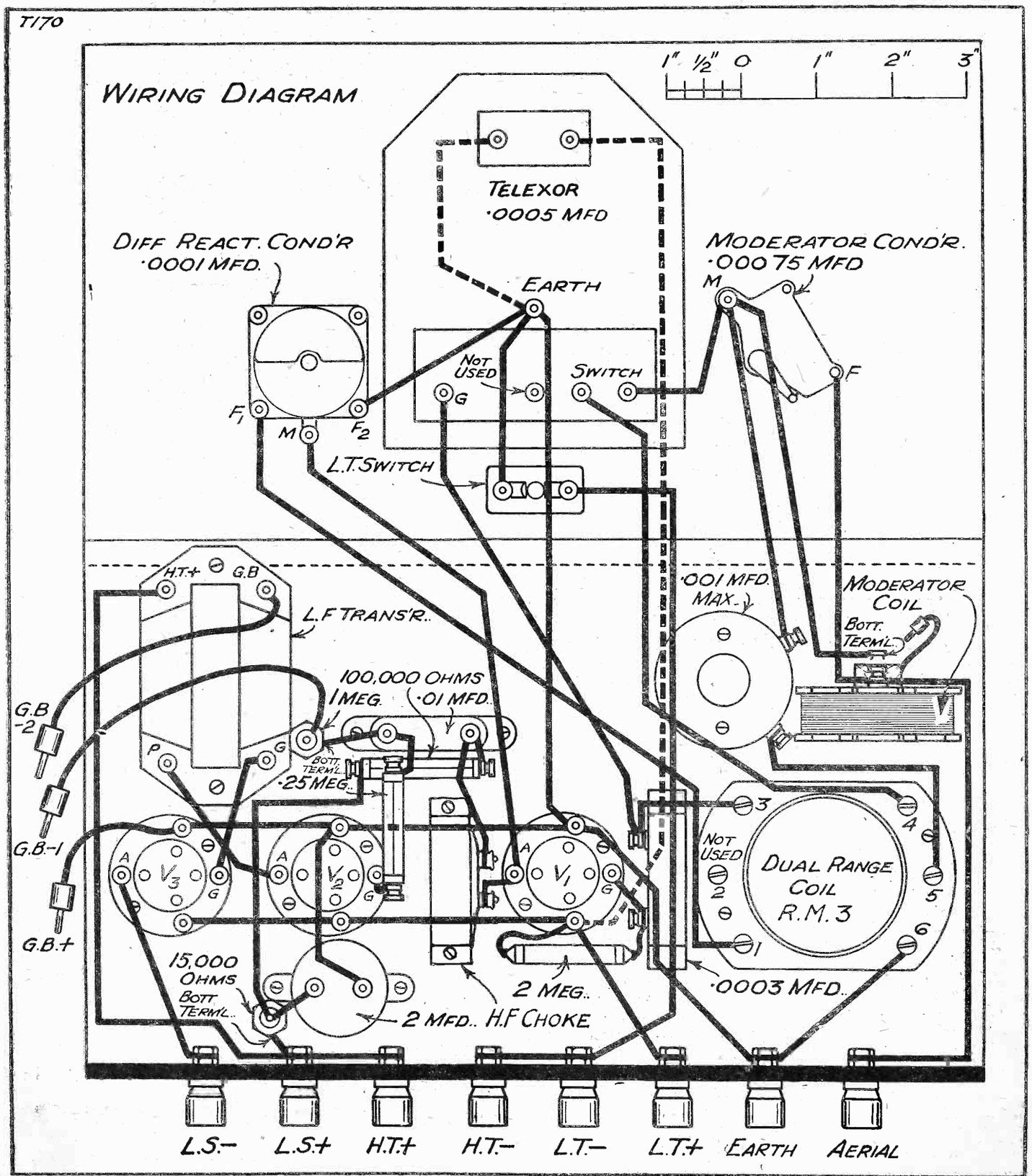
Wiring for the Dial Light.

You will notice that the wiring diagram shows dotted lines running to the top two "Telexor" terminals. These indicate the dial-light leads.

Obviously, a dial light is not essentia to the operation of the set, but it is a valuable refinement and one which we recommend constructors to take full advantage of.

This light is wired across the low-tension supply in such a way that the on off switch of the receiver controls it as well as the valves.

Next week we will give you some further notes on the construction and installation of this outstanding receiver.



The dotted lines indicate the dial-light leads. Constructors should note that the L.T. switch must be fixed and wired before mounting the "Telexor."

★ "has indeed solved my H.T. worries"

Pinewood Avenue,
Crowthorne,
Berks.
April 30th. 1932.

Dear Sirs,

. . . . I would like to congratulate you on the efficiency of the Milnes H.T. Unit, which **has indeed solved my H.T. worries.**

I test the Unit weekly with the voltmeter, and I find that it **never** registers less than 130 volts, and very often is as high as 150 volts. I have four 2-volt L.T. accumulators which enables me to have one on charge as a spare, but I can honestly say that I have not noticed any change in the L.T. consumption.

I have only one regret, and that is that I did not know about the Milnes H.T. Unit earlier and been able to have saved some of the money I wasted on Dry H.T. batteries.

I am,
Yours truly,
F. L. THOMPSON.

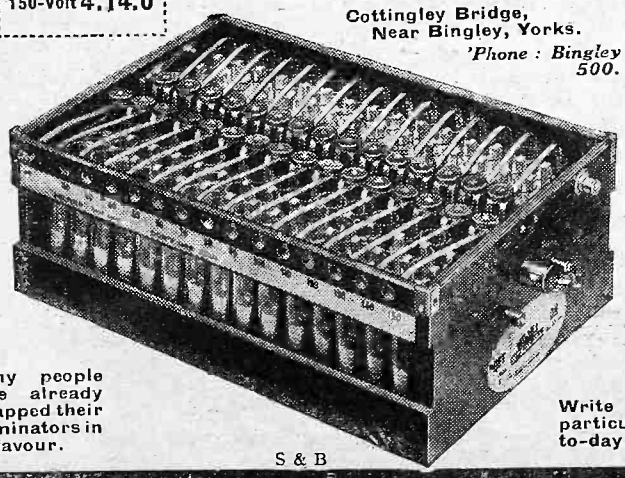
THE Milnes H.T. Unit gives better reception than any other type of H.T. supply, and is cheaper than mains operation. You can't damage the robust nickel-iron cells by careless maintenance—there is no buckling of plates—no sulphation—no mains hum, and practically no attention is needed. The Milnes unit will give 40 milliamps at a definite voltage against a dead silent background, and is charged automatically from your L.T. accumulator.

MILNES H.T. SUPPLY UNIT

SUPPLIES H.T. CURRENT FROM L.T. ACCUMULATOR

PRICES IN U.K.
£ s. d.
90-volt 2.18.0
120-volt 3.16.0
150-volt 4.14.0

MILNES RADIO CO.,
Cottingley Bridge,
Near Bingley, Yorks.
'Phone : Bingley 500.

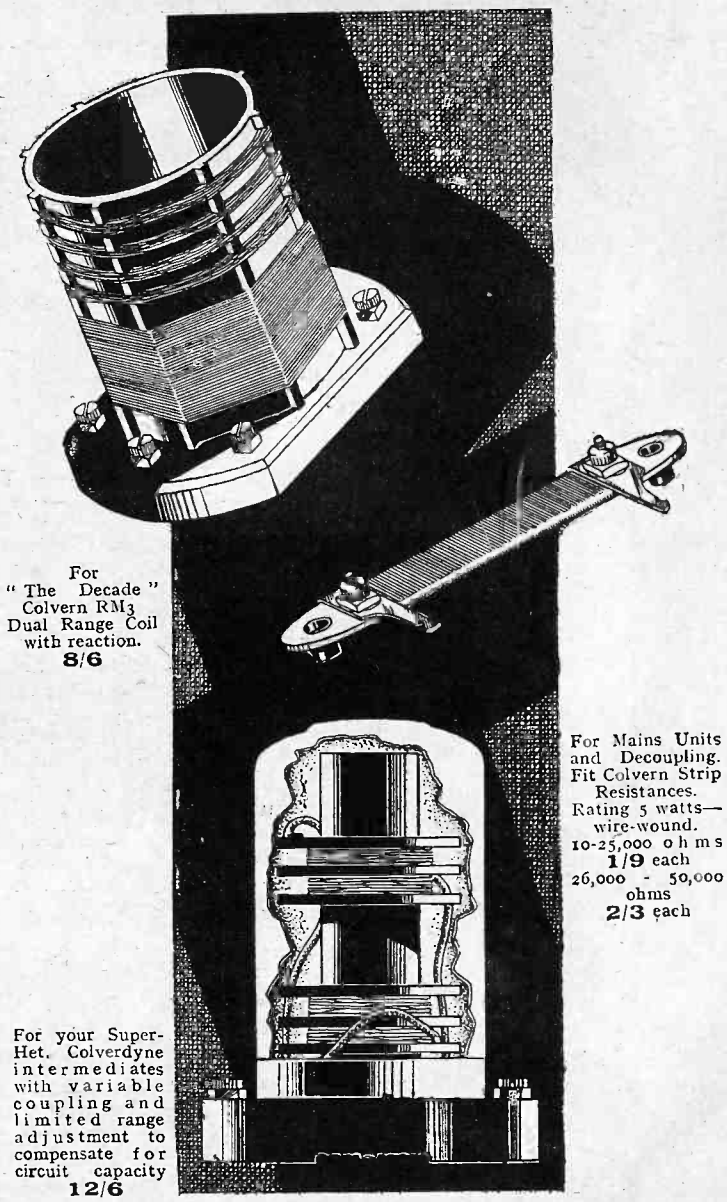


Many people have already scrapped their Eliminators in its favour.

Write for particulars to-day.

S & B

Colvern components for every receiver



For "The Decade" Colvern RM3 Dual Range Coil with reaction. **8/6**

For Mains Units and Decoupling. Fit Colvern Strip Resistances. Rating 5 watts—wire-wound. 10-25,000 ohms **1/9** each 26,000 - 50,000 ohms **2/3** each

For your Super-Het. Colverdyne intermediates with variable coupling and limited range adjustment to compensate for circuit capacity **12/6**

Colvern coils are available for every type of modern receiver. The leading designers specify Colvern components and the confidence they place in them is a sure guarantee of their excellence and reliability. Wherever the best is needed, the choice always falls on Colvern.

COLVERN LIMITED
MAWNEYS ROAD, ROMFORD, ESSEX.

CAPT. ECKERSLEY'S QUERY CORNER

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

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

OUTSIDE INTERFERENCE—EFFECT OF CONE ON TONE—RUNNING A LONG LEAD-IN—CONCERNING CONDENSERS.

Curing Crackle.

B. B. (Hastings).—"I am unfortunate in being situated near an electric motor which causes crackling noises in my loudspeaker. A friend has advised me to put my set in a metal box. Do you think that this would help matters?"

Take off the aerial, being sure this does not allow the set to oscillate.

To be sure of this, touch the aerial terminal with your finger. The loudspeaker must not go boomp, boomp, or make any loud sound as you put your finger on and off.

You have now got a set with the aerial disconnected and yet not oscillating. Does the crackle continue?

If moving the aerial does *not* stop the noise, and if you have electric mains, and if you work the set from the electric mains, you may find a cure by inserting air-cored chokes of low D.C. resistance in the mains and shunting with a small (if A.C. mains) or large (if D.C. mains) condenser, as shown in my diagram.

This may stop crackles.

These may then come in again when you replace the aerial. Now go to the owner of the motor and ask him if you may get someone to connect anti-interference devices to it. Write to the B.B.C. about this.

I think screening the set is the least useful remedy.

* * *

Moving-Coil Diaphragms.

N. K. L. (Southampton).—"In the case of a moving-coil loudspeaker, what bearing does the diameter and rigidity of the cone diaphragm have on reproduction?

"Does stiffness improve the high notes, and any increase in cone diameter the low notes?"

Phew! No, sir! This problem involves about ten independent values, as, e.g. position of coil drive relative to cone dimensions, cone dimensions, cone edge mounting stiffness, cone stiffness, cone homogeneity, cone mass, eddy currents in pole-pieces, and so on and so forth.

I, for one, am not such a fool as to think I could tackle the problem, while I am wise enough to suspect the theoretical results of those who have been brave enough, at any rate, to tackle them.

In general, one may say that at low notes it is probable that the cone moves in and out like a piston as a whole.

At higher notes, the cone tends to break up, when parts of the cone are stationary and parts move.

This breaking up contrives to be more pronounced and complex as the note is higher. You can damp the edge of an M.C. speaker without affecting most high-note reproduction.

* * *

A Rattling Baffle.

W. W. (Stony Stratford).—"I have been using for some time a thin baffle-board approximately 4 ft. by 4 ft. Would there be any advantage in increasing the thickness of this to, say, ½ in., or would even 1 in. be better?

"My trouble, which I am unable to cure, is an annoying rattle on certain notes."

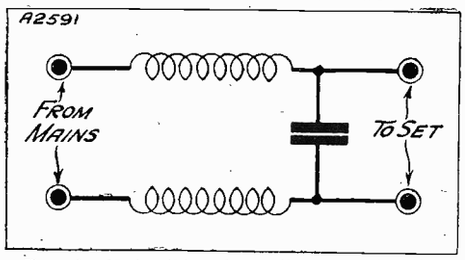
Question.—Does the baffle rattle, or is the rattle due to something other than the baffle?

Answer.—Remove the speaker from the baffle and see if you can hear the rattle. If you cannot hear the rattle it was the baffle, but if you still hear the rattle you cannot blame the baffle.

Advice.—If it is the baffle which makes the rattle, shake the baffle till you locate the rattle, and then use your common sense to cure the rattle in the baffle. Make it thicker, stiffen it with battens, use a 5-ply backing—anything to stop the rattle in the baffle.

But if it is not the baffle that makes the rattle, I am baffled to know what the rattle is. It may be the speaker, or an overloaded valve, or—it may be a host of things. You will, I hope, find the rattle in the baffle and cure it.

A MAINS SILENCER



You should try this scheme if you are troubled by H.F. interference coming "down" your mains.

* * *

Wall Losses.

A. N. (Mottingham).—"I have just had a puzzling experience. Owing to the fact that I had to move my set into another room, I took my lead-in along the picture railing and secured it in position with the aid of insulated staples.

"I now find that I lose considerably in volume unless I remove the staples so that the lead-in is clear of the wall of the room. When this is done volume returns to normal. Why is this?"

Certain walls are very "lossy." The high-frequency currents in the aerial set up electric and magnetic fields near the aerial.

If these rapidly changing electric fields have to be created and destroyed and then recreated near a material substance, then the process absorbs more energy than if the aerial is isolated from anything but air.

Walls give what is called "dielectric loss"—that is, a loss due to setting up electric fields, whereas iron and steel near aerials give rise to "eddy current" or magnetic field loss. The absorption of energy is from the aerial into the wall, and hence there is less energy available for the set.

* * *

Non-Inductive Condensers.

E. J. R. (Dovercourt).—"Recently a number of manufacturers have produced non-inductive coupling condensers. Would there be any advantage in using this type of condenser for coupling purposes in the R.C. stage of my set—as against my present mica?"

I think the non-inductive type of condenser was produced largely for high-frequency decoupling, wasn't it?

In any case, if you've got a mica condenser for R.C. coupling you cannot do better. Lucky man!

So many people use these other paper condensers, and while they are perfectly good for fairly low-voltage work, I always like a high voltage and a good mica condenser.

ONLY IN "P.W."
can you read Capt. Eckersley's replies to listeners' own problems.
AND REMEMBER—
Captain Eckersley's technical articles appear only in
"POPULAR WIRELESS"
and **"MODERN WIRELESS."**

A Special Offer you must not Miss

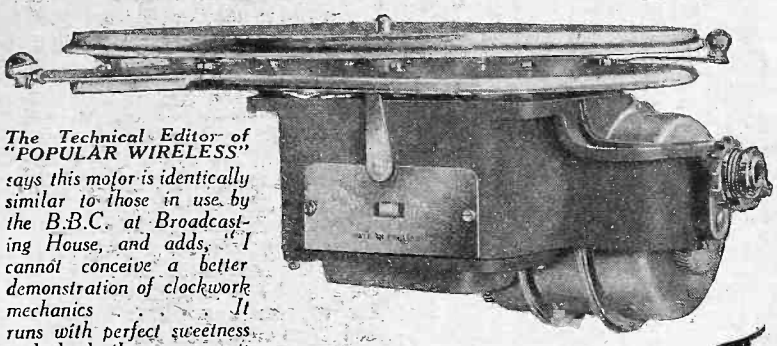
A WORLD-FAMOUS MAKE OF

TRIPLE-SPRING GRAMOPHONE MOTORS

BRAND NEW

At Less Than HALF PRICE

THE FINEST SPRING MOTOR EVER MADE



The Technical Editor of "POPULAR WIRELESS" says this motor is identically similar to those in use by the B.B.C. at Broadcasting House, and adds, "I cannot conceive a better demonstration of clockwork mechanics . . . . . It runs with perfect sweetness and dead silence . . . . . it will be an exceptionally good (and probably extremely expensive!) electric motor which will displace this bargain-price triple-spring motor."
—Popular Wireless May 28th, 1932.

Manufactured by the world famous
GARRARD
Engineering & Mfg. Co. Ltd.

If you have a gramophone or radio-gram, here is your opportunity to convert it easily into a long-playing, silent-running super instrument. Or you can make a fine new gramophone at very little cost. These Super Triple-Spring Gramophone Motors were specially made by the famous Garrard Company for one of the largest English gramophone factories, which has since closed down. The motors were intended for use exclusively in gramophones selling at £25 and upwards. List Price 81/3, but now offered to readers of "Popular Wireless" for only 35/-. This is indeed the opportunity of a lifetime. Secure yours while the offer lasts.

This Super Triple-Spring Motor embodies three distinct spring-drive units, and is thus three times as powerful and long-running as ordinary single-spring motors. Fitted with motor plate, speed regulating lever, safety friction clutch, 12-inch turntable, winding handle, and automatic brake. All bright parts heavily nickel-plated. All working parts totally enclosed. Silent running, silent wind.

OFFERED AT **35/-**
Carriage Paid

LIST PRICE £4:1:3

A limited number in Gilt, 5/- extra.

PLAYS 3-12" or 4-10" RECORDS AT ONE WINDING

CABARET ELECTRIC CO.

170, Vauxhall Bridge Rd., London, S.W.1
and 238, High St., Lewisham, London, S.E.13.

Postal Orders and Money Orders should be crossed and Treasury Notes sent by registered post.

For the Latest and Best Modern Fiction . . .

You must buy the finest all-fiction magazine in Britain—THE STORY-TELLER. Neither expense nor care is spared in maintaining the very high standard which has for so long been the hall-mark of this great publication. Every month it provides a regular feast of good contemporary fiction and contains the work of our most accomplished authors.

The **STORY-TELLER** 1/-

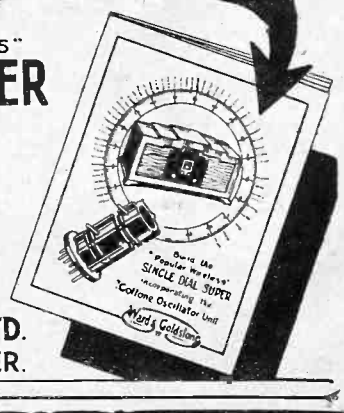
Monthly—At all Newsagents

FREE TO "P.W." READERS

BUILD THE "POPULAR WIRELESS"

SINGLE DIAL SUPER

Pamphlet contains FULL CONSTRUCTIONAL DETAILS, including WIRING DIAGRAMS for this amazing 5-VALVE SUPERHET. One-Dial Tuning. No soldering required. Highest degree of Selectivity. 90-100 stations obtainable at Loudspeaker Strength.
Send for Your FREE Copy TO-DAY.



WARD & GOLDSTONE LTD.
PENDLETON MANCHESTER.

Constructors! SEND FOR FREE LIST OF GODWINEX MAINS TRANSFORMERS

AV 5. (illustrated) Rectified output 250 v. 50 m/a.
AC Heater winding for 5 valves.
The lowest priced Quality Transformer on the market.

AV5 - £1 - 6 - 0

Write NOW for Free List and compare prices.

BRITISH BUY

J. DYSON & CO. LTD.,
5 & 7 GODWIN ST. BRADFORD
2 COLEMAN ST., LONDON E.C.2

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

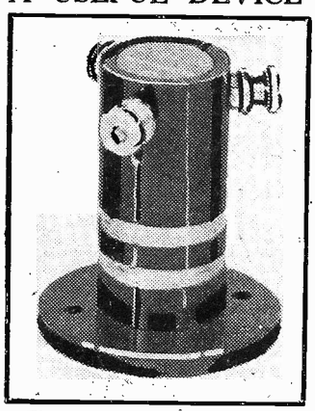
Tested and Found—?

A FIXED POTENTIOMETER.

THERE are many sets which would undoubtedly benefit by the introduction of the Bulgin fixed centre-tapped potentiometer. This component is electrically identical to an ordinary 400-ohm potentiometer, but instead of a moving contact, it has a centre tap, thus enabling the grid leak return of a detector valve permanently to be joined to a point midway between L.T. positive and L.T. negative.

But there is, in addition, a ·001-mfd. fixed condenser incorporated in this Bulgin component which has the important duty of by-passing stray L.F. currents.

A USEFUL DEVICE



The Bulgin centre-tapped, fixed potentiometer.

Nevertheless, the price of the compact little article is only 3s.; so, in addition to its simplifying qualities as compared with a separate potentiometer and condenser, it scores in point of cost.

The advantage accruing from the use of the device in a detector circuit is an almost invariably smoother reaction control. But it has other uses, such as the formation of a centre tap in the filament winding of a power transformer in a mains set.

I have used the Bulgin centre-tapped fixed potentiometer for both the above-mentioned purposes, and find it perfectly satisfactory.

MARCONIPHONE DRY BATTERIES.

A new range of these has just made its appearance. It comprises grid bias and H.T. types of popular sizes, selling at highly competitive prices.

LUXURY SOLDERING.

Once you have used an electric soldering iron you never want to go back to the flame heated kinds. For one thing, an electric iron maintains an even heat and enables long jobs to be tackled without the necessity of frequent stops while the iron is "cooking up."

Again, there is no soot or rapid oxidation to combat and so it is much easier to make clean, efficient joints.

Browning's Electric Co., of East Ham, manufacture an excellent electric iron for radio work. It is light and only weighs 7 oz. and its consumption, 45 watts, is less than that of one ordinary electric-light bulb.

Its price complete with adaptor and flex is 10/-, and the article carries a six months' guarantee. What I particularly like about it is the fact that its element is very easily replaceable and that new elements are readily obtainable at only 2/9 each.

VERY USEFUL.

I have just met "Celfix" for the first time, and henceforth I am always going to have a 6d. reel of it by me, for it is a most useful material.

It is a fine cord or a thick thread (whichever you like), treated in the same way as that sticky tape—not the black but the medical variety.

And if you want to bind up the end of a radio set lead or bind the handle of a cricket bat or golf club or tennis racket, or cover the handle of a kettle, or do any one of a hundred other such jobs, you merely wind some Celfix on and it fixes itself into place.

It doesn't soil the hands, either, and is water- and heat-proof. Also, it is tough. Radio enthusiasts, electricians and sportsmen alike should all welcome this new material with open arms.

THOSE SIBILANTS.

During a practical test of the M1 Ferranti moving-coil chassis, I compared the reproduction of this speaker with an earlier type of different make. The result was interesting, even amazing.

And the most marked difference between the two instruments was the difference between their rendering of sibilants. Indeed, to all intents and purposes, these were absent in the one case, and speech came over like this: "Here i' the fir' new'."

But with the Ferranti M1 the "s's" were crystal clear, and there was not the faintest suggestion of muzziness.

The M1 is a fine speaker, wonderfully sensitive and bell-like in its clean over-all response. Many constructors might think it high-pitched simply because it does do the high notes justice and has none of that wooffy boominess so commonly met with in the earlier moving-coil speakers.

But, thank goodness, the "mellow" phase of radio reproduction has practically ended. Do you remember the time when the popular idea of loudspeaker "perfection" was a more or less complete absence of high notes? I expect most of you very clearly do. Of course, there was a reason for this... there was so much distortion in the average set that a "faithful" response would have been intolerable; a Ferranti M1 would have been far too good to prove succesful!

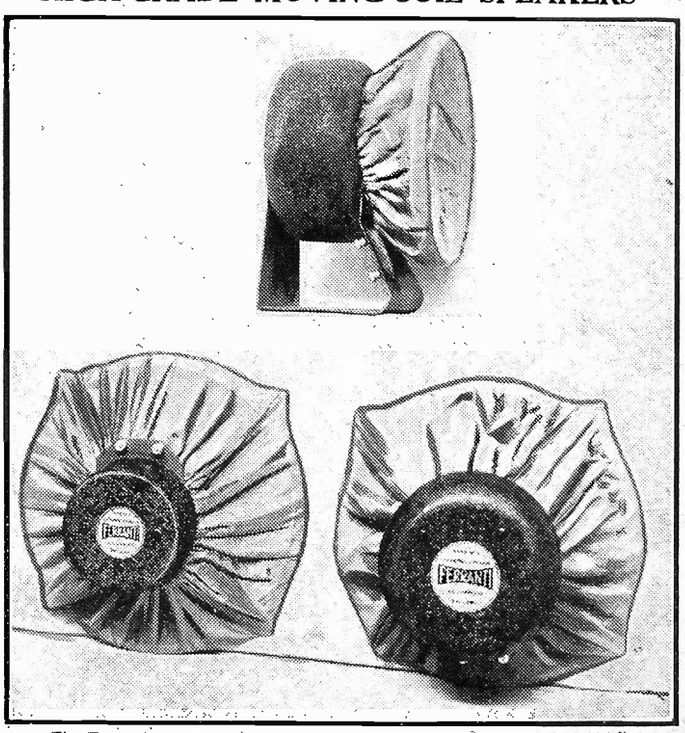
The M1 costs £7 10s. as a chassis, but it is well worth it; and if you cannot possibly run to that figure, then there are the M2 and M3!

PLEASE NOTE

Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department with the strictest of impartiality, under the personal supervision of the Technical Editor.

We should like to point out that we prefer to receive production samples picked from stock, and that we cannot in any circumstances undertake to return them, as it is our practice thoroughly to dissect much of the gear in the course of our investigations! And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are, therefore, framed up in a readily readable manner, free from technicalities unnecessary for that immediate purpose.

HIGH-GRADE MOVING-COIL SPEAKERS



The Ferranti M1, M2 and M3 permanent-magnet moving-coil speakers.

B.I. ENAMEL COVERED WIRES

B.I. Enamelled wires are unequalled for the field windings of small motors, measuring instruments, radio transformers, and other pieces of electrical apparatus where space is all-important. They are produced throughout in our own works, from the raw material to the finished wire, and every phase of manufacture is under the strictest control as regards quality of material and accuracy of gauge. B.I. Enamelled Wire is unexcelled for its high insulation, dielectric strength, flexibility of enamel, and general dependability. We regularly manufacture Enamelled wire as fine as ·002" dia.

BRITISH INSULATED CABLES
LIMITED
PRESCOT—LANCS.
Makers of B.I. Cables
Telephone No.: PRESCOT 6571.

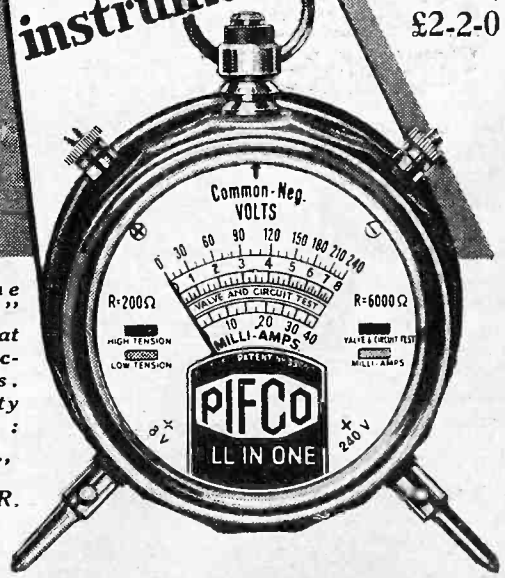
London Office: Surrey House, Embankment, W.C.2
Telephone No.: Temple Bar 4793, 4, 5 & 6.

The SHERLOCK HOLMES of RADIO

Even the novice can trace any Radio fault in a few minutes with this marvellous instrument

Solve any radio problem with a Pifco "All-in-One" Radiometer. Distortion, weakness, or even a complete fade-out—whatever the trouble, this marvellous instrument shows the cause in a few minutes. It is invaluable to every radio owner—novice or expert. Saves its first cost over and over again. No other instrument in the world like it.

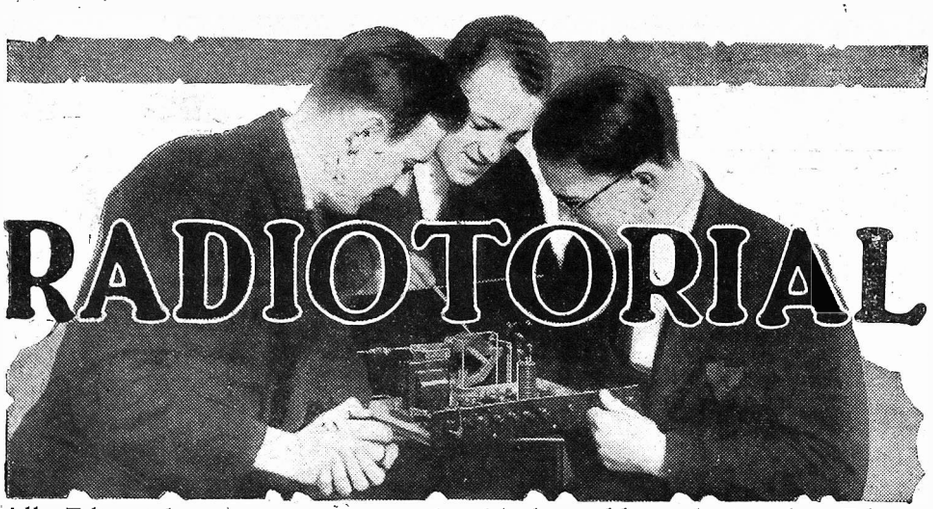
Standard Model for Battery Sets only,
12/6
De Luxe High Resistance Model for Electric Receivers and Mains Units,
£2-2-0



Ask to see the "All-in-One" Radiometer at your radio or electrical dealers. If any difficulty write direct to:
PIFCO Ltd., High Street, MANCHESTER.

PIFCO ALL IN ONE RADIOMETER

℗ S4



RADIOTORIAL

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 specialties 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.

QUESTIONS AND ANSWERS

SUPER CAPACITY NEEDED.

"LONGSIGHT" (Manchester).—"With the old set I always paid a little over ten bob for the H.T. Battery, and with one much-cussed exception it always lasted satisfactorily. (Never much less than three months, and often quite a bit more.)

"According to the milliammeter tests made at different times, 9 milliamps was the normal for that set, though it varied a little on either side of that figure according to the actual valves in.

"The new set takes 13½ or 14 milliamps. And the dealer says that is why my old standard type of batteries will not be suitable for the set, and why I should not attempt to run it from one of them.

"He wants to sell me one running up to the £1 mark (but only the same voltage!), and he says it will be the most economical way to go to work. Is that correct?

"I asked because he said, if I liked, I could write to you and he knew you would say he was right."

Yes, he is quite right. If the set is used under normal conditions an output of 14 milliamps or thereabouts is too much to expect from standard size batteries, and you need one of the super sizes.

A "COSMIC" DISAPPOINTMENT—AND THE CAUSE OF IT.

L. G. (Nr. Gillingham).—"Imagine my disappointment when I switched on the 'Cosmic' and heard nothing. Nothing at all.

"I turned the tuning and I turned the reaction, but not even a whistle rewarded me. It was sickening.

"Perhaps you can guess what was wrong, but I can tell you I had no means of knowing where to look for a fault, and I just kept turning the dials and looking back at the blue print, only to find everything appeared all right, though nothing in the way of a sound was forthcoming.

"But one thing I did notice. When I put the H.T. + 2 plug in the H.T. battery, I got a good click in the loudspeaker. But H.T.+1 could be moved to any voltage, and there was no click.

"In the end, I put the set away and went to bed, heavy hearted. But I mentioned this 'click' business of the one plug and not of the other to my friend when he came over the day after. And he said it looked as though the 100,000 resistance was a dud.

"He had a 50,000 spaghetti on him so we thought we would try this, but the results were no different. Finally, he said 'perhaps it is the H.F. choke' so we took that out and put the 50,000 in instead, and away she went! Glorious!

"Evidently there was a break inside the choke—it was all right as far as you could tell by looking—but what is puzzling me now is, whether I ought to get another choke, or leave it out and use the spaghetti instead. Is there any objection to this, as I certainly do not want anything better than the results I get now?"

No. There is no objection to the use of the resistance instead of the H.F. choke if reaction is O.K.

The idea of the choke instead of the resistance is, that with some detector valves and H.T. conditions it gives better reaction results. But in your case the spaghetti is perfectly O.K. apparently, so we should continue to use it.

WAS IT THE BATTERY?

The question above which was raised by a Watford reader in "P.W." No. 519 (dated May 14th) seems to have attracted such wide attention that the trouble experienced—unexpected running-down of a new H.T. battery in about three weeks—must be much more common than is generally supposed.

Most of the readers who wrote, mentioning the experience of "Worried" admit that in their own cases they found the cause to be one of those named; but some interesting exceptions occured in which the cause of the trouble was in no way connected with a run-down battery.

For instance, a North London reader—A. S. of Highbury—recounts an unusual experience in the following letter:

"I was in the same position as 'Worried,' (Watford) but I am using a 12 m.a. Eliminator, with 60 volts on the Det. (H. L. 2). I have tried a 20-henry choke and condenser, but only to find that it sets up distortion.

"I removed these and purchased a P.M.2.DX, but it still whistled. I tried all the hints that I have read in 'P.W.' but to no avail.

"At last I tied some thin rubber round the H.L.2 and the whistling stopped. I have since tried a very cheap det. valve, and that does not whistle, but it does not give such good results.

"With regard to the 'Cosmic Star,' I have nothing but praise. Up to the present I have received 30 stations including America, but the medium-wave stations are received in queer places on the dial, e.g. Midland Regional, dial 33; Tapping 2, or any other

(*Continued on page 454.*)

HOW ARE YOUR RESULTS NOW?

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 scales of charges, can be obtained direct from the Technical Query Dept., POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

A postcard 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.

DO YOU KNOW—

the Answers to the following Questions?

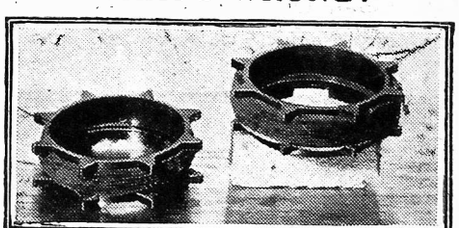
There is no "catch" in them; they are just interesting points that crop up in discussions on radio topics. If you like to try and answer them, you can compare your own solutions with those that appear on a following page of this number of "P.W."

(1) **How many broadcasting stations Paris has?**
(2) **What are the names of all the Paris stations?**
(3) **Who invented tuning?**
(4) **Who first noted that radio reception was usually at least twice as good by night as by day?**
(5) **What is a watt?**

* * *

ANSWERS to the above questions will be found on page 454.

WHAT'S WRONG?



COIL MOUNTING

One of the most important things to watch when mounting coils is that they are well spaced from other coils, and also from metal screens, etc.

* * *

In the illustration the Coil Quoit on the left would give very poor results, because it is lying on the metal baseboard. Lift the coil by an insulator, such as a wooden block (right), and the fault would disappear.

Have you tried *this* Shaving Cream

Fill in coupon below for 7 days free sample

You will always shave with the new, perfected softener for stubborn beards if you accept a week's supply of it **FREE**. Combining two different soaps into a smooth, beautiful, emollient and soothing cream, Parke-Davis Shaving Cream gives a new pleasure to shaving. Prove it with the sample tube we will gladly send you; afterwards you will buy the large 1/6 tube regularly from your Chemist.

PARKE-DAVIS
Shaving Cream

Made by the Makers of Euthymol Tooth Paste

POST THIS COUPON

BRITISH MADE

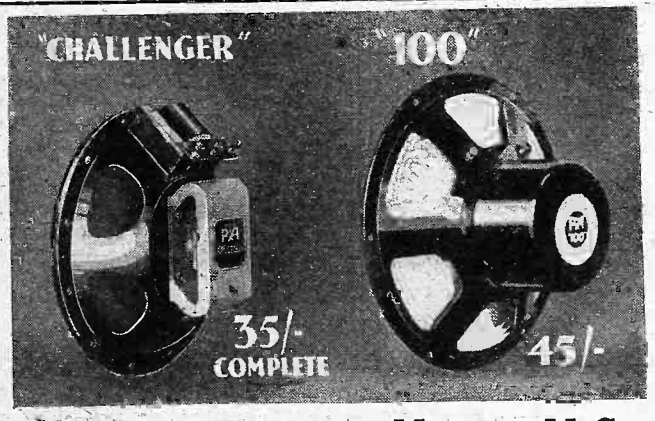
COUPON

EUTHYMOL (125F), 50 Beak St., London, W.1
Please send FREE sample tube Shaving Cream.

Name .....

Address .....

(Use block letters please)



R & A Permanent Magnet M.C. Reproducers are Unrivalled

Test them against all other makes irrespective of price. They have set a standard not equalled by the most expensive speaker.

R & A
BRITISH MADE
REPRODUCERS
are sold by all reputable Radio Dealers

REPRODUCERS & AMPLIFIERS LTD. FREDERICK ST. WOLVERHAMPTON

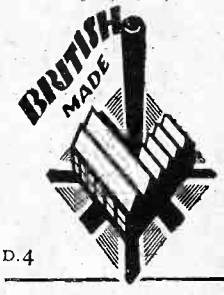
Proof!

of their AMAZING STRENGTH

These Dubilier Metallized Resistances are astoundingly sturdy. They have withstood a weight of 64 lbs. on a knife-edge across their circumference, and weights of 45 lbs. each have been suspended from their connecting leads.

Their performance in every way matches their phenomenal strength. Dubilier Metallized Resistances are made under a patent process and their range embraces a Resistance for every need.

Like all Dubilier products, these Metallized Resistances are as dependable as daylight. Whenever you need a Resistance . . . . be sure it is Dubilier.



PER WATT
1/-

D.4

1 watt 1/-, 2 watt 2/-, 3 watt 3/-.

DUBILIER
Metallised
RESISTANCES

DUBILIER CONDENSER CO. (1925) LTD.
Ducon Works, Victoria Road, North Acton, W.3

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page 452.*)

tapping. London Regional, dial 50; Tapping 2, or any other tapping. London National, dial 72; Tapping 2, or any other tapping.

"Yours faithfully,

"A. S."

This apparently-wrong position of the stations mentioned in the latter part of A.S.'s letter is due to the particular dial used—or rather to the scale which is marked in the reverse direction, and thus shows the longer wavelength stations such as Midland Regional on a lower dial reading than the shorter wavelength stations, like London National.

If this fact is borne in mind, there is no need for confusing readings, the only difference being that the normal "top" stations come in reversed, at the lower end of the dial; and of course, the "bottom-of-the-dial" stations such as Cork, Trieste, Belfast, Radio Normandie and London National are arranged at the top of the dial, instead of at the bottom, with the lowest wavelength corresponding to the highest dial reading.

Another unusual experience arising from run-down-battery symptoms is that reported by a Dorsetshire reader.

Writing from Puddletrenthide he says:

"Perhaps it would interest you to know I have experienced the same trouble as 'Worried' (Watford).

"In my own case I purchased a new H.T. battery and everything appeared O.K. for about two or three weeks, after which the same trouble occurred again. Having given up all hope, or nearly so, I decided to change over the leads to primary winding of the L.F. transformer.

"This completely cured the whistle, and the H.T. battery gives its normal life and the set has since logged over 50 stations.

"Thanking you for some very fine sets, my latest being the 'SQ Star.'

"As a regular reader since March, 1930, I wish 'P.W.' every success.

"I am, yours very truly,

"F. L. B."

The queer part of this case is that, provided only the primary terminals were changed over, as described, there could not possibly have been a removal of the current drain from the H.T. battery! But probably some other condition existed, and was not spotted by F. L. B., but was accidentally (and unnoticed by him) put right when he was making the alterations to the primary.

From the batch of letters received, we are tempted to quote yet another—from an Ipswich reader. But the circumstances and effects in this case are so completely topsy-turvy that we must finish our instances of interesting replies with the above examples.

MAINS UNIT CONNECTIONS.

R. A. S. (Birmingham).—"I have been asked to look over a D.C. mains unit of the type with one variable and one fixed H.T. voltage, the former being a slider on a 20,000-ohm potential divider.

"The unit was made up from a 'P.W.' circuit, and in addition to the H.T.— terminal there is a 2-mfd. condenser beside it. There is another 2-mfd condenser and a 4-mfd. condenser, and also a smoothing choke and 10,000-ohm resistance variable.

"Could you tell me how these are connected together, and to the plug for the mains?"

The usual connections for a simple unit of this type are as follows: Earth terminal to one side of the 2-mfd. condenser. The remaining side of this condenser goes to H.T.—, to one end of the potential divider, to the 4-mfd. condenser, to the other 2-mfd. condenser, and to the negative lead of the plug for mains. The positive lead of the mains plug goes to one side of the variable resistance, the other side of which goes to a 2-mfd. condenser and to a smoothing choke.

The other side of the smoothing choke goes to the remaining terminal on the 4-mfd. condenser, to the end of the potential divider and to the maximum H.T. terminal (H.T.+2). Finally, the slider on the potential divider is taken to the H.T.+1 terminal and this completes the connections.

CHOKE OR RESISTANCE?

"CHOKEY" (Leicester).—"Acting on your advice I successfully replaced an H.F. choke with a spaghetti resistance, and thus improved results from my detector valve, which for the past twelve months has been perfectly satisfactory.

"I am now making another set which incorporates an S.G. stage, and the owner of this is wondering whether he can do vice-versa, i.e. use an H.F. choke in place of the 600-ohms resistance which is recommended for the screen of the valve.

"The resistance is the only component to be wired in this lead apart from the bypass condenser, which is connected at the screen end of it, and we have been wondering whether his H.F. choke would act all right as the resistance.

"We do not want to put it in and try it out because space is rather scarce and there is a bit of screen to be cut away, etc. But if you think the H.F. choke will be just as good as the resistance, we could do this while the construction is still in the early stages.

"Would it work the same?"

H.F. chokes are not always interchangeable with resistances in this way, but apparently the purpose of the resistance in the case you mention is just to act as an H.F. choke, in which case a proper H.F. choke would quite likely be satisfactory in its place.

In many cases this would not be satisfactory because the resistance is arranged to drop the voltage simultaneously, and an H.F. choke in place of it would not have the same effect. But where, as in your case, a separate H.T. terminal allows the correct adjustment to be made it will probably be quite satisfactory to use an H.F. choke instead of a resistance.

"P.W." PANEL No. 76. ABOUT THE VALVE.—MUTUAL CONDUCTANCE

The mutual conductance of the valve is the factor relating anode current change (under working conditions) to grid voltage change. It is, in a sense, a measure of the valve's efficiency to do the work for which it was designed.

* * * * *

If the "impedance" and amplification factor of the valve are known, its mutual conductance can be found by dividing the impedance into the amplification factor multiplied by 1,000.

* * * * *

Thus a valve with $\mu = 180$ and Impedance = 100,000 has a mutual conductance of $\frac{180 \times 1000}{100{,}000} = 1{\cdot}8$.

THE ANSWERS

TO THE QUESTIONS ASKED ON PAGE 452 ARE GIVEN BELOW:

(1) Six.

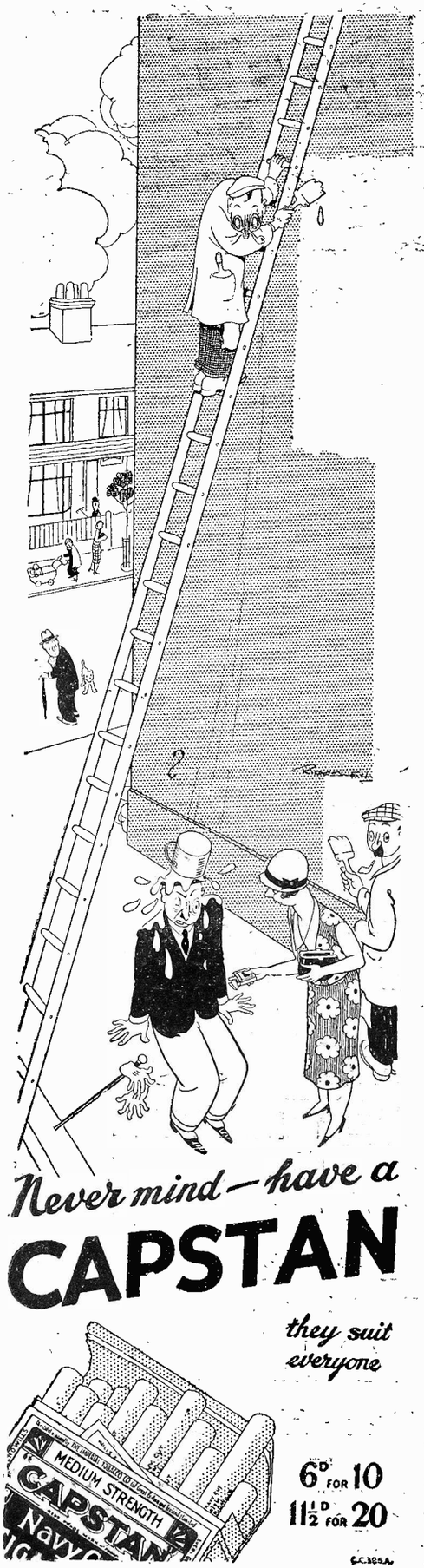
(2) Paris Ecole Supérieure, Eiffel Tower, Poste Parisien, Radio L L, Radio Paris and Radio Vitus.

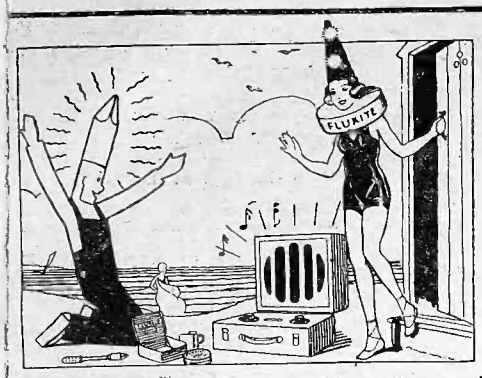
(3) Sir Oliver Lodge, F.R.S. (now "P.W.'s" Scientific Adviser).

(4) Marconi.

(5) The electrical unit of power. (It is the power represented by 1 ampere at 1 volt.)

DID YOU KNOW THEM ALL?





"We're Fluxite and Solder, the reliable pair,
Famous for Soldering—known everywhere!
See that we're with you—when out on that trip,
Avoid disappointment—have that musical 'dip'!"

See that Fluxite and Solder are always by you—in the house, garage, workshop—anywhere where simple, speedy soldering is needed. They cost so little, but will make scores of everyday articles last years longer! For Pots, Pans, Silver, and Brassware; RADIO; odd jobs in the garage—there's always something useful for Fluxite and Solder to do.

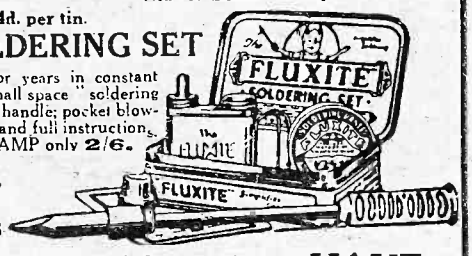
All Hardware and Ironmongery Stores sell Fluxite in tins, 8d., 1/4 and 2/8.

ANOTHER USE FOR FLUXITE
Hardening Tools and Case Hardening. Ask for Leaflet on improved method.

NEW "JUNIOR" SIZE, 4d. per tin.

FLUXITE SOLDERING SET

Simple to use and lasts for years in constant use. Contains special "small space" soldering iron with non-heating metal handle; pocket blow-lamp, Fluxite, Solder, etc., and full instructions. COMPLETE, **7/6**, or LAMP only **2/6**.



FLUXITE LTD.
(Dept. 324),
ROTHERHITHE, S.E.16

ALL MECHANICS *WILL* HAVE
FLUXITE
IT SIMPLIFIES *ALL* SOLDERING

TO MANUFACTURERS and CONSTRUCTORS!

Ostar Ganz UNIVERSAL HIGH VOLTAGE MAINS VALVES

One valve for both the A.C. and D.C. mains sets with heater voltage up to 250.
No mains transformers.
No breaking-down resistance.
See "P.W." and "W.M." reports.
Q.P., Det. and Power Valves, 17/6
Super Power Valves ... 18/-
Rectifying, 50 MA 14/6, 125 MA, 15/6

Full details and particulars from:—
EUGEN FORBAT,
(*Sole Representative for Gt. Britain*),
NIVALIGHT LTD.,
1, Rosebery Avenue, London, E.C.2

SENSATIONAL—REVOLUTIONAL!

UNIVERSAL ALL-MAINS KIT.

This Kit can be used for either A.C. or D.C. at will without any alteration with OSTAR GANZ UNIVERSAL HIGH VOLTAGE MAINS VALVES and all British Components.

Complete ready for assembling with 2 valves and rectifier **£6 : 0 : 0**

When ordering please state voltage only.

Full details and particulars from:—
EUGEN FORBAT,
NIVALIGHT LTD.,
1, Rosebery Avenue, London, E.C.2

Model Aeroplane Chat

IF you are interested in model aeroplanes and wish to keep right up to date in all aeroplane matters, you must write to The MODERN BOY about it. Full particulars of what you have to do are given in this week's fine issue. Make sure of your copy *Now*.

The MODERN BOY
Buy a copy TO-DAY. - **2d.**

We couldn't have put it better

Extract from the June issue of "Modern Wireless"

"A new condition is upon us. At one time the superiority of the moving-coil loudspeaker over all other types was freely acknowledged, but the price difference was great.

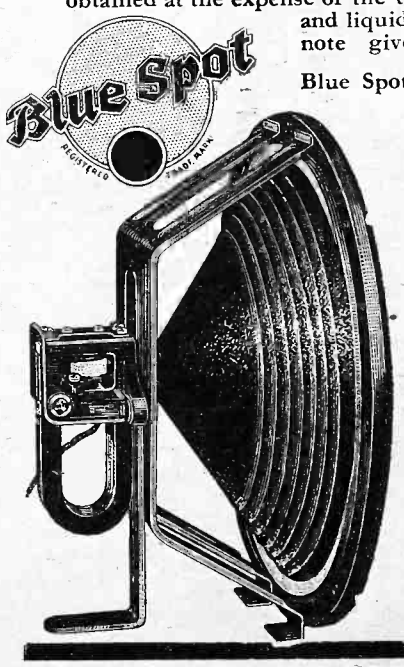
Nowadays, however, this price gulf is closing up—indeed, it can be said to have closed up so that the moving-coil faces the electro-magnetic principle on equal price terms.

A direct comparison can now be fairly made between the two. And when this is done, the moving-coil does not, in general, stand out as vastly superior as might have been expected.

For one thing, the other types have been greatly improved, and, for another in price-paring the moving-coil some makes have lost greatly in quality.

BLUE SPOT 100U gives a performance equal to a good Moving-coil speaker. Its remarkable sensitivity ensures *perfect reproduction for the full musical range* and the difficult bass notes especially are made as clear and full and rich as can be desired. This perfection in the lower register is not obtained at the expense of the treble which is clear and liquid in tone with every note given its true value.

Blue Spot 100U is sensitive even to very small inputs and is particularly suited for all battery sets. It can be used with normal or Pentode valves—no matching transformer being required.



100U

Price complete mounted to chassis

39/6

BRITISH MADE
Write for Catalogue No. P.W. 39U.

THE BRITISH BLUE SPOT COMPANY LTD
BLUE SPOT HOUSE · 94/96 ROSOMAN STREET · ROSEBERY AVENUE · LONDON · E.C.1

PILOT AUTHOR'S KITS

Exact to Specification

CASH—C.O.D.—H.P.— *Immediate Delivery.*

The DECADE

KIT "A" Author's Kit with Ready Drilled Panel less valves and cabinet

CASH or C.O.D. **£3-9-5**

or 12 monthly payments of 6/5

KIT "B" Author's Kit with valves less cabinet. CASH or C.O.D. £4-15-5 or 12 monthly payments of 8/9.

KIT "C" Author's Kit complete with valves and cabinet. CASH or C.O.D. £5/10/5 or 12 monthly payments of 10/1.

KIT-BITS *Selected C.O.D. Lines—Post Charges Paid on Orders value over 10/-.*

Set of Specified Valves	£1	6	0
Specified Peto-Scott Cabinet		15	0
Colvern Dual Range Coil, R.M.3		8	6
Lissen 0005 Variable Condenser with Formo Slow-motion Dial		9	0
Moderator Coil		2	6

COSMIC III KIT "A"

Author's Kit with Ready Drilled Panel less valves and cabinet

CASH or C.O.D. **70/-**

or 12 monthly payments of 6/5

Specified Valves, £1:6:0

Specified Cabinet, 17/6

COSMIC III STAR KIT "A"

Author's Kit with Ready Drilled Panel less valves and cabinet

CASH or C.O.D. **87/6**

or 12 monthly payments of 8/-

Specified Valves, £1:6:0

Specified Cabinet, 17/6

EASIWAY ITEMS

W.B. PERMANENT MAGNET MOVING-COIL SPEAKER P.M.3. Complete with 3-ratio input transformer. Cash Price £2/12/6. Balance in 11 monthly payments of 4/10. Send **4/10** Only

EPOCH "20 C" PERMANENT MAGNET MOVING-COIL SPEAKER. With 3-ratio input transformer. This speaker will handle up to 5 watts undistorted. Cash Price £1/15/0. Balance in 5 monthly payments of 6/6. Send **6/6** Only

EPOCH J.1 PERMANENT MAGNET MOVING-COIL SPEAKER with 3-ratio input transformer. Cash Price £2/5/0. Balance in 11 monthly payments of 4/2. Send **4/2** Only

R & A CHALLENGER PERMANENT MAGNET MOVING-COIL SPEAKER. With special Ferranti multi-ratio input transformer. Will operate from a 2-Valve set up to a power amplifier. Cash Price £1/15/0. Balance in 5 monthly payments of 6/6. Send **6/6** Only

R & A "100" PERMANENT MAGNET MOVING-COIL SPEAKER. Complete with multi-ratio input transformer. Cash Price £2/17/6. Balance in 11 monthly payments of 5/4. Send **5/4** Only

BLUE SPOT SPEAKER UNIT AND CHASSIS, TYPE 100U. Cash Price £1/19/6. Balance in 7 monthly payments of 5/5. Send **5/5** Only

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

PETO-SCOTT CO. LTD.

77, CITY ROAD, LONDON, E.C.1.

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.18/6/32.....

West-end Showroom: 62, *High Holborn, London, W.C.1.*

THE LISTENER'S NOTEBOOK

(*Continued from page* 434.)

so as to make himself *easily* heard? As it is, one has to listen rather hard to get everything.

* * *

And don't you think that Imito's imitations of the trilling birds are absolutely perfect? With the animals, on the other hand, he isn't nearly so clever.

And why does he include the cuckoo in his repertory? I should have thought this imitation too insignificant an accomplishment for a man of Imito's ability.

* * *

I should think Anne Thursfield has supplied amateur sopranos in quest of attractive numbers with songs till Doomsday.

What a prolific song-writer Schumann was, and how tuneful (and short) all his songs are! I think I like the Children's songs best.

* * *

Those of you who saw and enjoyed Conrad Veidt's acting of Metternich in that remarkable film, "Congress Dances," must have been mildly thrilled to hear him say, over the ether, how dependent he and all film stars were on the public.

It is, I suppose, something of a thrill to know that we do have so much to do with the ordering of such people's lives.

* * *

What fun the Effects Department must have had with Filson Young going West!

It was difficult at times to realise that Mr. Young's car was capable of doing the speed he claimed to be doing. To say the least of it, if I were in a car doing sixty, and it made the row his did, I should feel rather uneasy.

Outside Salisbury Cathedral, with the engine still running, it did, I confess, sound something like a car.

* * *

As regards the talk itself, although there is much to be said for the style of it, I can't say that I agree with the melodramatic form of delivery. Such a talk doesn't require that.

It *did* so suggest that the traveller was going to his doom (and the car seemed to confirm that impression, too!).

What have Okehampton and Launceston folk done to our Mr. Young to deserve the testimonial he gave them? I doubt whether they appreciated such advertisement.

* * *

It is easy to see why Miss Margaret Bondfield has made such a success of her life. It is not because opportunities just came her way, but rather that she went in search of them and, finding them, made the most of them.

* * *

It is extraordinary how certain people and things can always rub one up the wrong way.

"Squirrels' Cage" certainly got my goat. Its ultra-satirical dialogue irritated me to such an extent that I gave it up after persevering with it for half an hour. This satire, however, wasn't entirely devoid of merit, but perhaps it was that on this particular evening I wasn't in the mood for such.

THESE RADIO COMPONENTS

(*Continued from page* 431.)

In doing all this I was following in the footsteps of other and distinguished investigators and originators. Probably, R. E. H. Carpenter, the father of fine-quality technique, H. L. Kirke who did elaborate experiments for the B.B.C. on the same lines and proved the necessity for resistance-capacity technique and push-pull, and Mr. Denman who actually made practical use of his confirmation of those results and used Mr. Carpenter's circuits in the Science Museum Receiver. It has always seemed strange to me that the B.B.C. did not use Mr. Carpenter's circuits, but doubtless there *is* some explanation.

B.B.C. Practice

Thus, I cannot think that transformers are good in high-quality practice, and the curious thing is that their use is still to be questioned (and may still produce a noticeably worse result) even after the B.B.C. have considerably spoiled things by using—doubtless for some good reason—five or six of them in cascade before the result reaches us.

In all this I am speaking of *real* quality, quality very few people ever hear or dream it is possible to hear. In fact, so good is the kind of quality I talk about that some people saturated with the usual stuff say they do not like it—it doesn't sound like a loud-speaker any more! This kind of quality is affected by the non-linearity and the transient-distorting qualities of iron.

BATTERIES OR ALL MAINS?

The Editor, POPULAR WIRELESS.

Dear Sir,—I have read with great interest the article by Capt. P. P. Eckersley, M.I.E.E., in your issue of the 21st May on the subject of Dry Batteries.

The object of this letter is not in any way to enter into an argument with your distinguished contributor on a subject so controversial as the battery-driven set versus the all-mains set, but, being in the dry battery business myself, I do feel that Capt. Eckersley has not been quite fair to us, as I maintain that reception from a set driven by really good batteries is at least equal to the reception which can be obtained from any all-mains set or a set working through an H.T. eliminator.

Doubtless you will consider that these remarks are somewhat bigoted in view of my position, but the trouble which a battery manufacturer experiences is largely due to the absence of knowledge on the part of the battery user as to how this very important accessory should be used, and owing to its misuse, batteries have been branded as bad by a good many people.

In order to educate the public in the use of their dry battery, my company has recently issued a booklet in which we have tried to explain in very simple language the functions and uses of the high-tension side of their set.

A copy of this booklet is enclosed for your perusal, and I would like to take this opportunity of saying that if any of your readers who are battery users would be interested to receive a copy of this booklet free of all charge to themselves, I shall be only too happy to see that this is forwarded if they will be good enough to send a postcard direct to the Edison Swan Electric Co., Ltd., Dry Battery Dept., Ponders End, Middlesex.

Naturally, this booklet has not been issued without the hope that it will bring to this company a certain measure of business, but, on the other hand, if the distribution of this booklet will help towards the correct usage of this much-abused accessory as a whole, then I shall feel that its issue has been amply repaid.

I am, dear sir,
Yours faithfully,
For The Edison Swan Electric Co., Ltd.,
R. C. GOMINGE,
Manager, Dry Battery Department.

TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio reception.

By Dr. J. H. T. ROBERTS, F. Inst. P.

Amplification Without Valves.

A GOOD deal of success is being attained in regard to the amplification of the sound from gramophone records by means of a pick-up comprising a carbon microphone instead of the usual magnetic pick-up amplified by valves. The idea of a carbon microphone attached to the stylus of an ordinary gramophone soundbox is a very old one, and dates back long before the war. But in those days small microphones were not nearly so efficient as they are now and, although good amplification could be obtained quite easily, the quality was apt to be rather poor.

But in these days very efficient small microphones can readily be obtained, and the quality which you can get by this sort of arrangement is very much better.

A Microphone Dodge.

The scheme is simply to attach the microphone either to a special stylus bar or more simply to the centre of the soundbox diaphragm and, using a pair of very fine flexible leads, to place it in series with a battery of, say 4 or 6 volts, and in series also with the primary of a suitable step-up transformer. The amplified output is obtained from the secondary of the transformer and may be reproduced through a loudspeaker.

There are various elaborations of this scheme, but the above-mentioned is the basic arrangement. It has the obvious advantage that no valves or other apparatus are necessary, and if you do not want a particularly large amount of amplification you will find the arrangement very interesting to experiment with.

Radio in Cars.

This summer will also see a great increase in the use of radio sets out of doors. The popularity of wireless sets installed in cars has now increased so much in the United States that practically all the car manufacturers there are equipping cars with built-in aerials. It seems likely that the same kind of thing will happen in this country, and, indeed, several manufacturers are now prepared to install an aerial in the roof of a car and fit in the necessary receiving gear as alternative standard equipment.

Pentode Output.

A pentode valve is particularly designed to provide a large output from a relatively

(*Continued on next page.*)

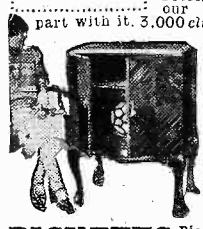
Advertisement of Belling & Lee, Limited, Queensway Works, Ponders End, Middlesex.

Famous Makers' Offer! **£5 Radio Gram CABINET for 65/-**

IMPROVES PERFORMANCE 50%

10/- monthly if desired

Polished Oak, Piano Tone Cabinet (42 in. high, 24 in. wide). ON APPROVAL at Makers' Prices!! You may return at our expense if you wish to part with it. 3,000 *clientele, B.B.C., Radio Press.* **All Models from 35/- to £15.**



PIANO TONE

Patent 8123. Users obtain 50% to 100% greater volume. The rich, mellow tone brings a fine thrill.

PHOTOGRAPHS AND LISTS FREE.

PICKETTS Piano Tone Cabinets (P.W.), Albion Rd., Bexleyheath, Kent

WET H.T. BATTERIES

Solve all H.T. Troubles.

SELF-CHARGING, SILENT, ECONOMICAL

JARS (waxed), 2½" × 1⅜" sq. 1/3 doz. ZINCS, new type 10d. doz. Sacs 1/2 doz. Sample doz. (18 volts), complete with bands and electrolyte, 4/1. post 9d. Sample unit, 6d. Illus. booklet free.

Bargain list free.

AMPLIFIERS, 30/-. 3-valve set, £5.

P. TAYLOR, 57, Studley Road, STOCKWELL, LONDON

REMEMBER!

"POPULAR WIRELESS" has the largest sale of any WEEKLY WIRELESS JOURNAL

EASY PAYMENTS

"There's no place like HOLMES."

The first firm to supply Wireless parts on easy payments. Seven years' advertiser in "Popular Wireless." Thousands of satisfied customers.

		Deposit	Monthly Payments
TELSEN VICTOR 3 KIT	39/6	5/5	7 of 5/5
COSSOR KIT	£6/8/6	10/-	11 of 11/11
OSRAM KIT	£10/15	19/6	17 of 19/8
METEOR 3 KIT	£3/15	6/10	11 of 6/10
EXIDE H.T. Accum., 120v.	£3	6/-	9 of 6/8
BLUE SPOT 66R & CHASSIS	£2/2/6	5/6	9 of 4/5
BLUE SPOT 100 U	39/6	5/8	7 of 5/4
AMPLION M.C.6	67/6	7/5	9 of 7/5
CELESTION M.C.	47/6	5/3	9 of 5/3
EKCO Eliminator A.C.18	67/-	7/5	9 of 7/5

New Goods Obtained for Every Order.

Send us a list of the parts you require and the payments that will suit your convenience, and we will send you a definite quotation. Anything Wireless.

H. W. HOLMES, 29, FOLEY STREET, Great Portland Street, London, W.1.

'Phone: Museum 1414.

ADVERTISERS PLEASE NOTE!

The Rate for a one-inch single Column Advertisement is **30/-**

Minimum Space Accepted:

Half-an-inch .. **15/-**

Send Remittance with instructions to

JOHN H. LILE, LTD.,

4, LUDGATE CIRCUS, LONDON, E.C.4.

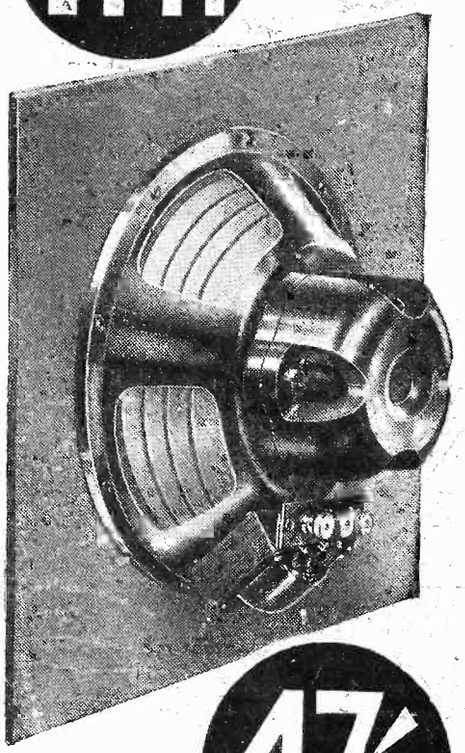
Telephone - City 7261.

Better than Wirewound All values from 300 ohms to 5 megohms. Accurate and Constant **1/6** each. Holder **6d.**

Made by GRAHAM FARISH Bromley Kent.

PPM

PERMANENT MAGNET MOVING COIL SPEAKER



Supplied fitted to baffle ready for mounting into cabinet. Price includes transformer - - -

47/6

Designed by experts

. . . experts who have been responsible for some of the most outstanding loudspeakers of recent years—manufactured by a firm who specialise in the production of speakers that give unrivalled reproduction. These two facts have made this speaker the most outstanding achievement of the year. The P.P.M. Speaker incorporates an impregnated diaphragm, and a patented twin suspension permitting large cone movements without distress. The new patented cobalt content steel magnet produces a very high flux density.

Easy payment terms: 10/- down and 6 monthly payments of 8/-. Unless otherwise specified, standard transformer supplied.

CELESTION

The Very Soul of Music

CELESTION LTD., LONDON RD., KINGSTON-ON-THAMES.
London Showroom: 106, *Victoria St., S.W.*1.

TECHNICAL NOTES

(*Continued from previous page.*)

small input. Quite a small pentode will give as much as 400 milliwatts when fully loaded using, say, 150 volts high tension and a grid-bias voltage of about 7½ volts negative. It is true that the same output can be obtained from an ordinary power valve; but for that purpose not only must 150 volts high tension be used, but also a negative grid bias of 24 volts, or even more is necessary.

Overloading Troubles.

Whilst a pentode can be used in any part of a low-frequency circuit, nevertheless care must be taken that it is not preceded by too much L.F. amplification, otherwise the input into the pentode will be too large and the valve will be seriously overloaded. This is what often happens when pentodes are used, particularly by amateurs, who tend to kill the goose that lays the golden eggs, as it were.

Knowing that the pentode gives a relatively large amplification, they seek to overdo this by putting in a larger input and expecting a correspondingly larger output. As I have said before, the benefit of the large amplification of the pentode can only be obtained when the whole power dealt with is kept within the proper limits. The way to look at the matter is not so much that the pentode gives a very great amplification, but rather that for a reasonable output it requires only a very much *smaller input* than ordinary valves. This overloading of pentode valves produces large voltages between the electrodes, and is a frequent cause of the breakdown of these valves.

Pentode Voltages.

With small pentodes the anode voltage may generally be about 150 and the auxiliary grid voltage about 120. If you are using batteries it is a simple matter to adjust these voltages fairly accurately, but with a mains unit quite a good deal of care must be taken.

Not only is the voltage from any tapping on the mains unit liable to be very different from the rated value, but it will jump about according to the load which is placed on the unit, and any alteration of the load on different parts will necessitate a check-up of the voltage delivered by any tapping. This is specially important with pentodes and screen-grid valves, both of which depend so very much for their efficient working upon correct voltages being applied to the different electrodes.

Filter-Feed.

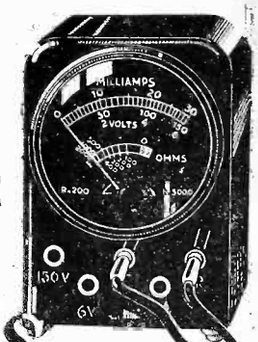
With a pentode it is generally desirable to feed the auxiliary grid by means of a filter circuit consisting of a resistance and condenser, the grid being connected to the mid-point of the two.

Where the voltage of the grid is to be kept below a certain definite value any extra voltage from the high-tension supply can very conveniently be "dropped" in this resistance. A flexible wire-wound resistance forms a convenient unit for this purpose, by the way.

With an ordinary valve one is accustomed to assume that little or no current passes in the grid—which, of course, is the control

(*Continued on next page.*)

Every Friday! TEST YOUR SET



WATES BRITISH METERS

WATES UNIVERSAL METER will tell the condition of batteries and locate any and every fault. No skill required to test voltages, milliamp consumption, valves, transformers, coils, condensers, short circuits, resistance values, distortion, connections. Four readings on one dial: (1) 0-150 volts for H.T.; (2) 0-6 volts for L.T.; (3) 0-30 milliamps for current consumption; (4) Resistance test 0-2,000 ohms. Of all [dealers] or direct, including special 4-page instruction leaflet - **12/6**

WATES 3-in-1 POCKET METER L.T. (0-6 v.). H.T. (0-150 v.) and 0-30 m.a. **8/6**

Two-range Volt Meter, 0-6 v.; 0-120 v. **6/-**

Of all Radio dealers or direct from us. Explanatory leaflets post free.

STANDARD BATTERY CO., 184-8, Shaftesbury Ave., W.C.2

GENUINE BARGAIN. Full-size, up-to-date British-made Fountain Pens, beautifully engraved with 14-ct. Iridium-tipped nibs, lever self-filling device, and safety cap, at 3/- each; usual price 6/6. ½-doz. lots at 16/-. Sent on approval; cash or C.O.D. Cannot be repeated.—Brookman Rapid Radio Service, 77, Hockley Street, Birmingham.

"ENGINEERING OPPORTUNITIES." This is a book you must not miss. It contains brilliant articles by Prof. A. M. LOW, our Employment Supdt., etc., shows how to pass A.M.I.Mech.E., A.M.I.C.E., A.M.I.A.E., I.E.E., M.I.M.T., Matric., G.P.O., and all other Exams, and outlines over 100 Home-Study Courses in all branches of Engineering. Send for your copy to-day. FREE and without obligation. We alone guarantee—"NO PASS — NO FEE." BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY, 401, Shakespeare House, 29, Oxford Street, London, W.1.

EASY TERMS

WE supply all good quality Radio Receivers, Components and Accessories on deferred terms. We carry adequate stocks and can give PROMPT DELIVERY.

12 EXIDE W.H. HIGH-TENSION ACCUMULATORS (120 volts, 5,000 m/a). Large capacity type. Cash Price £3 15 0

Or 5/- with order and 10 monthly payments of 7/10. Carriage charged on all orders from Scotland. This is the best and cheapest form of High-Tension supply where the Electric Light Mains are not available.

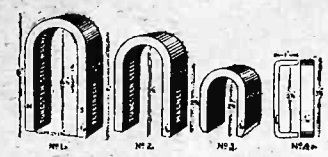
Send list of requirements, and quotations will be sent by return. Price list FREE on request

LONDON RADIO SUPPLY CO. (ESTABLISHED 1925), 11, OAT LANE, NOBLE STREET, LONDON, E.C.2

TELEPHONE: National 1977.

WE invite readers to support our Advertisers—care being taken to accept only announcements of reputable firms!

COBALT STEEL MAGNETS



PERMANENT POWERFUL MAGNETS
1 lb. weight, No. 1, **2/-**; No. 2, **1/6**; No. 3, **1/3**; No. 4, **1/-** each.

PHOTO CELLS

Famous UX867. The heart of R.C.A. talkies. A £7 unit for **25/-**. Sensitive light-to-sound production and a thousand interesting experiments with your radio set. B.T.P.-King Cells, **15/-**.

FULTOGRAPHS
Complete brand-new kits of these radio picture recorders in maker's carton with amplifier, **32/6**. In oak cabinets ready for use, **45/-**.

Bargain Parcels of dismantled sets, etc., useful experimental oddments, etc., all post free. 10 lb., **7/-**; 7 lb., **5/-**. Jewelled first-grade meter movements with magnet, **5/-** each.

For 1,000 other bargains send addressed envelope for our June Sale List.

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

WEEDON POWER LINK RADIO CO.
New service to their many clients. Transformers, Loud Speakers, Pick-ups, any make, or item, repaired as new, **3/6**. Articles returned to you C.O.D. Post. Eliminator repairs quoted for. Supervised by specialists. Note new address:
185, Earlham Grove, Forest Gate, London, E.7.

THE PICTURE PAPER WITH THE *MOST* NEWS
SUNDAY GRAPHIC
and Sunday News

Another FORTUNE Waiting!

£12 A WEEK FOR LIFE

or £3,500 CASH

MUST BE WON

in a sensational new Picture Contest in to-day's ANSWERS, which also contains more amazing chapters from the life-story of EX-DETECTIVE-INSPECTOR GROSSE, first leader of the Flying Squad, and for 25 years one of the most dreaded crook-catchers in London. This week Mr. Grosse reveals the inside stories of more of his astonishing cases—here is the greatest "yard" series of the year.

ANSWERS

Buy Your Copy TO-DAY - **2d.**

TECHNICAL NOTES

(Continued from previous page.)

grid—but with a pentode, remember that the auxiliary grid may carry quite an appreciable current, as much as three or four milliamperes.

Importance of Auxiliary Grid Voltage.

The output from a pentode depends very much upon the voltage applied to the auxiliary grid, which consequently should be as high as possible if we wish to get the maximum output. As the voltage on this grid is reduced the anode current falls accordingly, and therefore also the power which the valve gives.

A curious and important feature of a pentode valve is that the load does not greatly affect the current flowing in the anode circuit as a result of the signal applied to the grid. This is owing to the relatively high impedance of the valve. From this it follows that the higher audio-frequencies are apt to be stronger in the anode circuit with a pentode valve than when an ordinary three-electrode valve is used.

H.F. Stoppers.

Fixed resistances are often introduced into the grid-leads of L.F. valves in order to prevent or minimise trouble owing to H.F. currents getting into the L.F. circuits, and so on to the loudspeaker. The effect of the resistance is to bring down the voltage of the H.F. currents applied across the grid-and-filament path of the valve. You will notice that we have here a capacity; that is, the working capacity of the valve across grid-filament, and in series with this is the resistance just mentioned.

The question of how much voltage is developed across the ends of the resistance depends upon how the impedance of the resistance compares with the impedance due to the capacity. Obviously, if the impedance due to the resistance is large compared with the rest, most of the voltage will be set up across the resistance.

Weakening The Upper Frequencies.

The low-frequency voltages in the circuit, however, must reach the grid through the resistance and, therefore, if this resistance is made too high, there will be a weakening of the upper audio-frequencies. The same thing will happen if the capacity is too large.

Although for other reasons it may be useful to increase the value of the resistance it is, for the above-mentioned reason, necessary not to increase it unduly, and the value of the resistance should only be large enough to achieve the desired object.

Generally you will find that for a single stage a resistance of perhaps 100,000 ohms will be necessary, but for two or more stages 50,000 ohms is generally quite sufficient.

That Response Curve.

It is very difficult to know with any sort of certainty just how uniformly our receiving sets respond to different frequencies throughout the entire audio range. We talk glibly about uniform response curves, but I wonder how many of us have ever made any really careful tests on this important point. And, in any case, however much we might wish to check over the response of the set, what really reliable means have we at hand for making the test?

(Continued on next page.)

PILOT BAND-PASS UNIT

INSTANTLY CONVERTS ANY SET TO BAND-PASS TUNING

Popular Wireless says **"We have no hesitation in recommending the "Pilot" Band-Pass Unit as an ideal selectivity adaptor for all those who experience station-separation difficulties, and we regard the price of twenty-five shillings, which includes operating instructions, as very reasonable for what it will do. The unit is very neat in appearance, and the finish is of the high order that one would associate with the name of Peto-Scott."** ***P.W., June 11th, 1932, p. 408).***

25/-

Obtainable from all branches of Messrs. Curry's Ltd., and all Radio Dealers. In cases of difficulty sent direct.

YOU, TOO, CAN BUILD SELECTIVE FAMILY 3

An amazing 60 Station Set described by "Maxamp" in "Tit-Bits," May 7th, 1932.

EASILY BUILT IN ONE EVENING

PILOT ENVELOPE

Full-size Blue Print, 5 photograms, List of Parts with newly invented, Simplified System of Home Construction and easy to follow operating notes. Get your copy of the PILOT RADIO ENVELOPE TO-DAY and build this wonderfully simple family Receiver.

Obtainable from Bookstalls and shops of Messrs. W. H. Smith & Son, Newsagents and Radio Dealers.

1/-

PETO-SCOTT CO. LTD.
77, CITY ROAD, LONDON, E.C.1.

Dear Sirs, Please send me:

1 PILOT BAND-PASS UNIT 25/-
1 PILOT SELECTIVE FAMILY 3 ENVELOPE 1/-

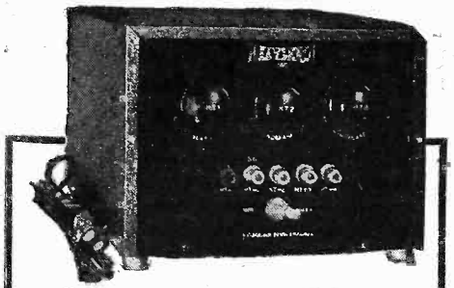
for which I enclose £.....s.....d. **CASH**

NAME.....

ADDRESS.....

P.W. 18/6/32.....

West-End Showroom, 62, High Holborn, London, W.C.1.



60 m.a. at 250 v.

The most powerful Heayberd Mains Unit—Model D.250. Heayberd Mains Transformer, Double-core Choke, Block-Condenser and Westinghouse Rectifier ensure a perfect hum-free power supply for any Receiver. Complete in neat metal case—ready to switch on.

OUTPUT: 60 m.a. at 200 or 250 volts. TAPPINGS: 60/80 v. Var. S.G., 0/150 v. Var., 100/200 v. Var., and 250 v. fixed.

Price - - - 170/-

--------POST THIS NOW--------

I enclose 3d. stamps for complete Lists of Mains Units, showing me how to run my receiver from the Mains.

M.....

Address.....

..... P.W.

HEAYBERD

MONARCH OF THE MAINS.

10, FINSBURY STREET, LONDON, E.C.2

(One minute from Moorgate Underground Station).

LOUD SPEAKERS REPAIRED, 4/-

(Blue Spot a Speciality, 5/-)

Transformers **4/-**, Headphones **4/-**, all repairs magnetised free. Eliminator Repairs quoted for. 24 Hours Service.

Discount for Trade. *Clerkenwell* 9069

E. MASON, 44, EAST ROAD, N.1.

FREE A Luxury Wireless Set

or components of equivalent value

Wonderful offer to introduce the **Radialaddin Club.** Write, enclosing 1½d. stamp for particulars.

Radialaddin Club (Dept. P.W.), 47/48 Berners Street, London, W.1. Museum 1821.

EXACT TUNERS

250 to 2,000 metres.

Thousands of these tuners are in use, and we can strongly recommend them. No further coils are required. Send P.C. for particulars and circuits—FREE.

THE EXACT MANUFACTURING CO.,

Croft Works, Priory Street, Coventry.

MAKE A RADIOGRAM OR GRAMOPHONE

at quarter price. Order loose kits or sets and assemble them at home, making your own cabinets or box. Get for 3d. our new 64-page catalogue, No. 222/1932, with scale drawings and instructions how to make them. We sell motors from 7/6; Tonearms, soundboxes, 1/6; Pick-ups, Horns, Loud Speakers, Radio Kits, complete Receiving Sets, Gramophones, Radiograms. Established 1903.

THE REGENT FITTINGS CO. (P.W.), 120, Old St., London, E.C.1.

Make

The DAILY SKETCH

YOUR Picture Paper

TECHNICAL NOTES

(Continued from previous page.)

Broadcast, so far as we are concerned, can only be interpreted in terms of the response which our receivers give us, and it is no use blaming the broadcast transmissions for any defects unless we are certain that the defects do not arise in the course of reception and reproduction. In other words, it is hardly fair to blame the transmission for what may very probably be faults of the receiver by which these transmissions are reproduced.

A Useful Check.

It has often been suggested that pure notes covering the whole of the audio range from, say, 50 cycles up to 10,000 cycles, should be broadcast from time to time by the B.B.C. so as to give listeners a really scientific means of checking up on their receivers. Something of this kind has often been done by broadcasting musical notes covering the most important part of the audio range.

This is very useful so far as it goes, but it does not cover the extreme frequencies, particularly the higher ones, which play an important part in the quality of the reproduction, nor is the apparent loudness of the transmitted musical tones kept strictly to a level. Furthermore, the musical tones transmitted for this rough-and-ready test are by no means pure tones. Tests of this kind are sufficient to tell you if there are any pronounced resonance points in your receiver or loudspeaker, but beyond that—which you probably know, anyway—it is doubtful whether they are of very great value.

NEXT WEEK

HINTS FOR "DECADE" BUILDERS

Some Useful Records.

Gramophone records have been made, giving a series of relatively pure tones ranging in frequency from about 30 cycles to as many, I think, as 7,000 cycles per second, and these are very useful for testing a receiver. But there, again, you can only make the test yourself by means of an electrical pick-up.

The scheme has shortcomings in that, in the first place, the record has to be interpreted through the pick-up, which itself introduces faults, and secondly, however uniform the apparent volume may have been in the recording, there is no guarantee that it will be similarly reproduced from the record.

Frequency and Quality.

It seems to me that the transmission by broadcasting stations of pure tones of uniform loudness over the whole of the range from perhaps 50 cycles to 15,000 cycles, will form a much better means than any other for estimating the "factor of merit," as it were, of a receiving set. By tones of uniform loudness, which is perhaps rather a vague phrase in itself, I mean obviously tones which the "perfect" receiver would reproduce in the form of musical notes which would sound to the ear of the same loudness irrespective of the pitch.

Owing to the limitations of most ordinary loudspeakers, we are apt to fall into the habit of assuming that the audio frequencies above about 4,000 cycles are not worth talking about, but in point of fact it has been very definitely shown that frequencies up to at least 10,000 play an important part in determining the quality of the reproduced sound. In the best types of talking-picture reproducing apparatus the makers strive very hard to preserve these higher frequencies.

What is Wrong with Home Recording?

I do not seem to hear very much about home-recording these days. Perhaps this is due to the approach of the summer season. Of course, home recording makes its appeal most particularly in the winter months, when listeners are more likely to be indoors.

At the same time, I have often wondered whether the types of home recorder which we have so far had, have made the appeal which was expected. I think many people have found that they are not quite so simple to operate as they seemed, or perhaps I should say that good results are not so easy to obtain.

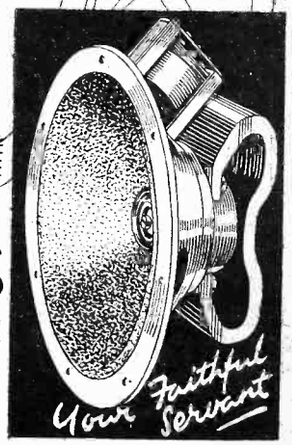
In one sense, that makes the thing all the more interesting to the experimenter, but on the other hand, there are many people who are not quite so bent on experimenting and who prefer something which gives good results without very much trouble or practice.

OUTSTANDING FOR QUALITY ALONE

However good your receiver, its final performance rests upon the quality of your speaker. Goodmans "Dreadnought" Permanent Magnet Moving Coil Reproducer will render absolutely faithful service—fidelity to the highest and the lowest note. A retainer worthy of a far greater price and a fit servant for the most aristocratic receiver.

GOODMANS

"DREADNOUGHT" PERMANENT MAGNET MOVING COIL REPRODUCER



YET ITS PRICE IS STILL MORE REMARKABLE

39/6

INCLUDING MULTI RATIO OUTPUT TRANSFORMER

From your Dealer, or direct from P.M. Dept., GOODMANS, 69, St. John St., LONDON, E.C.1

The WIRELESS CONSTRUCTOR

Another fine selection of articles by

JOHN SCOTT-TAGGART, F.Inst.P., A.M.I.E.E.

IN THE JULY NUMBER. **NOW ON SALE 6d.**

The MYSTERY of the METAL RECTIFIER

Some "inside" information of these useful components.

FROM MY ARMCHAIR

One of the most popular "S.T." features ever published.

HINTS FOR "S.T.300" USERS

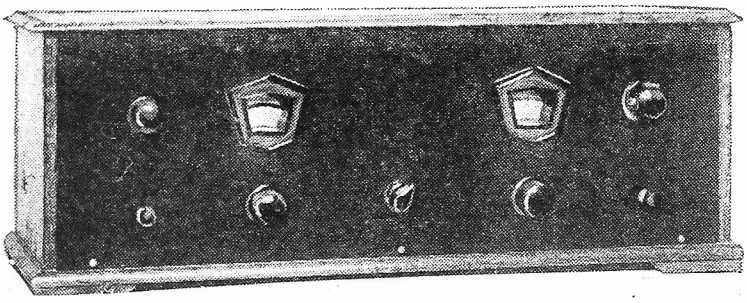
Everyone interested in this set should read these tips.

ALSO FULL DETAILS FOR BUILDING

The "FLEXIDYNE" — AN ORIGINAL AND POWERFUL BAND-PASS DESIGN

By VICTOR KING

In this fine four-valver, Victor King has excelled himself! For the "Flexidyne" has a "Range" switch on the panel — and when you push it in, you have a one-knob tuning set for family use; pull out the switch and you have a highly-selective long-distance four!



You simply must read about this remarkable set and examine the clear diagrams that make its construction so extremely fascinating and simple.

Among the other contents of this remarkable sixpennyworth are:—

The Editor's Chat
"On the Grid"
The Month on Short Waves
The "Localisor"
All Britain Endorses Progressive Design Work
Pick-up Hints and Tips
B.B.C. News
This "Portable" Problem
A Practical Man's Corner
The Valve Made Readable
Queer Queries
As We Find Them
Round the Dials
With Pick-up and Speaker
Our News Bulletin
Where to see "S.T.300's" and "Cosmics"

YOU CANNOT AFFORD TO MISS THE JULY

WIRELESS CONSTRUCTOR

NOW ON SALE, PRICE 6d.

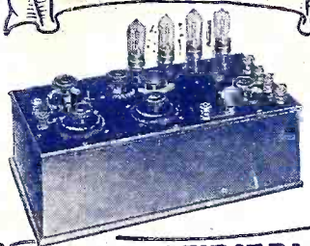
10 YEARS ACHIEVEMENT

SETS IN RADIO TRANSFORMERS

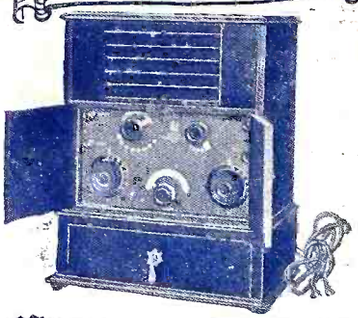
1922 - 1932

Veterans of radio cannot fail to review, with a renewed enthusiasm, the calvalcade of radio which we have briefly expressed in this page, showing these R.I. components and sets which, in a series of remarkable advances since 1922, have brought set building and reception to the high pitch of efficiency to which the modern experimenter and listener is accustomed to-day.

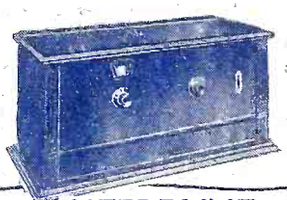
R.I. Research and fertility in production continues. It sets the standard of perfection by which the public now judge radio. R.I. create nothing but the best and most reliable—you cannot play with electricity—and as Radio Electrical Engineers of 30 years standing with 10 years specialised experience of what is best for public and experimenting use, R.I. still stand first as Britain's manufacturers of finest Radio products.



1922 THE FIRST R.I. POPULAR 4 VALVE RECEIVER

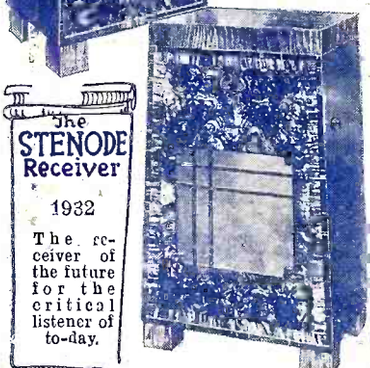


1923 The "LYRIAN"
The first combined receiver and loudspeaker.



The INTERDYNE RECEIVER 1927

The MADRIGAL
1931 The first all electric transportable receiver to operate without aerial, frame aerial or earth.



The STENODE Receiver
1932
The receiver of the future for the critical listener of to-day.

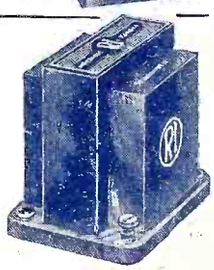
TUNERS CHOKES

The R.I. PERMANENT Mineral Detector.
Produced in 1926, the most amazingly successful component in early radio.

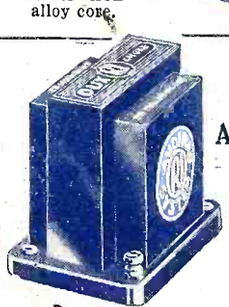
The R.I. DUAL ASTATIC CHOKE
1929
The H.F. choke that ensures absolute uniformity of choking over the whole band of broadcasting wave lengths.

The R.I. RETROACTIVE TUNER
1925
The first tuner with an efficient variable reaction. An outstanding development of early radio.

The R.I. HYPER-CORE CHOKE
1930
The first commercial choke employing nickel iron alloy core.



The R.I. "ANTINODAL" SHORT WAVE COIL
1932
The only short wave coil giving even reception and smooth reaction control throughout the short wave band.



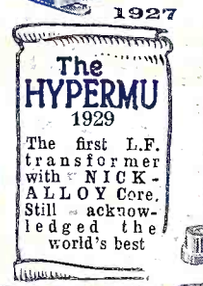
The DUX AUDIRAD
1932
A revolution in radio practice—a combined H.F. and L.F. Choke.

1922

FAMOUS R.I. INTERVALVE Transformer
The L.F. transformer that made transatlantic possible for the early experimenter.

The First MULTI RATIO Transformer
The transformer that met a real need among experimenters requiring to obtain best results with a selection of different valves.

1926



1927

The First STRAIGHT LINE Transformer
Besides other advantages gave a greater step-up in amplification than had hitherto been available.

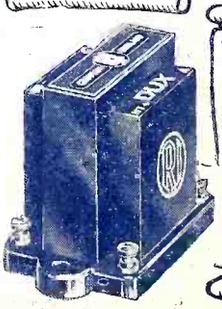
The HYPERMU
1929
The first L.F. transformer with NICK-ALLOY Core. Still acknowledged the world's best

1928

The PENTAMU
The first transformer designed to secure the fullest advantages from the pentode valve.

The PARAFEED
The world's smallest and greatest amplification unit for parallel feed coupling.

1931



The 'DUX'
1931
Designed to give the constructor the best possible results for the lowest cost. "The transformer for the million."

Your Copy of the Latest R.I. Catalogue Awaits You—

Ask Your Radio Dealer or Us to Give You a Copy!

1922 1932

The Advertisment of Radio Instruments Ltd., Croydon, England. 'Phone: Thornton Heath 3211.

Printed and published every Thursday by the Proprietors, The Amalgamated Press, Ltd., The Fleetway House, Farringdon Street, London, E.C.4. Advertisement Offices: Messrs. John H. Lile, Ltd., Ludgate Circus, London, E.C.4 (Telephone: City 7261). Registered as a newspaper for transmission by Canadian Magazine Post. Subscription Rates: Inland and Canada, 17/4 per annum; 8/8 for six months. Abroad (except Canada), 19/6 per annum; 9/9 for six months. Sole Agents for Australia and New Zealand: Messrs. Gordon & Gotch, Ltd.; and for South Africa: Central News Agency, Ltd. Saturday, June 18th, 1932. S.S.

POPULAR WIRELESS, June 25th, 1932.

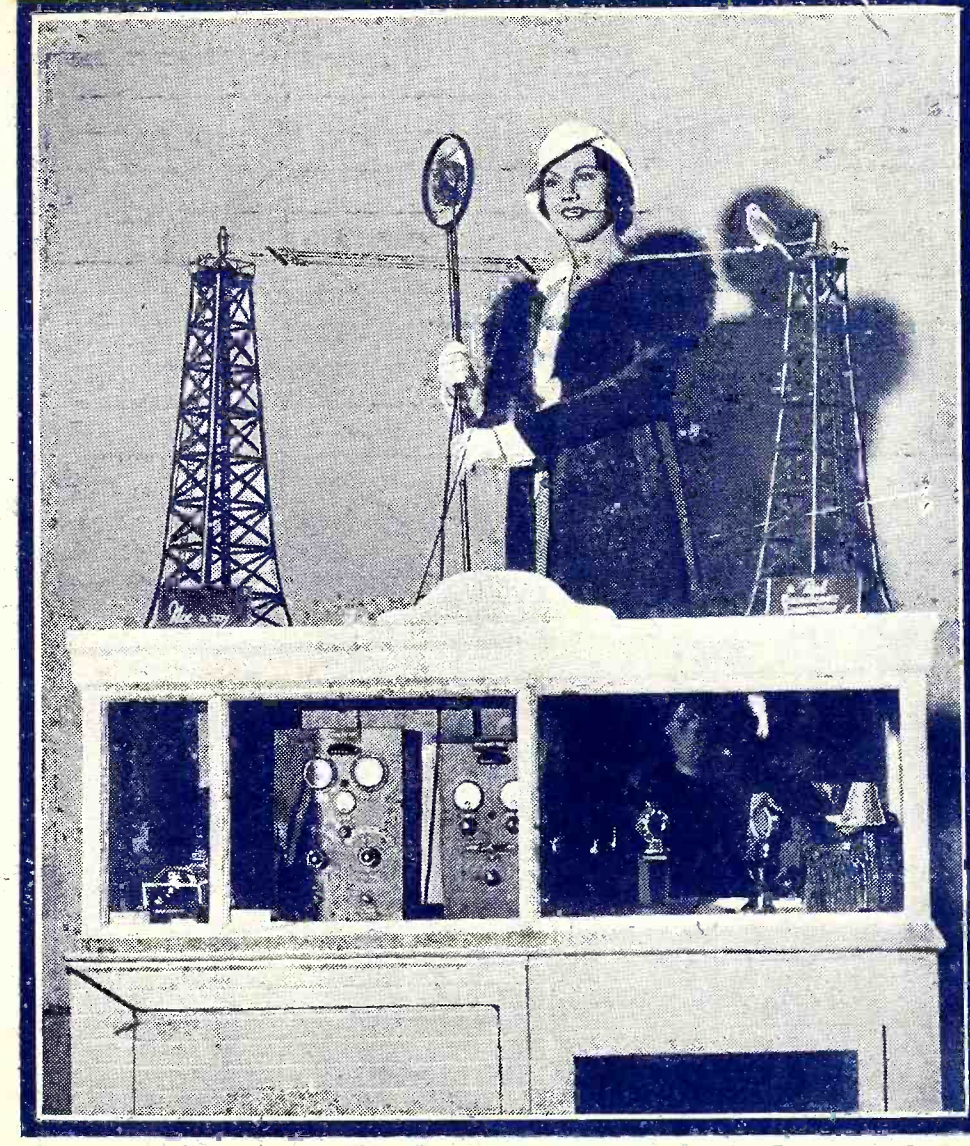
REGISTERED AT THE G.P.O. AS A NEWSPAPER.

CAPT. ECKERSLEY ON CONTROLLING VOLUME (See Page 475)

Popular Wireless

Every Thursday
PRICE
3d.

No. 525. Vol. XXI. INCORPORATING "WIRELESS" June 25th, 1932.



THIS WEEK:

SCOTLAND CALLING
A visit to the New Falkirk Broadcaster.

TELEVISION TO-DAY

WIRELESS IN WARTIME

THOSE SPORTING BROADCASTS

HINTS FOR "DECADE" BUILDERS

TRIESTE'S TRANSMITTER
Some details of one of Italy's powerful Regionals.

THE WEE STATION. Our cover photograph this week shows the world's tiniest complete broadcasting station, which has the appropriate call-letters W E E. Its diminutive panels, studios, etc., are all working models, and the station's power is 40 milliwatts!

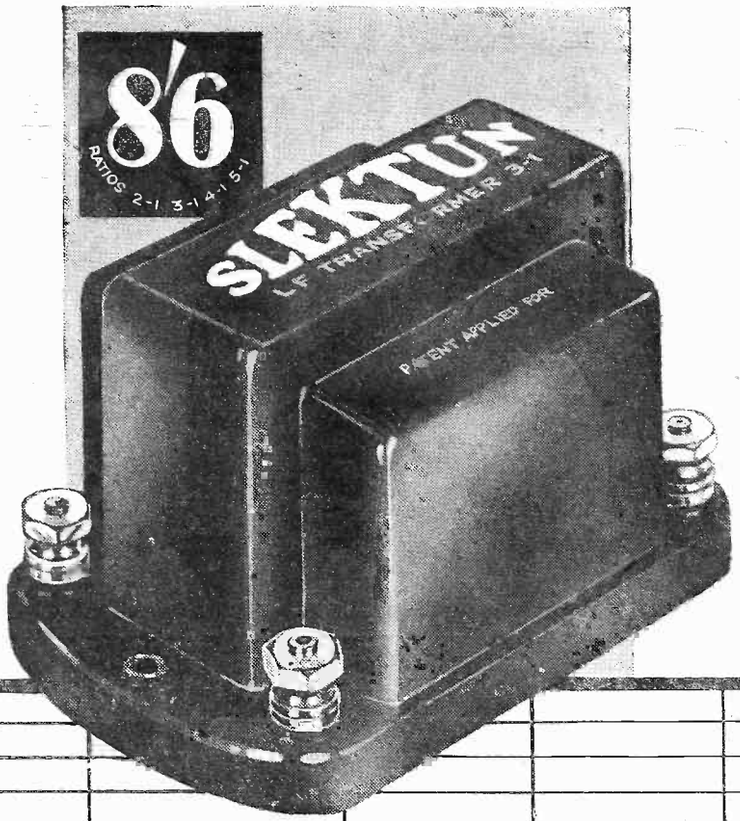
The World's Greatest Suppliers!

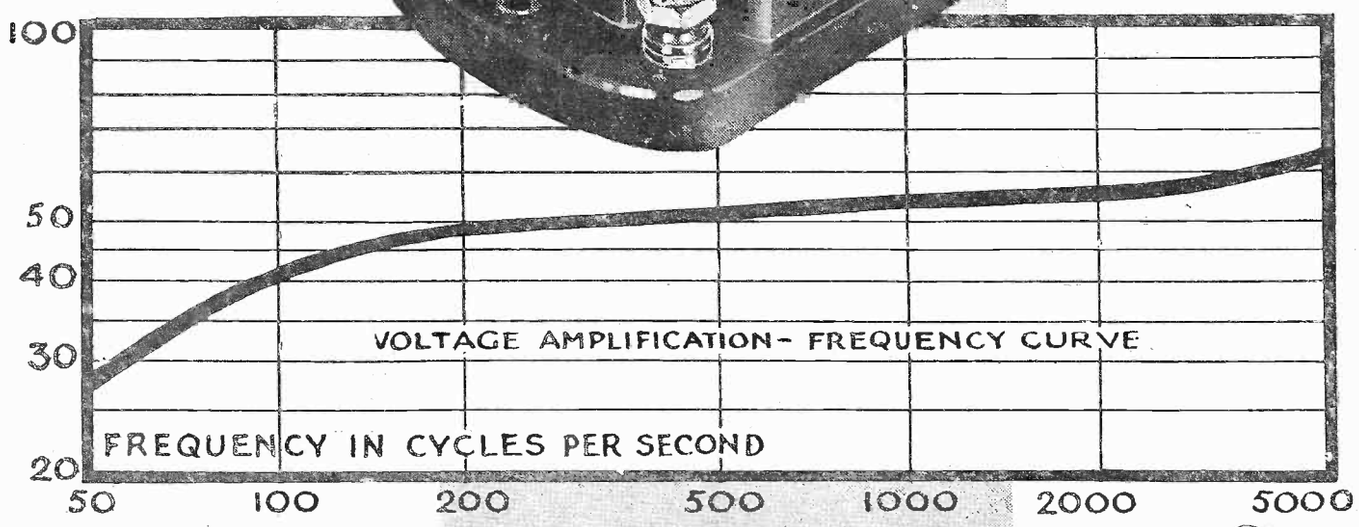
KITS! COMPONENTS!

Eastnor House, Blackheath, S.E.3.
'Phone: Lee Green 5678.
Showrooms: - - 159, Borough High St., S.E.1.

READY RADIO

Advt.





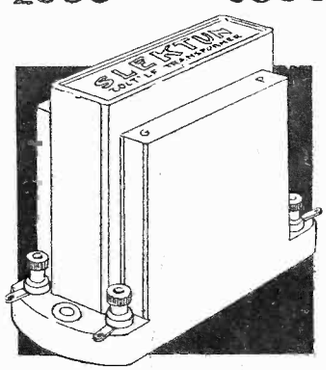
Change over to "Slektun," the new and amazing transformer with a primary inductance 50% greater than other transformers at double the price.

Performance and dependability guaranteed for three years.

SLEKTUN PRODUCTS LTD.
21 Douglas Street, Vauxhall Bridge Road, S.W.1
Lancashire and Cheshire Distributors:
John Moores & Co., Ravald St., Salford, Lancs.

4/9
RATIOS 2-1 3-1 4-1 5-1

The SLEKTUN Colt is both robust and compact. Ratios 2-1, 3-1, 4-1 and 5-1.



SLEKTUN

L.F. Transformers

Obtainable from all good Radio dealers.

Popular Wireless

LARGEST NET SALES

Scientific Adviser:
Sir OLIVER LODGE, F.R.S.
Chief Radio Consultant:
CAPT. P. P. ECKERSLEY, M.I.E.E.
Editor: NORMAN EDWARDS.
Technical Editor: G. V. DOWDING, Associate I.E.E.
Assistant Technical Editors:
K. D. ROGERS, P. R. BIRD,
A. JOHNSON RANDALL.

A BOUQUET NOT FORGOTTEN
TROUBLE IN ITALY
A PLEA FOR HENRY

RADIO NOTES & NEWS

HEN-DECEIVERS DOWN THE CHIMNEY
PA'S PORTABLE DISILLUSIONED

A Bouquet for the Admiral.

CONGRATULATIONS to Admiral Carpendale on his newly-acquired honour of Knighthood, which he has earned as Controller of the B.B.C.

The gallant Admiral is one of those strenuous workers who, behind the scenes, the footlights and the limelight, gets things done. He also carries great weight internationally in connection with the International Broadcasting Union.

One of these fine days I shall try to get him to join my Anti-pip Brigade.

Radio Really Arrives.

IT was most gratifying to learn that the British Standards Institution has taken a leaf out of the radio book and has produced a set of wiring symbols for the use of architects, contractors, etc. What gives one the greatest pleasure, however, is to know that one of these symbols indicates "Loudspeaker outlet." With this we may say, I think, that domestic radio is now on the map.

Scotland Not Forgotten.

THE B.B.C. is co-operating in the formation of a Scottish National Orchestra for 1933, and by way of helping in a positive way the Scottish Orchestra, it has offered to broadcast, at a fee of £100 each, five concerts of that orchestra during the 1932–33 season. It is hoped that the Glasgow Choral and Orchestral Union will co-operate next year in the Scottish National Orchestra project.

The most enjoyable choral singing I ever heard was performed by a Scottish choir, and I think that the Scots merit a lot of support.

Programme Note.

DON'T forget the Prince's speech about Dominion Day (July 1st), to be relayed from the Savoy Hotel by the National on June 30th.

Note that a new series called "Encounters" is being planned—something like "Conversations in the Train."

NEW AID FOR NEW YORK POLICE

Seated in the chair is Mr. "Jimmy" Walker, Mayor of New York, officially opening the new police broadcasting system with which it is hoped to combat the gangsters more effectively.

Trouble in Italy.

THE Marchese Luigi Solani, who manages Marconi's Italian business, has been shot at and wounded by an ex-employee. Sorry for Solari; sorry for the ex-employee—in these hard times.

The Marchese, whom I have met on several occasions, is a very handsome and charming man. He was mixed up in some way with Marconi's wonderful transatlantic experiment in 1901, and has been associated with him ever since.

The announcement of the concert by the band of the 2nd Batt. of the North Staffordshire Regiment, to be broadcast from Belfast on June 28th reminds me that this regiment was formed in 1760 for active service in the West Indies. It has since been a regiment of Marines, a Highland Battalion and a Rifle Regiment. In 1824 the regiment as it now stands was added to the Army List.

The First Telegram.

AT a ceremony in New York University to celebrate the invention of the electric telegraph it was revealed that the first telegraph message sent by Samuel F. B. Morse, over ten miles of wire at the University in 1838 was, "Attention Universe; by Kingdoms, right wheel!"

Part of Morse's crude equipment was a baby's cradle, which was rocked to make the batteries stop or start. Considering that telegraphy was only just born, and radio not thought of, that message was a bonny bit of bouncing optimism.

A Plea for Henry Hall.

L. A. S. (London, N.15) complains that Henry Hall is being handicapped because the microphone used by him is "obviously unsuited" to dance music. "It gives cracked quality; speech is woomfy, and singing is forced," says L.A.S.

Well, well! Henry, if you have cracked quality and woomfy speech, I hope that you will requisition the microphone which is used for the Prince of Wales's speeches.

We all begin to like you, but your "approach" is a *teeny weeny* bit off-hand. Get some "hail fellow, well met" into your announcements, there's a darlint!

Wireless on Duration Flight.

ABOUT the end of this month the Hon. Mrs. Victor Bruce is to try to beat the duration (re-fuelling) record in the air by staying up for four weeks, during which she will make several long flights instead of going round and round in a circle.

With all this in view, her machine has been equipped with a radio transmitter and receiver, so that she can get navigational and weather information, and also keep in touch with her ground base to arrange about food and fuel. A mobile radio station

(Continued on next page.)

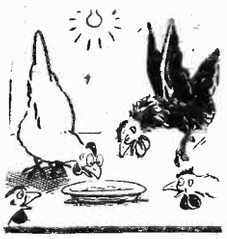
"ARIEL'S" RUNNING COMMENTARY ON RADIO *(Continued)*

is being installed in a motor van which will be used for following the fliers on the ground.

The aeroplane is to have an electric kettle and an illuminated advertising sign.

Automatic Hen-Deceivers.

THAT device for switching off a radio set while one is abed, which employed an alarm clock, has brought me a note from W. A. W. (Moulton), in reference to a diabolical deceit which he practised upon certain helpless chickens. It is desired to feed the fowls at 10 p.m. in the winter, and the houses are lighted by a 50-volt set.



W. A. W.'s first alarm clock switches the light on about 9 p.m., and the cacklers, realising that it is breakfast-time, hog all the corn which has been placed for them. At half-past nine clock No. 2 switches the light to "dim," and the fowls, realising that the sun has set, return to the perches. Ten minutes later the clock switches the light off. One crowded hour of glorious life! Night falls on the fowls!

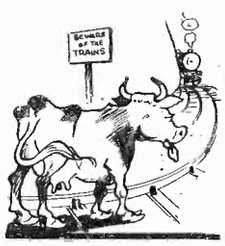
Age-old Aid to Radio.

IT is curious to note how in the ultra-modern American broadcasting studios the primitive language of signs is used, the announcers behaving like deaf and dumb persons having a heated argument; in fact, some of the signs are taken from the deaf-and-dumb alphabet.

As an example, I may mention that a finger placed against the side of the nose means that the programme is running according to plan. I wonder whether the lowering and raising of an eyelid means, "See you outside, Sadie!"

Round the Bend.

ON May 20th, according to a pre-arranged plan, an Imperial Airways liner and the "Flying Scotsman" express "met" somewhere between Newark and Ripon and had a cosy chat by means of two-way radio-telephony. The train left London at 10 a.m. and the air-liner at 11 a.m. "There's a cow on the line just round the bend," the Air might have said. "Garn!" Rails might have replied. "Where are your landing-wheels? I saw something drop off just now!"



Most Popular Item.

WRITING about B.B.C. programmes, a contributor to an evening paper gave out that the most popular item is the forenoon service. How he knows that I cannot pretend to imagine; perhaps he took a private census. However, it is a surprising statement, though I don't think that the "Daily Mail" census showed that any religious service was *very* popular.

In my view, it is impossible to fix on any particular class of item as the "star turn." It is best, anyhow, that the programmes be well mixed—like listeners' tastes.

How It Went in Canada.

THE year 1931 showed excellent progress in Canadian radio, there being an increase of 40,000 licences over 1930. The production of sets increased by 70 per cent, and the sales by 25 per cent, these sales amounting to about 286,000 sets.

I understand that the sales increase was due to the rise in demand for A.C. receivers. There was a drop in sales of battery sets and radio-gramophones and it is interesting to learn that of miscellaneous sets, *including those for use on cars and motor-boats*, only 685 were sold.

Radio as a Film Star.

BEFORE I close my industrial section and pass to more recreative matters, allow me to mention that the New Era Film Company has chosen radio as the first of a series of films which it will "shoot" on the Epics of Industry, illustrating the rapid development of broadcasting and the vitality of the new industry to which it has given birth.

The gramophone company are co-operating in this film, and much of the production will be done at the H.M.V. factories at Hayes and the St. John's Wood recording studios.

"SHORT WAVES"

FOGGED.

Visitor at Sheringham: "What weather does this sea-fog denote?

Local inhabitant: "I don't know. I didn't hear the wireless to-night."—"Daily Mirror."

* * *

"I see they are going to have wireless in coal mines. That's hardly fair, when a chap can't get away from it."—"Pictorial Weekly."

* * *

"In these days," says a writer, "it is difficult to think independently."

Especially when Mother wants the wireless on, and father wants it turned off.

* * *

"Do you believe in auto-suggestion?"

"I didn't until yesterday."

"How's that?"

"Well for the last three months I've been telling myself that I shall be summoned for not having a wireless licence, and sure enough it came last night."

* * *

THOSE WEATHER REPORTS.

"What exactly is the meaning of 'a secondary depression,' moving across Iceland, and all this other meteorologist jargon, which the B.B.C. hands out to us?" asks a correspondent. "Weather, to the ordinary man, means rain, hail, snow, fog or sunshine—but chiefly rain! Why all this camouflage about depressions? The weather supplies enough depression, without the B.B.C. adding to it."

* * *

After spending forty years in the bush, an Australian recently visited Hobart and saw for the first time electric light, motor-cars, clocks, the sea and ships.

We understand that news about saxophones, ukuleles, loudspeakers, golf and the telephone has not been broken to him yet.—"Humorist."

Down the Chimney.

ONE of the published accounts of the great new White Star liner "Georgic" tells how the vessel is equipped with a dummy funnel in which the wireless set is housed. It explains that the direction-finding set and its aerial are both in the funnel, and adds that the funnel screens the ordinary wireless telegraph apparatus from electrical disturbance, but that the open top "permits uninterrupted reception of signals for direction-finding."

Very accommodating of the signals to pop down the chimney, I'm sure—and of the electrical disturbances to stay outside!

Pa's Portable Problem.

A City acquaintance of mine tells me that he is confronted with a dilemma which so far he has lacked the courage to escape from. It seems that he simply must have a new set. Now, the "family" want a good portable, whereas he favours a radiogram. He says, "When I don't want to use the portable it will be here; when I do want it it will either be miles away with the car or at home with the H.T. battery 'dud'; or if I do want it and it is here in good condition, the B.B.C. will be handing out clotted tripe."

I believe that he has the right idea!

"Ariel" Becoming Disillusioned.

WHENE'ER I take my walks abroad during my vacation, I rely upon the Good Fairies (my relatives by adoption) to keep me well supplied with the genuine yeoman of Old England, wherewith to sip ale and converse in country inns. But to my chagrin I begin to find that the country bumpkin is gradually being changed by B.B.C. "talks" into a fearsome person who "knows about wireworms." It is rather disconcerting to hear in the "Drover's Arms" the complete life-history of some pestiferous wriggler, described by a young fellow whose "vather" used to haunt fairy rings by moonlight, etc. Yes! Romance is in extremis.

Grave Allegation Against Dictator.

I AM always ready to "knock" the B.B.C. about its "pips," radio for schools, and other crank products, but I hereby dissociate myself from the recent personal attack on its Director-General, which took the dastardly form of alleging that he was found wandering about Broadcasting House—lost. He couldn't find his way to his little bathroom!

Oh, no, no! Dictators should be made of sterner stuff. As a matter of fact, so a little bird has whispered to me, he had been having another look at the Latin inscription in the entrance hall, and was merely having a walk through the corridors in order to banish his blushes.

Why should the iron man of radio blush? Read the inscription and you will understand!

ARIEL.

SCOTLAND CALLING

The Scottish Regional Station at Falkirk is the newest product of Capt. Eckersley's "Regional scheme." As will be seen from this account, it embodies the very latest development in engineering and building skill.

From OUR NORTHERN CORRESPONDENT.

SCOTLAND has a magnificent opportunity to make a remarkable individual contribution to British broadcasting. I have just visited the new Scottish Regional transmitters at Falkirk. I have seen the splendidly appointed studios at Edinburgh. I have been informed of the high aim set up by Regional Director Cleghorn Thomson for the future Scottish programmes.

Will the Scottish Regional programme make good ?

The future will tell. Let me describe the excellent facilities provided by the engineers for the broadcasting of alternative programmes to Scotland.

A Replica of Other Regionals.

In most respects the Scottish Regional station is a replica of the London and North Regional stations, having two transmitters each of 50 kilowatts power. Improvements have been incorporated, however, the most important being in the aerial system.

There are two masts, each 500 ft. high, set on the hillside (itself 500 ft. above sea level) at Westerglen, midway between Glasgow and Edinburgh and three miles from Falkirk. From the top of each mast three aerial wires drop to insulators anchored in concrete blocks 150 ft. from the base of the mast.

The wires are spaced equidistantly around the mast. They look, in fact, just like guy-wires, but at the bottom they are connected together and led to an aerial transformer house at the foot of the mast, whence the usual overhead feeder lines run on posts to the transmitter building.

Two Masts Only.

Thus the Regional and National aerials are supported on two masts, compared with three at Moorside Edge and four at Brookmans Park. The economy in cost is considerable and the "umbrella" aerials at Falkirk are proving equally, if not more efficient.

Another difference compared with the earlier Regional stations is that the transmitter hall is lighted through a big dome in the roof instead of through windows in the walls. This is to prevent dazzle to the engineers when reading meters.

In the engine house Crossley Diesel engines are used instead of the Ruston make previously favoured. The new engines are more compact, though more powerful than the engines at either Brookmans Park or Moorside Edge.

The water-cooling plant at Falkirk is also different. For valve cooling a supply of distilled water has been sealed in tanks in the basement.

The small loss by evaporation is made up by topping-up the tanks with distilled water manufactured in a small still. For cooling the Diesels, water is pumped direct from the mains.

The transmitters work on the low-power modulation system now standardised by the B.B.C.

"The Last Word."

Falkirk is certainly the very last word in British broadcasting practice. It will give Scotland a service far superior to what it has had in the past, both in power and quality.

And what of the programmes ? There will be the National programme, relayed from London over 400 miles of landline and transmitted on 288·5 metres.

And there will be the Scottish Regional programme, on 376·4 metres. "There will be an expansion of the Scottish programmes both in quality and quantity," says the B.B.C. in a booklet about its plans, which is issued to Scottish listeners.

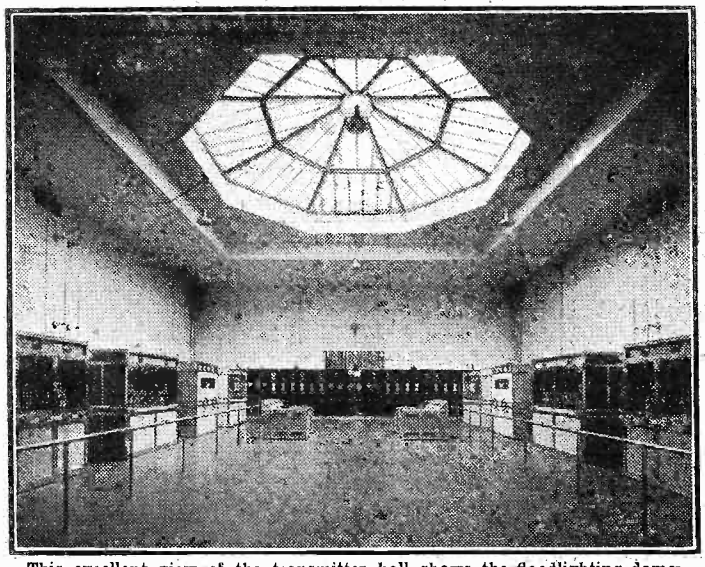
Its Own Orchestra.

In music the Scottish Regional programme will offer its own Scottish Studio Orchestra, the Scottish Philharmonic Orchestra, and the Reid Orchestra. In September the B.B.C. will send the Philharmonic Orchestra on a tour of Scottish towns.

For listeners beyond the boundaries of Scotland, who will now be able to receive these Scottish programmes, the feature programmes will probably be of greatest interest.

This is only a very rough outline of plans, but it certainly shows that "Scotland is Calling" in no uncertain voice.

THE LAYOUT AND THE LIGHTING



This excellent view of the transmitter hall shows the floodlighting dome, 30 ft. above the ground, which provides all the illumination for the control engineers without any glare. The floor is made of compressed cork, a new material for this purpose.

TELEVISION TO-DAY

The facts of the experiment at the 1932 Derby, and an explanation of its significance as an indication of television progress.

BY THE TECHNICAL EDITOR.

TELEVISION has been figuring in the programmes of a London cinema, and scenes from the Epsom race course were reproduced on a large screen on "Derby" Day.

But this spectacular achievement must not be allowed to blind us to the fact that television in the home appears to be as far away from practical politics as it did one year, or even ten years ago. For, as far as we are aware, there has been no notable development in the science which renders it probable that the huge snags which exist are likely soon to be overcome.

"Big Screen" Images.

Big screens have been used for television in the past, and we would remind our readers that Sanabria was exhibiting his in a New York theatre at least twelve months ago.

But it is significant that it was *after* this that a notable change of front on the part of certain American journals in their attitude towards television became most marked. Even those who had hitherto been ardent supporters of the "Television is here" theory, began to reveal misgivings in their articles, while to-day it can be truly said that the television publicist has practically no "Press" in the U.S.A. A staggering change from the days when any technician who ventured mild criticism was at once the target of what almost amounted to abuse.

Disillusioned.

We believe the change was due to a reaction against what were felt to be "red-herrings." Television "in the home" had been promised in the very near future. It did not come, although the televisionists began big-screen experiments as if the miniature, home outfit had been perfected.

It was a curious, piquant situation and we are able to appreciate it the more as it is now duplicated in some measure in this country.

Quite naturally, it would be logical to assume that if a huge picture of admitted crudity and imperfection can be obtained, it should be possible quite easily to receive small pictures of passing effectiveness. In actual fact, this is not the case. However much the "Derby" television pictures had been compressed, they would have fallen very far short of that minimum of pictorial clearness which has been adjudged essential for "service purposes."

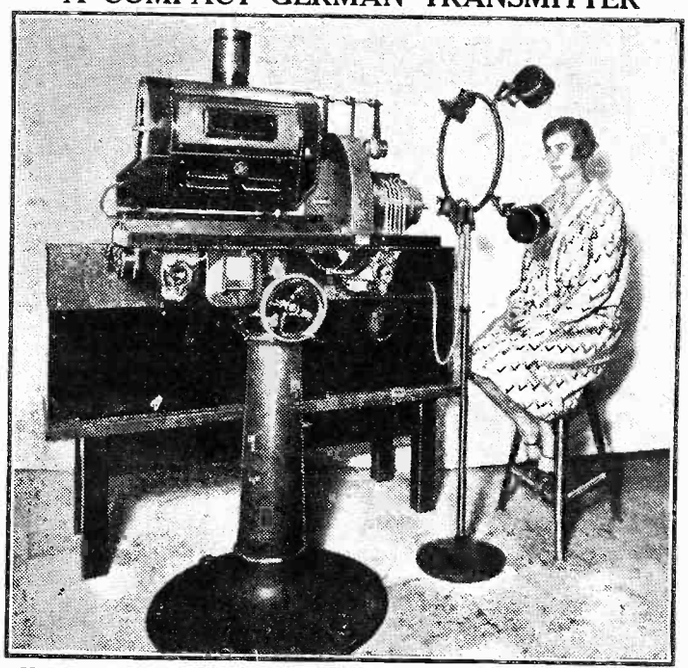
Novelty Not Enough.

The public would look quite a number of times at a streaky collection of almost formless blobs rushing across a flickering screen and labelled "The finishing post at Epsom," or "Bradman running between the wickets" with some interest — so long as they didn't have to purchase complicated and costly apparatus to do so, and had good talkies, or stage acts thrown in to balance it for the price of a theatre seat. But mere novelty obviously cannot in itself make for a lasting form of entertainment. Maybe the 5-and 7-metre experiments which are now being carried out will lead to the discovery of that new development which television needs before it can line itself up with radio telephony as a home entertainment.

That remains to be seen; in the meantime, POPULAR WIRELESS is not now nearly alone in saying television is still in the laboratory stage. A few years ago we evoked world-wide criticism for expressing that opinion, whereas to-day the statement "Television is just round the corner" is a stock joke in the U.S.—the birthplace of most of the television ballyhoo.

However, we eagerly await the time when television will emerge from the incubator, for there is no doubt that it is wanted by the public. And you can be sure we are watching every phase of its development with the greatest of keenness, and will keep POPULAR WIRELESS readers *au fait* with all the news concerning it.

A COMPACT GERMAN TRANSMITTER



Much experimental work is carried out in Germany, in connection with television, and this photograph shows a neat outfit which is typical of their technique in this branch of science.

Are you a short-wave "Fan"?

Do you make your own sets?

Have you a radio-gramophone?

there is sure to be something to interest YOU in

MODERN WIRELESS

(on sale every month at one shilling).

A Special "WORLD'S PROGRAMMES" supplement appears in every number—also "ON THE SHORT WAVES" by W.L.S., the well-known expert on this fascinating subject.

CURING INDUCED HUM

By FRANK BRIGGS.

An easily-applied method of overcoming what may easily be a very complicated trouble.

WHEN wiring present-day houses for electric light it is sometimes the practice to use ordinary rubber-covered wire. This may be quite in order as far as the actual lighting is concerned, but it can be very troublesome when a radio set is installed.

The difficulty is that the wires being unshielded are liable to introduce a certain amount of mains hum into the receiver. This applies whether the instrument is mains or battery-driven, and it is generally more noticeable when the supply in the premises is A.C.

If the house wiring is enclosed in earthed metal tubing, or if lead-covered cable is employed, the trouble does not occur, as all the leads are effectively screened by the earthed metal covering. But if plain rubber-covered cable is used, only those who have experienced the effects can realise what an annoyance it can be from a radio point of view.

Suggestions for You to Try.

Fortunately, there are several fairly easy ways out of the difficulty, and I hope the following tip will prove useful to any reader who is unlucky enough to suffer from the annoyance. I have had my share of it, hence my reason for writing these notes!

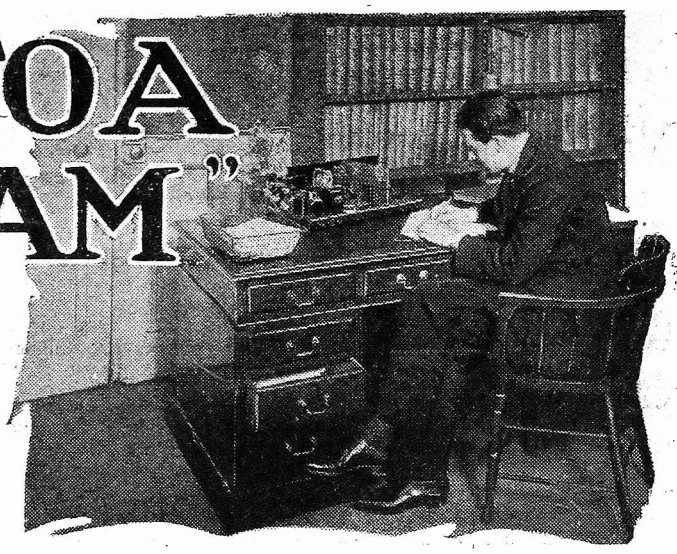
The several ways in my mind at the moment are: (1) Enclose the set in a metal cabinet. (2) Dismantle the receiver and cover the baseboard with copper foil. (3) Stand the instrument on a sheet of metal. And in each case it should be remembered that it is essential to earth the screen.

By far the easiest is the last, and as a rule is quite effective. It was the method I employed when first meeting with the trouble, and in my case, at least, proved a complete cure.

In fact, I used a common-or-garden "tin" tray for the purpose, a small place being scraped bare for connecting the earth lead. So, speaking from experience, I feel sure that if you give this little dodge a trial, it will be perfectly successful.

LETTERS TO A YOUNG "HAM"

by ARIEL



"Uncle Ariel's" young nephew is growing up, and this week we hear of him getting into serious trouble through trying to erect an aerial! Some very useful advice on the proper management of fathers is also included in this, "Uncle Ariel's" third letter.

My Dear Young Ham,—I received your nice envelope quite safely, because the postman saw that it was valuable and would not poke it through the letter-slit, preferring to hand it to me personally. This he did on my paying him for the stamp which you did not affix to that beautiful envelope for fear of spoiling it—the envelope, I mean.

He also charged a small fee for his services.

It was a pleasant surprise, that envelope. I am hoping to get, by an early post, the letter which you forgot to enclose.

Pater's Point of View.

Still, it was frightfully decent of you, Horace, to think of me—though you might note that *Chizzic* is sometimes spelt *Chiswick*.

Thanks, old boy.

Of course, I know what prompted your kindly thought; you see, I met your father in a—at a business meeting, I should say, and heard *his* version.

It seems that under the pretence of erecting an aerial for the wireless set which you are going to build if you pass the Oxford Local and Uncle Ariel comes down handsomely, you deliberately hurled yourself through the roof of the greenhouse and squished the largest tomato that the world has ever seen.

Deliberately, mark you, Horace! You tore the pants off your back but were yourself unharmed. You *would!* You *would* be!

So I can guess that the letter which you did not post was intended to bring me in on your side and, by pure accident, to apprise me of your conviction that the "Oxford" is a dead cert, provided that you can scrape through English, French, mathematics, geography and history.

Apart from those small matters, you have every hope of bringing home the bacon.

"What About Your Uncle Gilbert?"

Dash it! Am I your only uncle or am I merely the softest of them?

Why don't you bite your Uncle Ben's ear occasionally, and give me a chance to fatten up my wallet? And what about your Uncle Gilbert! Ask him to give you the fiver which I lent him in 1909, when he had put his shirt—I mean, when he had lost all his week's wages in a—*hem*—hippodromic fiasco, and was afraid to go home and tell your Auntie Saxifragia about it.

Terrible things, these fiascos, my boy! (I hope and trust that you don't know what "hippodromic" means!)

Well, I can relieve your mind at once by saying that I have calmed the pater's wrath. It was very simple! I just allowed him to beat me at golf and he is now so bemused with visions of the Ryder Cup that the tomato has shrunk to the size of a golf ball.

If a boy were, at some well-chosen moment, to drop in front of his father a casual remark to the effect that I told him that his father is a "Magician of the Mashie"—as I do now—that boy would probably find no further difficulty about tomatoes and might even scoop a bob or two out of it.

I merely throw out the hint.

That Sick Radio Man!

By the way, if you could quietly discover where the pater gets that pre-war brandy, I should be interested. I'd like to get some—for a sick friend—but your pa says that there are only a few cases left and he has an option on 'em. You wouldn't like to think of a thir—sick radio man suffering for want of a little medicine, would you, Horry?

Something that "Stinker" Briggs said to me yesterday, when I came across him practising "Yo-Yo" instead of doing his homework, makes me fear that you design to open your serious radio career with a nine-valve superhet, wound for 1 to 7 metres.

Who do you think you are, anyway?

You think that "reaction" is the second knob on the right, and that metres are wavelength units, like ohms, amperes and other units. One day I'll tell you the wavelength of Lwow in nautical miles or furlongs, just to show you that it can be done.

What on earth is the use of your asking me to explain a *decibel* when you can't understand yet that volts are not things which the local radio shop puts into your pa's accumulator for sevenpence a dozen?

An Easy Way Out!

But pray don't let me discourage you Carry on with the nine-valver; your pocket-money will, I calculate, just about do it in 9 years, not including valves or batteries. Something to look forward to, Horrie!

If nine years seems rather too long—you'll be wanting a television set before that—apologise to the Giant Tomato and then find out about that brandy. You know—the funny black bottles with green seals, that pa keeps hidden.

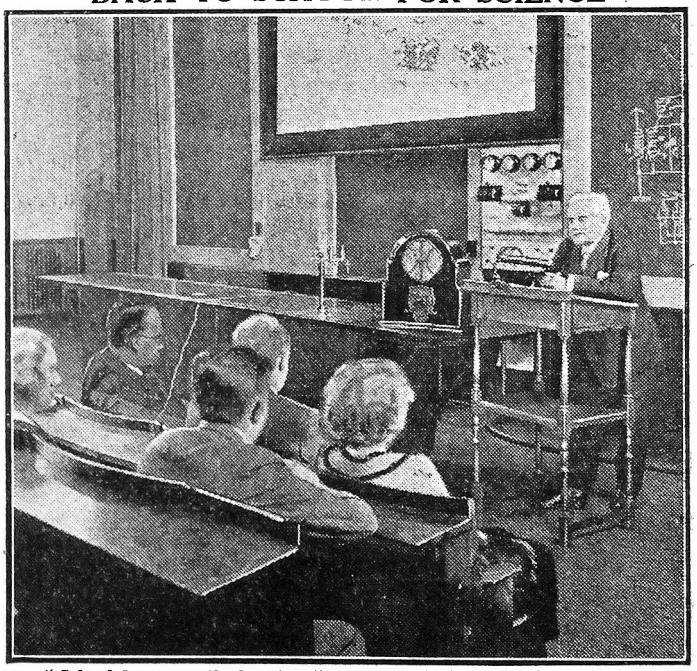
And then, maybe, I'll put you on the rails! *No*—not *rails*; too much like those footling toy trains. I'll put you on to the proper *waveband*.

Your affectionate,

UNCLE ARIEL.

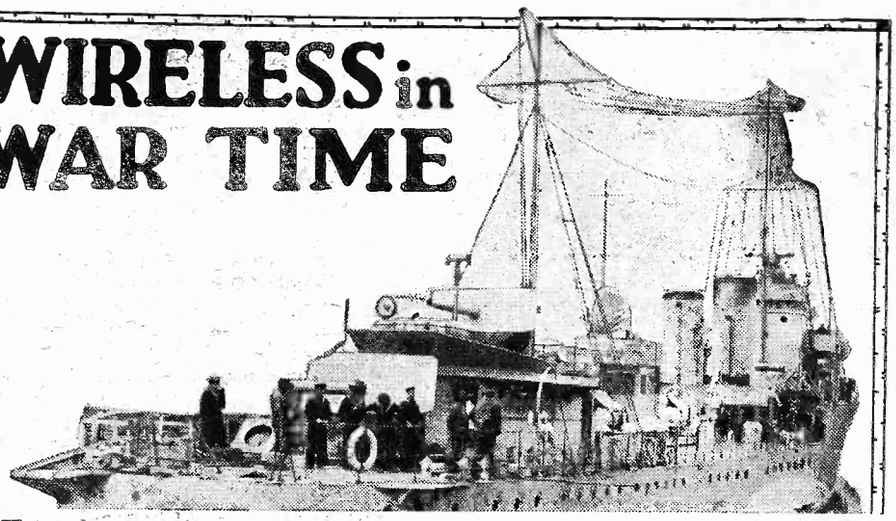
P.S.—The enclosed five bob would buy another tomato-plant—or—well, I leave it to you.

BACK TO SCHOOL FOR SCIENCE



"School days were the happiest time of our life" is the opinion of these listeners if we are to judge by their eagerness to attend the science lessons broadcast from a German station.

WIRELESS in WAR TIME



Extracts from the Diary of a Wireless Operator at Sea 1916-18

AUGUST 6TH, 1917.—I had a look round Sierra Leone this morning and found it very small but very clean. The natives, who are coaling us here, are Kroo boys. West Africa, it will be remembered, is the home, among other things, of the mysterious Ju-Ju, or Magic Fetish.

Questioning one of these Kroo boys about it, he at once manifested extreme uneasiness and rolled his eyes in a most alarming manner. He scratched his black head and then his ribs, and eventually said, "No savvy Ju-Ju, sar, or me fit for die, and me damn bad man to die, sar." And that was all I could learn about Ju-Ju from a coloured gentleman.

Anchored Off Dakar.

AUGUST 15TH.—Anchored in the harbour of Dakar early this morning. It is much warmer to-day, and huge dragon flies, like those in Basra, are swarming all over the ship. Later: Went ashore this evening, but found the town not very lively. There were one or two cafés and an apology for a theatre. Several of us congregated outside one of these cafés.

On the opposite side of the street was stretched out a cinema sheet, and so we had a free show while drinking our beer. I saw one film which I recollected having seen in London something like five years ago. The streets in this place are thickly shaded with palm trees and shrubs which give off the most peculiar odour: but it is very pleasant, especially when walking in the cool of the evening.

Most of the people are natives, and the beggars are few—for a French Settlement—but one little fellow made me laugh because of his queer mixture of French and English. He danced around me, screaming out, "Oh, Monsieur, Monsieur! Donnez moi un sou, Monsieur. Oh, give me a penny, sir, curse your eyes, give me a penny."

An Interesting Yarn.

AUGUST 18TH.—Have just finished "Mr. Brittling Sees It Through," a most interesting book by H. G. Wells. By the way, our captain, chief engineer and carpenter were all on a ship that was sunk by the Emden. When Captain Muller came on board, he quite casually remarked to the captain that the British cruiser, the "Yarmouth," would not be able to come to their help as he knew the crew were playing football in Madras!

This was afterwards found to be quite correct. The crew of the captured ship were given plenty of time to get into the boats and, according to the captain's story, Muller seems to have treated them quite decently.

Awaiting the Escort.

AUGUST 22ND.—We have been waiting a week in Dakar for the arrival of the auxiliary cruiser Moldavia (torpedoed six months later, 68 killed). She sailed proudly into the harbour yesterday amidst a great deal of flag dipping, and even a spot of gun-firing by a super-courteous French cruiser.

Amidst the generally satisfactory plaudits of the waiting convoy she dropped anchor.

"Convoy" explains it all. We are one of a collection of some thirty ships now proceeding to England, and the Moldavia, as cruiser in charge of the convoy, is hovering around us like a worried hen with a brood of chickens. This ship is the third best and fastest boat of the lot, and yet the first thing we did on leaving harbour was to delay the general start off by breaking down for half an hour.

The chief engineer says it's because we are going too slowly! Being in a convoy is not all honey, especially at night-time, for we must not show any lights. Consequently, it's a matter of pretty good judgment and luck whether you ram or are rammed by the next boat.

We are all armed, mostly with 4.7's and howitzers on the poop; but some of the crews on the other ships are very uneasy, fearing that if a submarine does pop up, some nervy gunner will blaze away and hit one of the convoy, not the sub. We picked up war warnings to-day reporting submarines off the Azores, and each day brings a new list of positions where they have been sighted. The sea must be alive with the swine. We reckon to be home, with luck, in fourteen days.

We Reduce Speed.

AUGUST 23RD.—More trouble. We are now steaming a bare 4 knots, for a bally Norwegian commenced to lag last night and this morning was right out of sight. The cruiser has gone off to look for her, sending out a stream of flag signals ordering the rest of the convoy to slow down. Last night, too, the leading ship in our column got suddenly nervy and slowed down so suddenly that we narrowly escaped ramming her.

AUGUST 24TH.—To-day we had orders from the Moldavia to alter our position. This was greeted by the chief officer with a bitter smile, and a still more bitter allusion to the collection of "duration land sailors" on the Moldavia who would probably expect us to form fours and present arms before we got home.

This morning the Norwegian made a gallant attempt to catch up with us. Smoke poured out of her funnels in thick clouds, and a crest of foam licked her dirty iron sides. With wonder we saw that she was gradually overtaking us, His Majesty's Prize Ship, "———"!

At last she got so near that we had to hop forward a bit to avoid a shove from the rear. But the effort, as we feared, was too good to last. About 1 o'clock there came a terrific bang and a cloud of steam hid the poor Norwegian's shame.

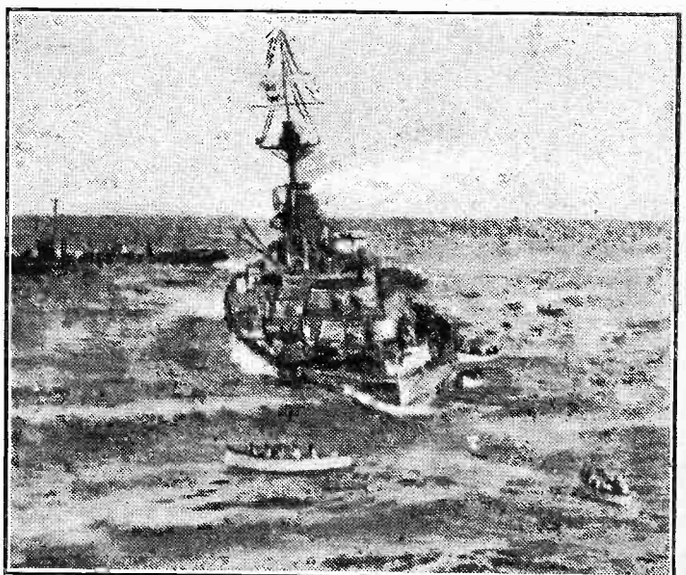
Completely Out of Action.

The Moldavia went puffing up, her attitude exactly like that of a worried mother, a kind of "Now, what have you done, you naughty boy?" Well, the naughty boy had burst his boilers or some such silly thing, and we had to leave him.

Submarines reported off the Canary Islands, and very nice, too, especially at the stupid rate we're going!

(To be continued.)

THE SINKING OF THE "AUDACIOUS"



A vivid photograph taken from the crow's nest of one of the rescue ships. It shows the "Audacious" shortly before she sank, and you can see lifeboats from s.s. "Olympic," and from accompanying American destroyers taking off the crew.

CAPT. ECKERSLEY'S QUERY CORNER

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

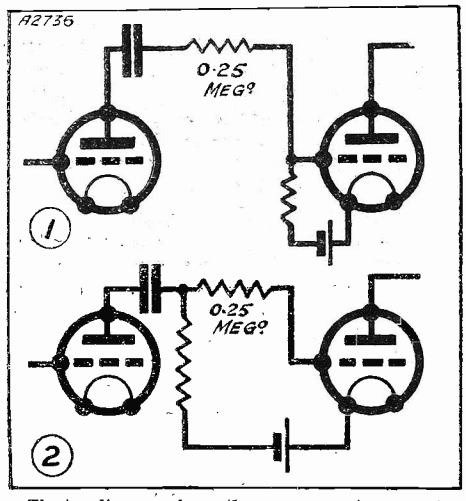
Under the above title, week by week, our Chief Radio Consultant comments upon radio queries submitted by "P.W." readers.

GRID STOPPERS—OVERLOADING—INSULATORS—RECEIVING AERIALS.

How It Should Be Done.

J. J. (Southall).—"In a recent reply to a reader's query regarding the use of a ·25-megohm grid leak in series with the grid lead of an L.F. valve to prevent H.F. currents leaking into the L.F. amplifier, I notice that the diagram shows the components connected as follows: grid side of ·01-mfd. condenser to one end of ·25-megohm grid leak, other end of ·25-megohm grid leak to grid of L.F. valve, and one end of the usual grid leak, remaining end of this grid leak to G.B.—.

WRONG AND RIGHT



The top diagram shows the wrong way to connect a grid stopper in an R.C.C. circuit, while the bottom one illustrates the correct method.

"Surely the usual grid resistance for the valve should be connected to the junction of the ·01-mfd. condenser and the ·25-megohm leak and not actually to the grid of the valve, for so far as I can see, the effect obtained with the connections actually shown would be that of the usual potentiometer volume control, except that, of course, this would be a fixed one?"

You are perfectly right. If the usual leak were of the order of ·25-megohm half the L.F. voltage (or more) might well be lost. Was I guilty of this? Sorry if I was.

Obviously, the correct connection is as shown in Fig. 2. But of course, you know ½ voltage is only 6 D.b's.! But perhaps you have not yet come across the D.b's. maniac.

* * *

A Super Power Valve Trouble.

V. C. (Maldon).—"I have a det. and 2 L.F. receiver run from an H.T. eliminator, and irrespective of how I adjust grid bias, a milliammeter in the plate circuit of the last valve still kicks on the loud passages.

"If I use a super-power valve in the last stage the set immediately starts to motor-boat. Surely there must be a solution?"

There may be one or two causes of your trouble. (*a*) Insufficient power in your eliminator; (*b*) a wrong impedance in the anode of the last valve.

If it's (*a*) the kick would be mostly downwards on loud passages; if (*b*) it could be either way.

Then there may be insufficient H.T., which is another way of saying (*a*). It's all so difficult without the knowledge of the values which you are using.

As to motor-boating, this is commonly due to a lack of decoupling, but again a lack of eliminator power and insufficient value of smoothing condensers would produce the effects.

1. Does your eliminator give you about 60 m.a. at 200 volts?
2. Have you at least a 6-mfd. condenser across it?
3. Is the penultimate stage decoupled?
4. If you are using a moving coil are you sure the output transformer is right? If a moving-iron speaker and choke feed, is the choke good and big?

* * *

All About Insulators.

W. E. (Ware).—"Is it true that under certain conditions insulators become conductors? For example, when a high voltage is applied to them. Or is there really a definite distinction between insulators and conductors?"

An insulator is really only a poor conductor. For instance, if you take a porcelain insulator with sulphur held in metal caps on top, the ordinary bolt screwed up into its skirts, and then you apply high-frequency (say 1,000 kilocycles) at, say, 20,000 volts with a kilowatt power, in a few minutes the sulphur begins to melt and soon may burst excitingly and damagingly.

If, however, you took that same insulator and put D.C. at 20,000 volts (and a kilowatt) upon it, it would hold up for ever.

Actually the high-frequency made the porcelain conductive, and it was the current passing through the porcelain which heated it and exploded it.

The idea in designing insulators is twofold: (a) to minimise large electric field densities; (b) to make the path between electrodes a surface rather than a through path. Thus you may see large metallic rings on wireless aerial insulators to distribute the field, and you will always see an attempt made to make surfaces very smooth and shiny and to keep them dry by "skirts."

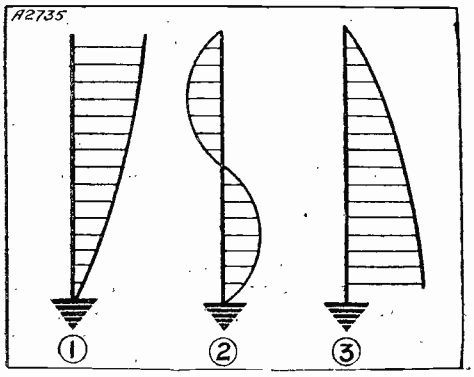
Voltage In Aerials.

T. R. (Chiswick).—"I live at the top of a large block of flats with the result that my set is in effect at the top of the aerial, instead of at the bottom end. I find that with the aerial used as an earth I get better results than when using the aerial proper. Is this normal?"

Anything that actually happens is bound to be normal, said he amazingly! Abnormal is a bad word more properly used by politicians and miracle makers.

It is almost impossible to calculate aerials when the set is high up and is connected to an earthed conductor, etc. etc. I always just mess about to get the best results; I never try to predict them.

POTENTIAL DISTRIBUTION



These three diagrams illustrate Capt. Eckersley's statement that the voltage distribution in different aerials varies tremendously.

You can have the distribution of potential in an aerial like (1), or like (2), or any combination thereof, and the circuit you use to terminate will alter all the conditions and may do as at (3). No. 1 at the top of the aerial will—oh no, there's no saying what may not happen, but it's quite normal to get volts at the top of an aerial as well as at the bottom!

THOSE SPORTING BROADCASTS!

A special contribution to "P.W." by a well-known journalist who for many years was Sporting Editor of one of the leading national dailies. We have no doubt that listeners to the B.B.C.'s sporting broadcasts will find below many points with which they heartily agree.

I SUPPOSE there are few classes of listeners who have not at times been rattled by the way a subject in which they are specially interested has been dealt with by the B.B.C. Certainly the sports enthusiast has in many respects just cause for complaint.

Knowing how ready the B.B.C. is to pay attention to any constructive criticism, I have been wondering lately if the case for what I'd like to term "the man in the street" has ever been put strongly enough to them.

I notice that on the recently appointed Commission to go into the burning question of lotteries, Sir F. S. Jackson, the famous cricketer, will be there to see that the views of the humble supporters of sport are not smothered. It is just such a man who would be of inestimable value when the B.B.C. are discussing or seeking advice on what is most popular with the sporting public.

Casual and Contemptuous.

Let me make it clear that I am not charging the B.B.C. with neglect of sport. The great failing is the casual and sometimes even contemptuous way two particular branches of sport are treated—except when the event lends itself to a certain amount of glorification by the Corporation. I refer specially to Racing and Football.

Of course the B.B.C. scores with its broadcasts of such outstanding events as the Derby, the Grand National, the Cup Final, Rugby Internationals, the Boat Race, and Lawn Tennis at Wimbledon. But even these events have hardly been given the attention they deserve, and the manner and general method of presentation show little, if any, advance year by year.

What is more, such important events as I have mentioned are usually ignored until the day they take place.

Undoubtedly there has been in connection with the "calling over" of racing and football results the greatest dissatisfaction among listeners. There was a time when the starting price of the winner of a race was given, but nowadays this most important part of the race "return" is not "offered," although greatly "wanted."

Standard Speech.

The announcers have varied in their rate of delivery and, after listening recently to the way two meetings were gabbled through—with, incidentally, the times mixed up—I thought it worth while writing to the B.B.C. about the matter.

In reply I was informed that "the general principle is that a standard speech shall be adopted, i.e., that of ordinary news reading."

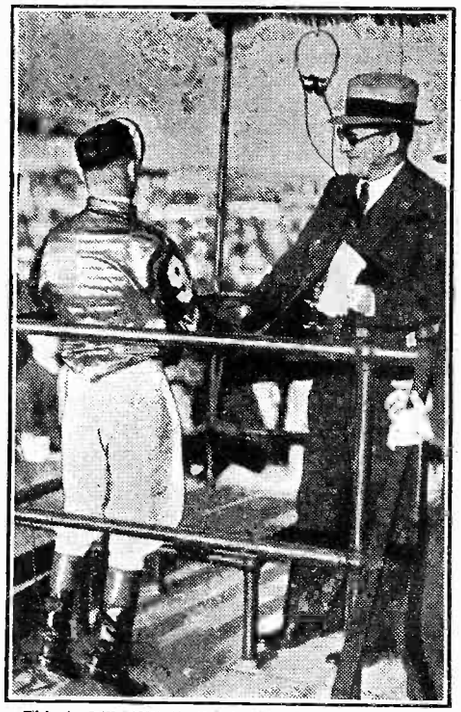
This, I maintain, shows a sad lack of understanding—in fact, it indicates that racing is a subject foreign to the originator of such a rule. It is evident, too, that the announcers have not been paying attention to "the general principle."

During a recent week, one announcer started with a slight pause between reading the first, second, and third horses. Obviously he clearly realised that if a listener is ticking off the results—and this is the general method—some allowance must be made for the fact that, say, No. 1 may be in the middle of the list, No. 2 at the top, and No. 3 probably at the bottom.

On the following night the results came through as though the announcer was anxious to beat a record by getting through six races at each of the two meetings with only one pause for breath.

If the B.B.C. want this point driven home, let them ask any of their staff interested in racing—and perhaps outside the Programme Department there may be a few—to sit for an examination at the rate taken by the announcer I have indicated.

"ON HIS TOES!"



This is Billy Elliott, the jockey, broadcasting the result of the Californian $50,000 handicap direct to Australia. He is so small and so anxious that they shall hear every word that he is on tip-toe to the "mike"!

It should be added that a marked improvement was noticeable at Epsom and it looked as though serious attention had been given to the protest.

There has always been a lot of feeling among listeners over football results. For a time Rugby had precedence, but it is different now.

Maybe the fact that the newspapers, wisely recognising what readers wanted, put in special radio football charts so that the results could be taken down at once, had a lot to do with this; and here it can be pointed out that football and racing results cannot be placed in the same category.

The League results come in alphabetical order, such as: Aston Villa, Bolton, etc., whereas the placing of horses in a race programme is governed by the weight they are set to carry—a notable exception being the Derby, when many newspapers prefer the names of the runners to be printed in alphabetical order.

Even in football I have known the Soccer results run through at lightning speed, and the Rugby results dwelt on with loving care—even if such a team as the "Old Leysians" is called the "Old Laysians"—greatly to the disgust of all Cambridge men.

A Difficult Task.

There are many items of sports news that one never gets, but I notice that time was found the other night for a list of all the "bumps" made in the Oxford "Eights." They were broadcast in a most enthusiastic manner by the announcer, and one wondered if this particular gentleman was a young Oxford rowing man who distinguished himself by his broadcast of the Boat Race, and whether this item actually got a show on its merits.

Of the events I have mentioned, the Derby and the Grand National are, far and away, the most difficult to tackle.

Mr. Lyle at the Derby this year gave, at the urgent request of listeners, the Draw, and next year I hope he will tell us how the horses are numbered on the race card.

Some folk were no doubt confused, after getting the draw for places at the starting gate, to hear that they were not parading in that order. This point might be made perfectly clear in future.

Mr. Lyle is not above paying attention to suggestions, as was shown by his promise to keep a special eye on Orwell's progress throughout this year's Derby, no matter who was leading.

As for the broadcasting of other sports events, I would suggest that Mr. G. F. Allison's attention is not diverted by questions or side remarks of the gentleman who is really only there to give out "Square X," or whatever number it is, for the benefit of readers of "The Radio Times."

Too Enthusiastic.

At the Rugby games, Captain Wakelam is frequently so uncertain that the listener gets confused; and the gallant captain might also restrain his impatience at any slight delay.

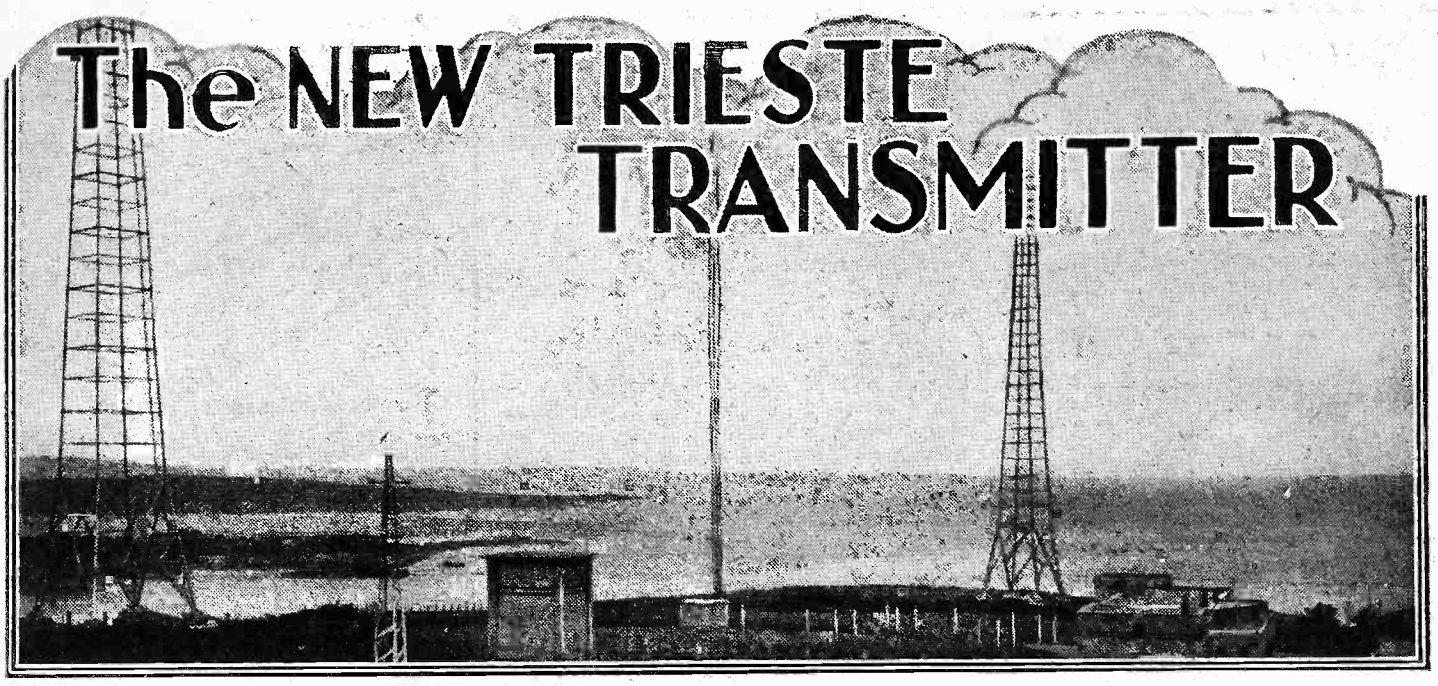
I am afraid he is just a little too much of an enthusiast. Personally, I prefer the cool, steady story sent out by the Irish commentator.

Bearing in mind that cricket still stands out as our great national game, the B.B.C. will hardly claim that the summer pastime receives full attention. There might well be a few more advisory talks by leading personalities, for the young cricketer is at least as eager for instruction as the gardener.

Golf is brought into prominence now and again by Mr. Bernard Darwin, whose talks must give delight to all who follow the royal and ancient game. Mr. H. M. Abrahams deals with athletics in a way that convinces the listener that there is a man at the microphone who knows his subject from A to Z.

But, taken on the whole, the sports enthusiast does not get anything like what he wants and deserves in the B.B.C.'s programmes to-day.

The NEW TRIESTE TRANSMITTER



Radio Trieste is well known to nearly all British listeners, and we feel sure our readers will be interested in this account of a visit to this popular station.

By OUR SPECIAL CORRESPONDENT.

TRIESTE is, geographically speaking, at the "top" of Italy, and although the average British listener is probably not well acquainted with the "layout" of this part of Europe, Yugoslavia and Hungary are all relatively near this end of the country.

This means that although mention of an Italian station is apt to conjure up visions of Rome and Milan, Trieste is actually a close neighbour to Ljubljana, Zagreb and the Graz, Innsbruck and Klagenfurt relays, all of which I have been visiting.

A Child of Chelmsford.

The Marconi engineer who arranged for me to visit the Trieste station told me that the whole of the transmitter, the panels for power valves, big water-cooled valves and tuning coils, were tested out at Chelmsford. Trieste was, in fact, built in the same "stocks" as the big Warsaw station, also a British product.

The man on the spot said it was a pity I could not have made my visit at the official opening. A striking thing is the interest which Mussolini and other members of the State take in Italian broadcasting. The Crown Prince and Princess of Italy went to the official opening at the end of last year!

Not Much Top!

Radio Trieste is three miles out of the town of that name. The two aerial masts are 260 feet high, so it is unnecessary to say that they are landmarks for a considerable distance around. There are not many buildings in the immediate neighbourhood of the aerial, so it is not shielded in any one direction.

An impressive thing about some new stations is the small amount of "top" to the aerial. In the case of the Trieste aerial, for instance, the top length of wire appears small in comparison with the long down lead.

The length of the top is 60 feet. The lead-in is joined to the centre and there are three wires forming the down lead. Stout three-foot diameter hoops separate the three wires. The lead-in, you see, is four times as long as the aerial itself.

There is the usual little transformer house, a small stone building exactly below the aerial lead-in. The lead-in goes into the transformer house via one of the biggest porcelain insulators I have ever seen, and a peep inside revealed an outsize in H.F. couplers, an air-dielectric condenser and a couple of high-frequency meters.

A row of telegraph poles extends from the coupling house to the wall of the transmitter hall, and two wires, each of them carrying part of the aerial current, vanish into the transmitter hall through a little window at the top of the wall.

The Feeder Line.

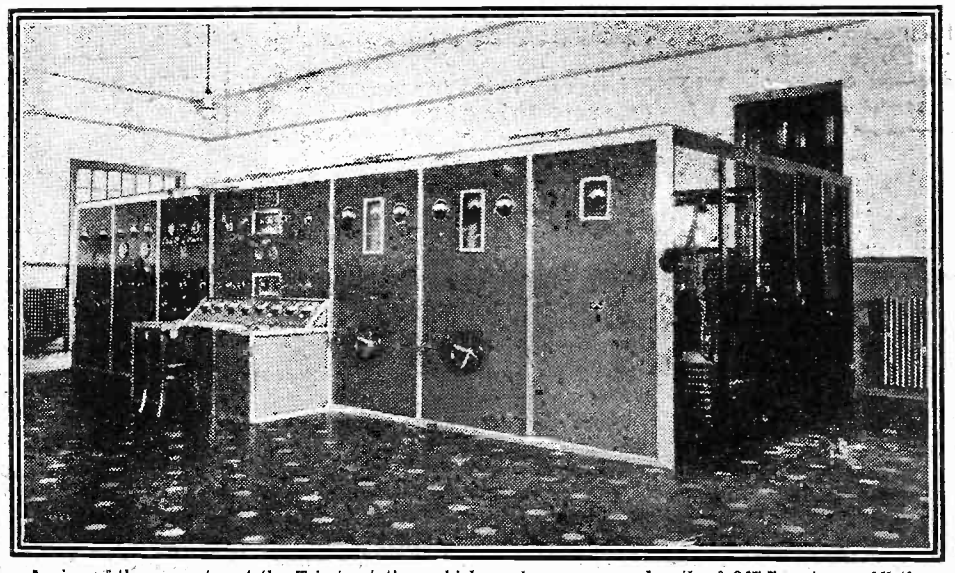
A good many stations have this method of connecting up to the lead-in. The engineer explained that if one wire were used, trailing up to the lead-in point, it would be so long that it would upset the natural wave-length of the aerial and would certainly increase the lowest wave-length at which the transmitter could broadcast. As Trieste is fitted with coupling circuits, tapped to go down to 200 metres if necessary, this would be a real snag.

The two lines are just the two sides of a closed circuit. At the transmitter end they are connected to the secondary of a gigantic H.F. transformer and at the other end, in the little stone house, they are connected to the primary of a similar transformer, the secondary of which goes straight up to the aerial.

In cases where the two leads have to be very long, the length of the primary or secondary winding, at either end, is

(*Continued on next page.*)

A "HIGH SPOT" IN ITALIAN BROADCASTING



A view of the apparatus at the Trieste station, which works on a wave-length of 247·7 metres. All the apparatus is of British manufacture, and was taken direct from Chelmsford to the station site in huge crates.

THE NEW TRIESTE TRANSMITTER.

(Continued from previous page.)

reduced. As long as they keep the three circuits in tune the length does not matter.

The transmitter is the standard P.A.14 A. type and from the outside looks very much like part of our 5 S W short-wave transmitter. As far as the inside arrangements go it is a great deal different, and is an improvement on other P.A.14 A.'s at other broadcasting stations.

Crystal Control.

Trieste at present is working on 247·7 metres. A novelty is that it is crystal controlled. Some previous Marconi transmitters have been fitted up with a special kind of master oscillator—a valve in a shielded-off compartment, fed with batteries apart from the rest of the transmitter and fitted up with every gadget to keep it oscillating at a constant frequency. Now at Trieste the engineers are trying crystal control.

The "A" panel of the transmitter has part lined off and in this is a heat insulated box, fitted with a thermostat working on an electric heater. This is just like any other crystal drive.

The crystals are specially ground and by simply retuning the frequency doublers and the three coupling circuits between the water-cooled valves, the wave-length can be shifted from 200 metres up to a maximum of 545 metres.

A new crystal has to be inserted for practically every range because the frequency doublers are tuned each time to a harmonic of the crystal frequency.

Between the crystal and the frequency doublers is a shielded valve—an ordinary power valve, such as you might have in the output stage of your set—across the grid circuit of which the crystal holder is connected.

A Homely Thought.

The last stage of the frequency doublers is connected to a small transmitting valve. The anode is also connected to the output of the last L.F. stage on the amplifier rack connected up to the control room.

In technical terms this small transmitter valve is the first modulated stage. It is in itself a complete transmitter. If an aerial were connected to it signals would be broadcast, but at very low power, of course.

After this, in order to increase the power, come the water-cooled valves. These are just the same water-cooled types as at Brookmans Park. Homely thought!

At present Trieste is run by the Ente Italiano Audizioni Radiofoniche and takes its programme from its own studio. The engineers hope very shortly to get a balanced landline link through to Milan and other studio centres.

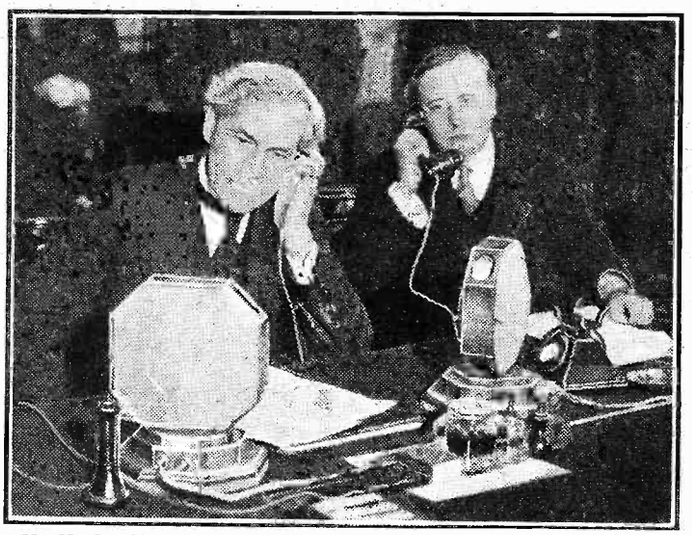
The Day's Work.

The control man comes on duty at 8 o'clock in the morning and the first programme is put out at 8.55. He then has breakfast and comes back at 11.30 for the start of the main morning programme, which is then continuous.

There is a very ingenious indicator system working between the studio and the station control room. Practically everything comes from the studio, but fill-in items, which are done with gramophone records, can be done from the listening room at the transmitter.

When initial programme difficulties have been overcome, the E. I. A. R. official will give over his responsibility to a local man.

OPENING ANOTHER EMPIRE LINK



Mr. Macdonald opening the new public telephone service to South Africa, on which occasion he spoke to General Hertzog, the South African Premier for five minutes. Sir Kingsley Wood, the Postmaster-General, is seen on Mr. Macdonald's left.

TWO USEFUL HINTS

Using old match boxes. Better volume controlling.

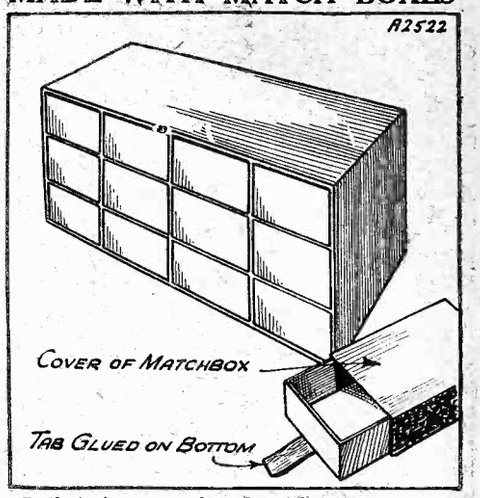
WHEN engaged in experimenting, it does not take long for a host of small oddments to collect, and if some system is not adopted, confusion quickly follows.

I find the best plan is to house these small items in tiny chests of drawers made by gluing together a dozen or so waste matchboxes, as shown in the sketch. A better job is made of the cabinet if pieces of stout cardboard are cut to size and attached to the exterior.

Tidy and Handy.

Each little drawer has a tab of leather cloth attached to the front bottom edge, so that it can be drawn out easily. The name of the contents is written in ink on the front of the drawer. The contents comprise nuts, washers, and terminals both 2BA and 4BA, spring washers, labels, tags of different types, bushes, valve legs and sockets and a host of small articles.

MADE WITH MATCH BOXES



By fastening a number of match boxes together, as here illustrated, a very handy "chest-of-drawers" can be made.

PRE-DETECTOR volume controlling is more or less a necessity on a powerful set that employs one or more stages of H.F. amplification. And one of the most common schemes used is to alter the voltage on the screening grid of the S.G. valve.

This is carried out by means of a potentiometer across the high tension, the slider feeding the screening grid. Unfortunately, if control is carried too far with this scheme, there is likelihood of rectification.

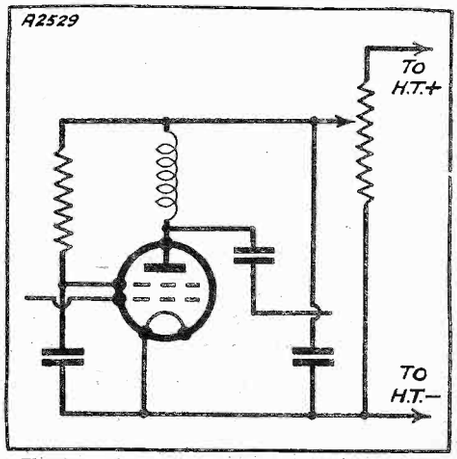
As you are no doubt aware, the right voltage for use on the screening grid depends largely upon that applied to the anode of the valve. Therefore, if the anode voltage were reduced at the same time as the voltage on the screening grid, this method of volume control could be carried much further before rectification set in.

In the diagram a simple scheme that makes this possible is shown. You will see that a potentiometer is used but instead of it supplying the screening grid alone, it supplies the anode of the S.G. as well.

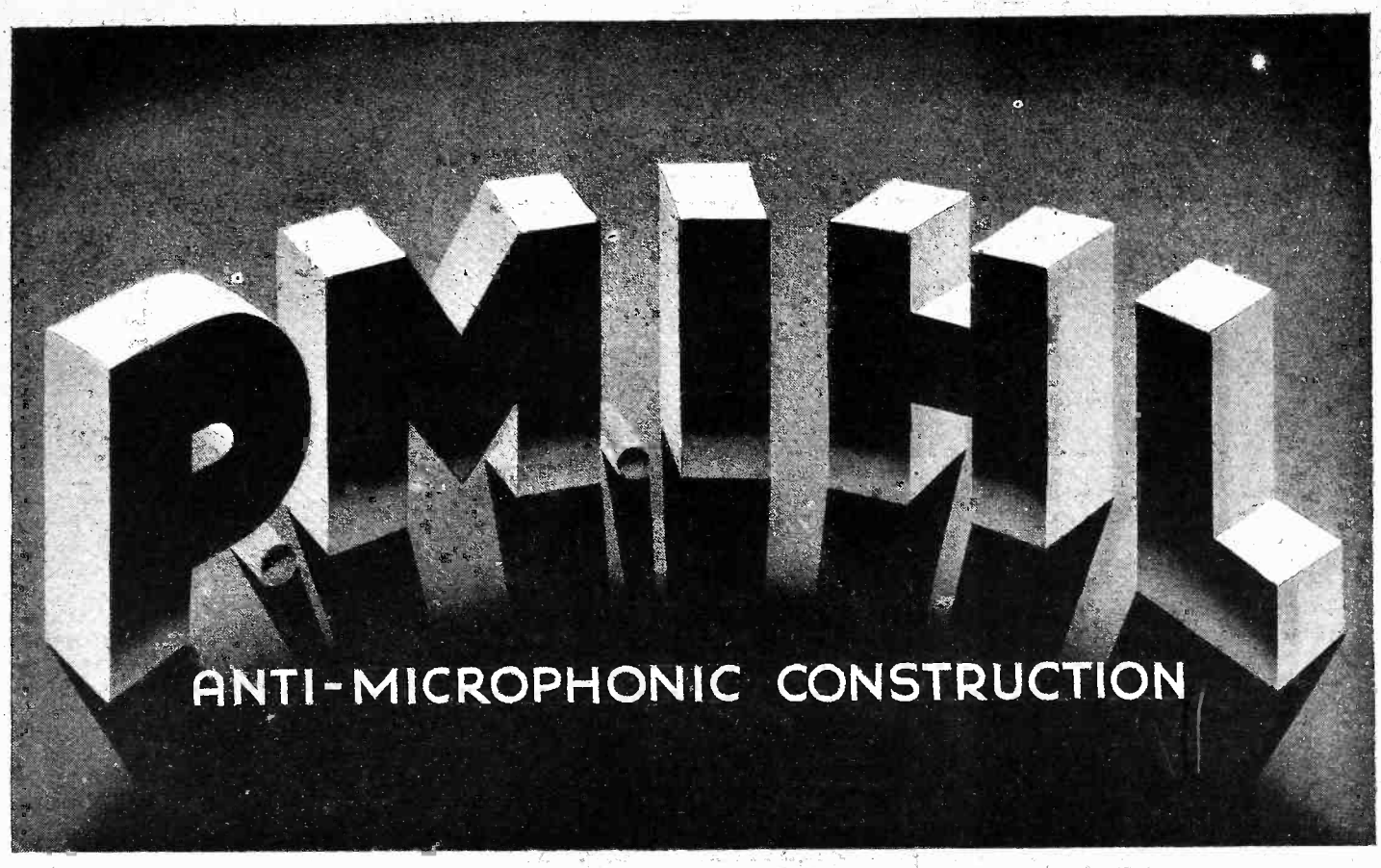
The voltage for the screening grid is dropped through the resistance. The net result is that as the voltage on the potentiometer is lowered the high tension applied to both electrodes is reduced at the same time. Consequently a much better and wider control of volume is available.

A.S.C.

PREVENTS DISTORTION



The potentiometer is arranged to control the anode voltage as well as that applied to the screen. This scheme has several advantages over the usual method where the screen voltage only is varied.



THE VALVE THAT PULLS EVERY OUNCE OF ITS WEIGHT

Are you satisfied with the same performance today as two years ago? Of course not! Your demands become more exacting every day; that is why the improved P.M.1.H.L. was marketed.

Due to the low anode current of the P.M.1.H.L., the effective inductance of the transformer is maintained at a high value, thus giving a maximum stage gain.

This low anode current also obviates the risk of saturating the transformer and thus ensures good quality.

Price 7/-

MADE IN ENGLAND

OPERATING DATA

Filament Voltage	2·0V
Filament Current	0·1A
Max. Anode Voltage	150V

CHARACTERISTICS

(At Anode Volts 100; Grid Volts Zero)

Anode Impedance	20,000 ohms
Amplification Factor	28
Mutual Conductance	1·4 mA/V

Mullard

THE · MASTER · VALVE

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

THE MIRROR OF THE B.B.C. By O.H.M.

THAT ANNUAL REPORT

AT PORTLAND PLACE—VAUDEVILLE NEWS—THE CONQUEST OF THE MATTERHORN—GENERAL HIGGINS TO BROADCAST.

I CONFESS that the B.B.C. Annual Report to Parliament, which is tabled as a White Paper by the Postmaster-General, irritates me increasingly.

True, it draws a calculable number of superlative tributes in ponderous newspapers, and a little sarcasm from less serious organs of opinion. True, also, it records the hard facts of magnificent progress. But what a dreadfully soulless document!

It is the official record of what should be the most human organisation in the country! Seriously, the B.B.C. loses a glorious opportunity of developing interest and goodwill by the unimaginative handling of this business of the Annual Report.

It is not much use the B.B.C. pretending that it is not getting more and more like a Government Department when it allows a really wonderful record of positive achievement to be expounded in the style and language of a "dry as dust" Blue Book. Members of Parliament have noticed this anachronism and it will be well if steps are taken to remedy the deficiency before there is intervention in an unwanted direction.

"The Background of Civilisation."

This is the title of a new series of talks which the Central Council for Adult Education, known otherwise as "The Central Elephant," and presided over by the Archbishop of York, is trying to impose on the B.B.C. But the going is not easy, even on the skin of the elephant!

Serious trouble is threatened about the inclusion of Nietzsche as one of the heroes of the series. The battle waxes fiercely.

The protagonists include the redoubtable Miss E. S. Haldane, Professor T. H. Searle, Sir Walford Davies and others, with the sphinx-like Charles Siepmann nursing his own tendencies in a neutral background. All that I can say is that I hope the Central Elephant will go on discussing the subject until it is too late to impose such an appalling series upon the innocent public.

Mr. Whitley at Portland Place.

Mr. Whitley, the Chairman of the B.B.C., has now got his own room at Broadcasting House, and is attending regularly to deal with the business of Broadcasting. I hear that he is taking a keen personal interest in the welfare of staff.

This is a very good thing. It looks as if the £3,000, which is the Chairman's salary is not being taken for granted, but is being worked for as it ought to be.

As Mr. Whitley and Sir John Reith are now intimate personal friends there is not likely to be any friction from the chairman's increasing activity.

Vaudeville News.

Two dates—Tuesday and Wednesday, July 19th and 20th—have been set aside for the next programme which Philip Ridgeway is arranging for the microphone. Although it bears the old title of the "Ridgeway Parade," I understand that Mr. Ridgeway intends introducing some brand new items.

"Flags on the Matterhorn."

The dramatic story of Whymper's historic conquest of one of the most formidable peaks of the world will be told in the broadcasts of a play, "Flags on the Matterhorn," on Tuesday and Wednesday, July 5th and 6th, respectively. This thriller, which promises to be one of the best of the year, will be given first for National listeners and repeated from Regional transmitters.

General Higgins to Broadcast.

A speech by General Higgins, leader of the Salvation Army, is to be relayed as part of the National programme from a lunch to be given in his honour at Fishmongers' Hall, in July.

Mr. Cochran on Himself.

Mr. C. B. Cochran can be relied upon to provide a sensation of some kind every few months, and I should not be at all surprised if we get a few when this supershowman speaks before the microphone next Monday, June 27th, in the "Rungs of the Ladder" series of talks.

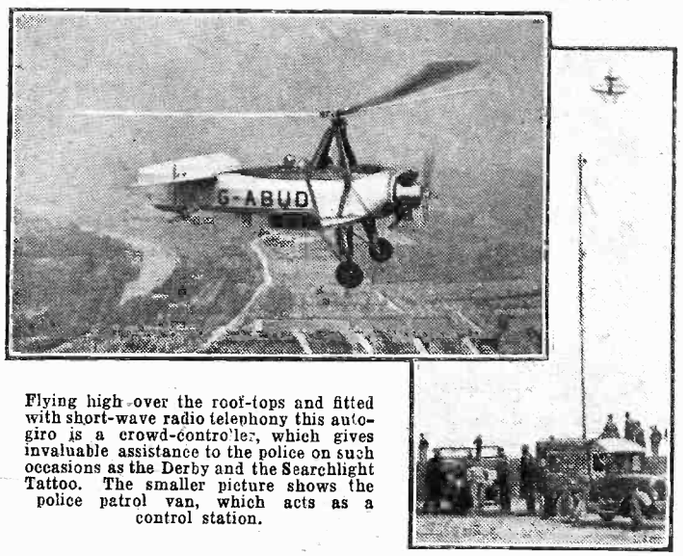
His life has been amazingly crowded with "high spots" such as are normally experienced by about twenty average men put together. In fact, I am wondering how he is going to tell listeners in a single talk all that is worth hearing about himself.

I recall listening to a talk from him about six years ago. Donald Calthrop brought him to the microphone and his subject was a book he had brought out.

Discs.

I hope that listeners will like the novel gramophone programme which is being given to West Regional listeners at 9.15 p.m. on Saturday, July 9th, under the title of "Discs," because if they do Mr. E. R. Appleton, the West Regional Director, intends to arrange a series on similar lines.

LOOKING DOWN ON LONDON TOWN



Flying high over the roof-tops and fitted with short-wave radio telephony this autogiro is a crowd-controller, which gives invaluable assistance to the police on such occasions as the Derby and the Searchlight Tattoo. The smaller picture shows the police patrol van, which acts as a control station.

THE LISTENER'S NOTEBOOK

A rapid review of some of the recent programme tendencies.

NOTE this from a German wireless journal:

"The S—— has already often pointed out that punctuality of broadcasts is a matter of common politeness to listeners. But unfortunately, unpunctuality seems to be so naturalised that only a strong decree from 'on high' could have any effect now.

"A few days ago there was a transmission from Hamburg shared by six other stations. It was to begin at 9.10 p.m. Listeners tuned in and listened; for 13 long minutes there was nothing but the monotonous Hamburg interval clock going.

"During this unnecessarily long delay, when most listeners must have switched their sets off, not one of the Hamburg announcers thought it necessary to offer a single word of apology to the waiting listeners.

"At long last, at 9.23 p.m., a voice announced the beginning of the programme just as if nothing untoward had happened. We consider this gross slackness, and once again express the hope that the authorities responsible for this sort of thing will soon take steps to avoid its recurrence."

I think we can say we get better treatment than this from Broadcasting House. We may *occasionally* be kept waiting, but we *never* have to wait for an apology. That always comes immediately.

* * *

Commenting on the appearance of a German actor in the cast at the Garrick Theatre, Mr. James Agate observed in his talk that he (the actor) was all charm and ability, and a change from the usual English actor, all charm and nice trousers—or something to that effect.

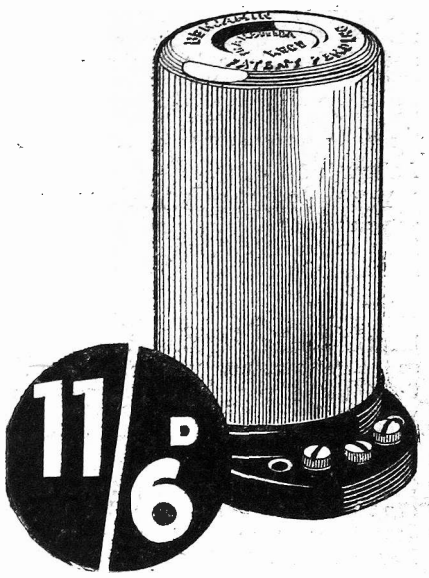
* * *

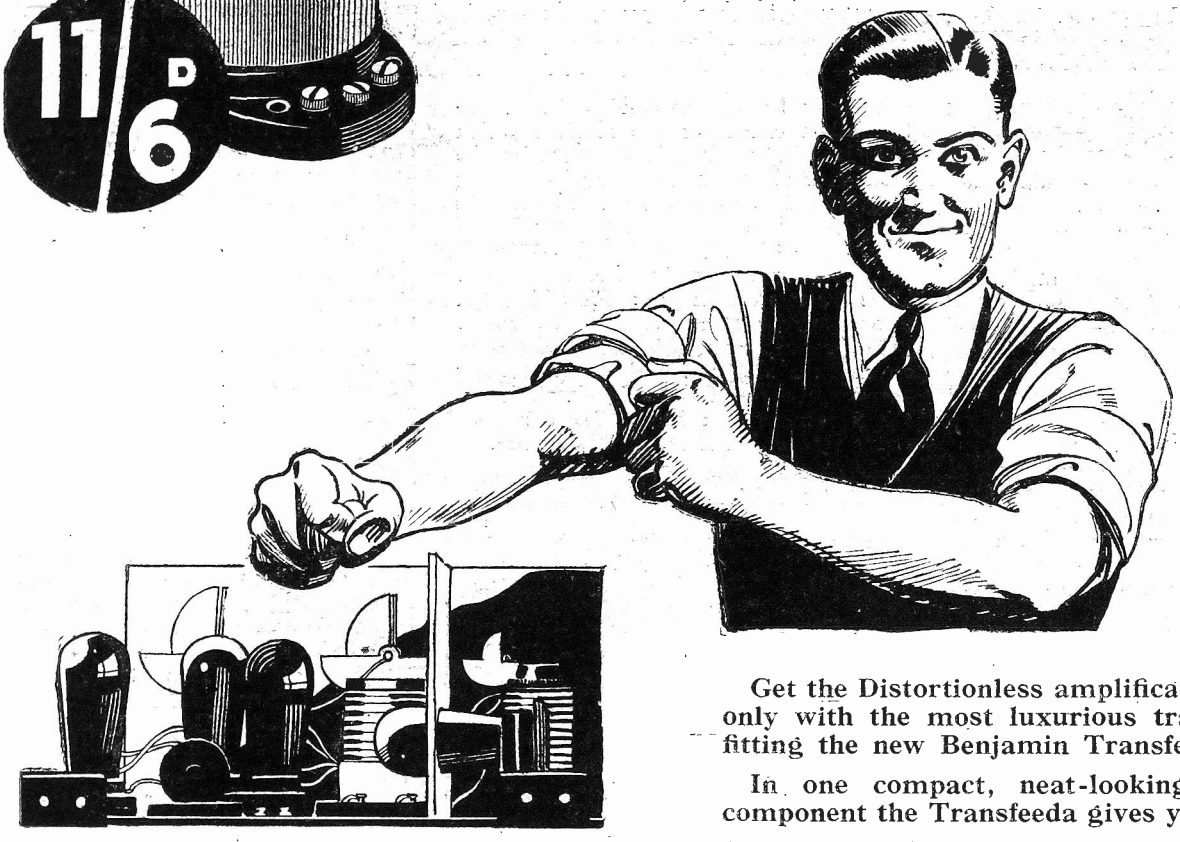
Very amusing, perhaps, and a remark that would get a laugh, but hardly a helpful one to the theatre! It is generally known that the English theatre is at present passing through very bad times.

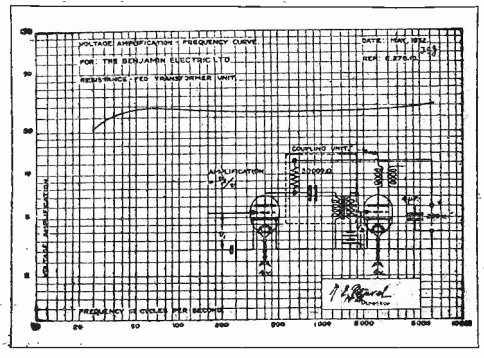
(*Continued on page* 486.)

Now! for the BENJAMIN TRANSFEEDA!

(Regd.)







Note from this N.P.L. curve what an exceptionally even amplification is obtained throughout the scale of musical frequencies — a positive proof of excellence in both materials and design.

Get the Distortionless amplification associated only with the most luxurious transformers by fitting the new Benjamin Transfeeda.

In one compact, neat-looking, inexpensive component the Transfeeda gives you—

(1) a 3:1 L.F. Transformer with special nickel iron core, inductance over 80 Henries.

(2) a silk-covered, WIRE WOUND RESISTANCE rated to carry $1\frac{1}{4}$ watts ; and

(3) a separate condenser in METAL Case.

The Resistance of 50,000 ohms is tapped at 30,000 ohms to suit various valve impedances. De-coupling provided for. Examine the N.P.L. curve here and see what unapproachable results the Transfeeda will give you.

The British Made Benjamin Transfeeda is the answer to your L.F. amplification problems. Ask your dealer.

THE BENJAMIN ELECTRIC LTD., TARIFF ROAD, TOTTENHAM, N.17

HINTS FOR "DECADE" BUILDERS

By G. V. DOWDING, Associate I.E.E.

Some further constructional details are given, and you are shown how the initial adjustments are made in order to bring the set to its highest efficiency in any local conditions. In conclusion, a few practical suggestions are provided regarding indoor and outdoor aerials.

THE Moderator coil is mounted on a small block of wood which, in its turn, is fixed to the baseboard.

The object of this is to bring the Moderator coil more into the field of the medium-wave winding of the dual-range coil than would otherwise be the case.

The exact height of the piece of wood is of no vital importance—that is, speaking in terms of sixteenths of an inch.

But the point to remember is that when the Moderator coil is in the position shown in the original model approximately the tightest practical coupling results.

Optimum Coupling.

This is the condition for maximum power, and anything less will inevitably result in some slight falling-off of volume. A few constructors may have to put up with this in order to deal with very bad local conditions, but they will at least have the satisfaction of knowing they are working down towards an average set's efficiency and not below!

By the way, I trust constructors have realised that most of the information given about the "Decade" in Nos. 522 and 523 of "P.W." applies equally well to the "Decade" With Simplified Tuning.

On the other hand, much which can be said about this instrument is applicable to the former model.

Therefore, to make the most of the space I have at my disposal, I propose to devote the remainder of this article to general "Decade" hints.

Regarding "break through," that annoying interference of long-wave reception by a powerful medium-wave station. You will find that practically any instance of this trouble can immediately be dealt with by that handy little Moderator control. You should understand that on the long waves the Moderator acts as a medium-wave rejector.

Therefore, it can *tune out* any one medium-wave station just like a wavetrap. Indeed, it is now nothing more or less than a wavetrap.

Wavetrap Action.

So you adjust the Moderator condenser until you find that point when the interfering station disappears.

You can even meet with equanimity, that rare condition where there is break-through from two stations simultaneously. And there are two alternative methods at your command.

These are:

1. An adjustment of the ·001-mfd. baseboard condenser in conjunction with a Moderator condenser adjustment.

2. The transformation of the Moderator condenser into a series-aerial condenser.

This transformation, to which I refer as the second alternative, can be carried out without any wiring alteration at all. All you have to do is to withdraw the Moderator coil plug and leave it hanging disconnected.

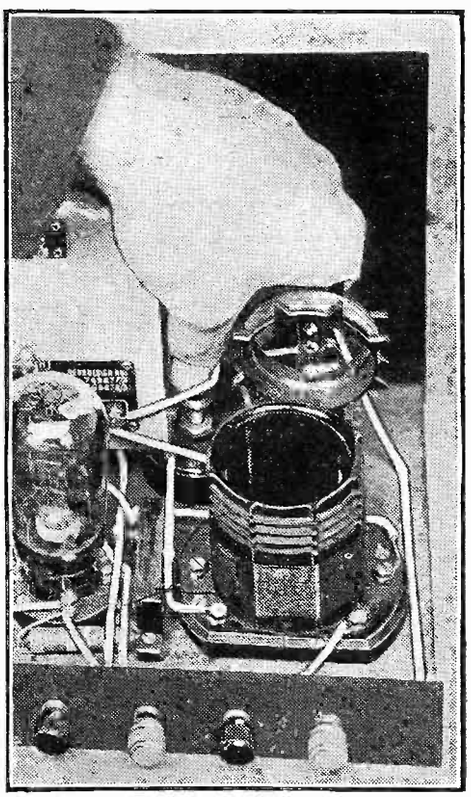
As a matter of fact, this is a tip well worth remembering if you are seeking a super degree of long-wave selectivity quite apart from the question of that specific form of interference known as "break through."

A Series Condenser.

The circuit arrangement which results can easily be seen if you glance at the theoretical circuit of the receiver which was given last week. On disconnecting the Moderator coil by withdrawing its tapping plug, the Moderator condenser is left as the only connection between the aerial and the ·001-mfd. baseboard condenser (this is only on long waves, remember). Thus the two condensers are in series, and a much lower minimum capacity is possible.

You cannot make this circuit alteration on medium waves, for the only coupling between the aerial and grid circuit is via the Moderator coil itself, this being inductively coupled to the dual-range coil.

SELECTIVITY SETTINGS



Adjusting the ·001-mfd. baseboard condenser. You set this control in accordance with your individual long-wave selectivity requirements, and once you have found an adjustment to your liking you do not have to alter it again. This ·001-mfd. condenser can also be used in conjunction with the Moderator condenser to deal with extreme cases of "break through," as is described in the accompanying article.

But you will obtain all the elasticity you need for the most extreme conditions by varying the position of the Moderator coil. You can turn it a little, or drop it nearer to the baseboard, etc.

The vast majority, however, will not need to take drastic steps of this nature and will be able to do all they want to do merely by varying the Moderator condenser as they search for stations with the "Telexor" and reaction.

Automatic Switching.

You can twist the "Telexor" knob as far as you like in either direction, and you can keep on turning in any one direction for as long as you like.

All that will happen is that you will automatically slip in and out of the wave-bands. As the 0–100 numbers are passed so the medium-wavers come in, while on the 0–200 part of the scale you cover the long-wave tuning.

The absence of a stop may at first prove disconcerting to those who have been used to the fixed 180° movements of ordinary condensers, but as they become more acquainted with their "Telexors" the fascination of 360° freedom will grow upon them.

Indeed, there is something very attractive about it as well as its direct simplicity. In fact, it brings quite a new and attractive element into tuning.

Big Aerials Are Best.

To go back to the 180° one-wave and principle, is to find oneself artificially restricted and fettered. Constructors who build "Decades" with Simplified Tuning should make the experiment as a matter of interest. We feel certain they will agree with every word we have said.

Now just a few words about aerials. Mainly through the B.B.C. it is now widely believed that good station-separation is impossible unless you clip your aerial down until it is only twenty or thirty feet long.

This is a fallacy, and to clip down an aerial in that way is to clip down your programme alternative possibilities. With a set such as the "Decade" you can employ a good aerial and still be able to maintain adequate selectivity.

Use a Single Wire.

Nevertheless, there is no good purpose served by having either two or more wires and a great length. Aim at 75 ft. as an ideal, and keep as much of this 75 ft. in the horizontal span as you can—in other words, reduce your lead-in to a minimum.

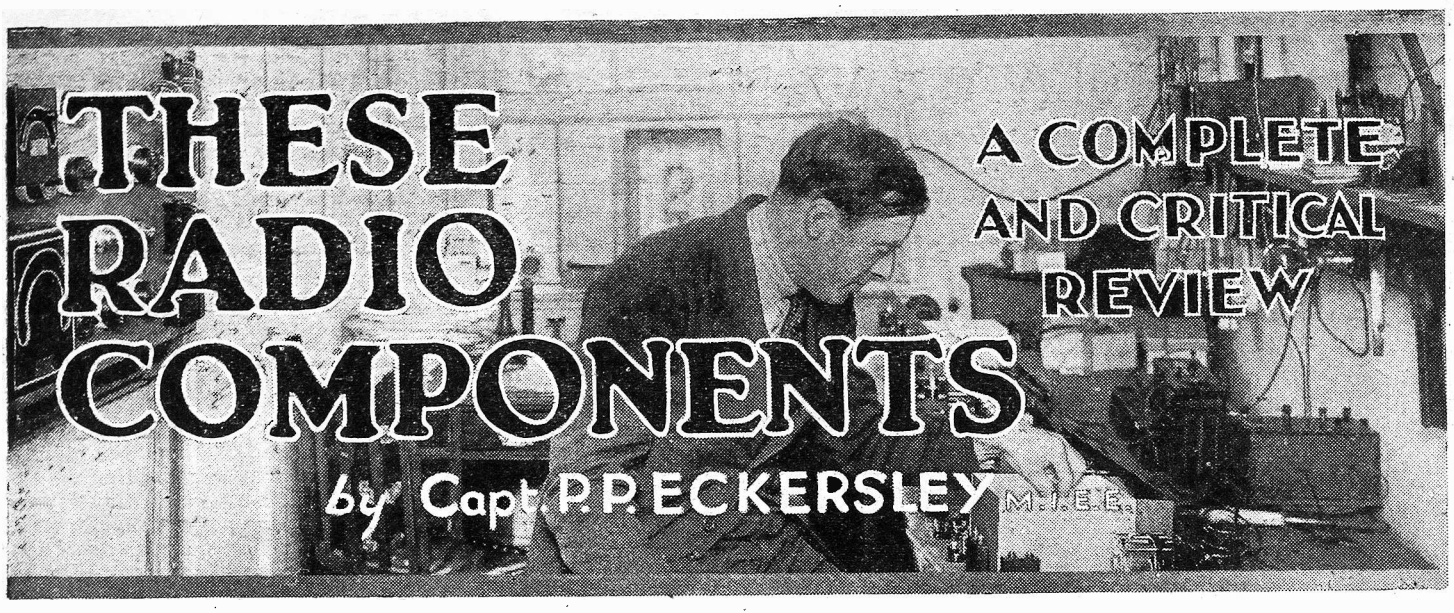
But obtain all the height you can—that is a very important factor.

With a moderately efficient aerial and a good water-pipe or buried earth your "Decade" will accomplish excellent feats of reception so long as its valves and batteries are in good order and it is operated with method.

You can, of course, use an H.T. mains unit if you desire, but see that you get a good unit, for a first-class set deserves high-grade accessories.

The "Decade" Coil.

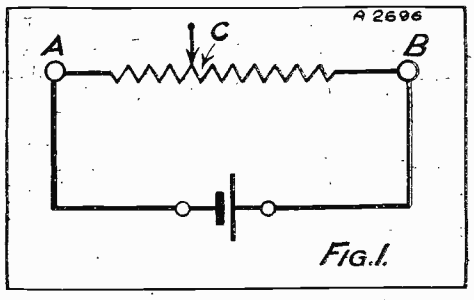
Before finishing this article there is one other point that is very important, and this concerns the coil for the "Decade" series of sets. In the diagrams and lists of components it has been specified as a type R.M. 3, but the correct coil is the R.M. 3A, the "A" makes quite a bit of difference!



LOTS of people call them potentiometers—lots of people are wrong. A potentiometer means, because its name ends in meter, that it *measures* something, and because the word begins with potent, that it measures a potential.

Now if you take a uniform resistance and connect it across a battery, as in Fig. 1, and you move a slider along it from A to B, then the actual potential between A and C is

VARYING THE VOLTAGE



If a resistance is connected across a battery as illustrated above, any desired voltage, up to the maximum of the battery, can be tapped off with the slider. Hence its name—a potential divider.

proportional to the physical distance A.C. Thus if you know the battery voltage was 2 volts and you moved the slider quarter way between A and B, then the potential between A and C would be $\frac{2}{4} = 0{\cdot}5$, and that between B and C 1·5. But this would only be the *open* circuit potential.

Do We Want Uniformity?

If, as in Fig. 2, you took the same uniform resistance and a rather bad moving-iron voltmeter which took a good deal of current, to verify my calculations, you would think you'd found me out in a mis-statement. Because the voltmeter would take current, and while a given current would flow through C and B, a less current would flow through A and C, hence the "drop" in A.C. could *not* be proportional to the position of the slider, strictly speaking.

But in the *low*-frequency side of a valve receiver we work to all intents and purposes into an open circuit, and we may say that in Fig. 3 the voltage is proportional to the setting of the potential divider—*provided the resistance is uniform along its length.* But do we want uniformity of voltage?

POTENTIAL DIVIDERS AND VOLUME CONTROLS.

This week our Radio Consultant discusses many points about potential dividers and the advantage of logarithmic resistance variation when controlling volume.

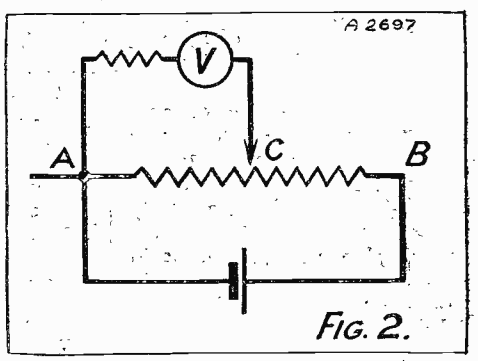
Do we want to know that voltage given to valve V_2 grid filament circuit is proportional to slider setting? The answer is that we certainly do *not*.

Now if you make a loudspeaker volume louder you do so by applying more voltage to it. Suppose you have a voltage E—a standard—and you increase that voltage twofold, then the loudspeaker takes four times the power. (Because the current is proportional to the voltage divided by resistance. So if you double the volts you double the current. But power is amps times volts, so that doubling volts means doubling current, means quadrupling power.)

About Those Decibels.

If you double the power in a speaker, does it sound twice as loud? Well, what's twice as loud, anyway? No, there's a more scientific way of looking at it than that. We talk about a unit called a "Bell," or more commonly a tenth of that unit, a

EFFECT OF A LOAD



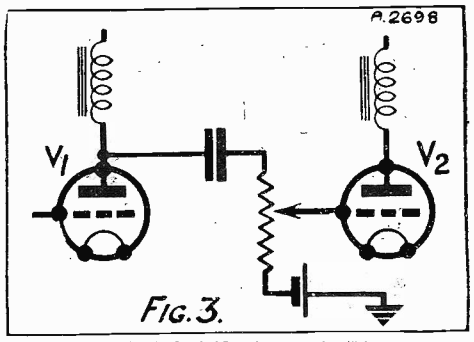
If current is taken from a potential divider, the voltage across that section of the resistance which is in use will drop considerably. (This explains why misleading readings are obtained when cheap low-resistance voltmeters are used for testing mains units employing such an arrangement.)

decibel, or more shortly still a d.b. Decibels are really the logarithm of the ratio of powers, but we won't worry you more than to say the following.

Increasing The Loudness.

If we increase the power in a loudspeaker by the same number of decibels anywhere within the limits of hearing, then any increment makes the same change of loudness. From 10 decibels to 20 decibels above some given level makes an increase

ON THE L.F. SIDE



When a potential divider is used in this manner as an L.F. volume control there will be no voltage variation due to load. This is because for all practical purposes there is no current flowing in the grid circuit.

of sound exactly the same as from 20 to 30, or 30 to 40, or 40 to 50 decibels, etc., etc.

Now here is a table showing decibels against ratios of power and against ratios of volts to produce those ratios of power.

Ratio of Powers.	Decibels of change.	Ratio of volts to produce d.bs. change.
10,000/1	40	100/1
1,000/1	30	33/1
100/1	20	10/1
10/1	10	3·3/1

So if you had a given standard voltage and you wanted to produce a 10 decibels louder signal, you would have to make a 3·3/1 change in that voltage—increase it, that is, to 3·3. If you wanted the volume to increase *as much again*—i.e. if you wanted to go up 10 decibels more (to 20 decibels above your original volume) you would have to increase the voltage ten

(Continued on next page.)

ACCUMULATOR WORRIES

An amusing account of the varied troubles experienced with early types of low-tension accumulators.

By ONE OF OUR READERS.

IN fiction one occasionally comes across the unfortunate gentleman whose hair turns white in a single night. In our early struggles with wireless apparatus, we had an accumulator that behaved in an identical manner. We unfortunately parked it for the night in the back kitchen, where it could watch our water motor and dynamo, in one of its rebellious moods, dealing drastically with another innocent victim.

As White as Snow.

The strain, apparently, was too much for it, and in the morning every plate was white as driven snow: it never recovered from the shock. Of course, there may have been other reasons. In our innocence we had run it for an evening with only the addition of acid, believing it had arrived fully dry charged, but there is no question that when we left it that night the plates were a nice brown colour, and twelve hours later complete sulphation had taken place. It must be almost a record.

A second accumulator (admittedly cheap) was seized with a tendency to corpulence; in fact, the swelling of the plates and the increasing convexity of the celluloid container was so alarming, that the accumulator became a real pest. Every minute or so one kept peering round the edge of the set in terror lest the wretched affair had burst a seam, and was secretly dropping acid on the carpet. Eventually we installed it as a 4-volt lighting plant in the coal cellar, where it could drip to its heart's content if it felt inclined; naturally it never did.

One of the most annoying troubles is that known as "creeping." A film of acid climbs the stems of the plates, by surface attraction, finally reaching the terminals where it at once commences a vile attack on the brass, particularly at the positive terminal.

If left for any time unattended, the terminal becomes coated, and in bad cases may even be eaten through. The usual remedy is scraping, and the application of vaseline. This is, however, only a palliative once the trouble has become anything like acute.

Quite by accident we came across a much better remedy. We had been renewing the plates in a small accumulator, and the pitch had failed to stick to the stem of the positive plate. There was a clear road for the acid to follow and it took it.

Our Cheap Cure.

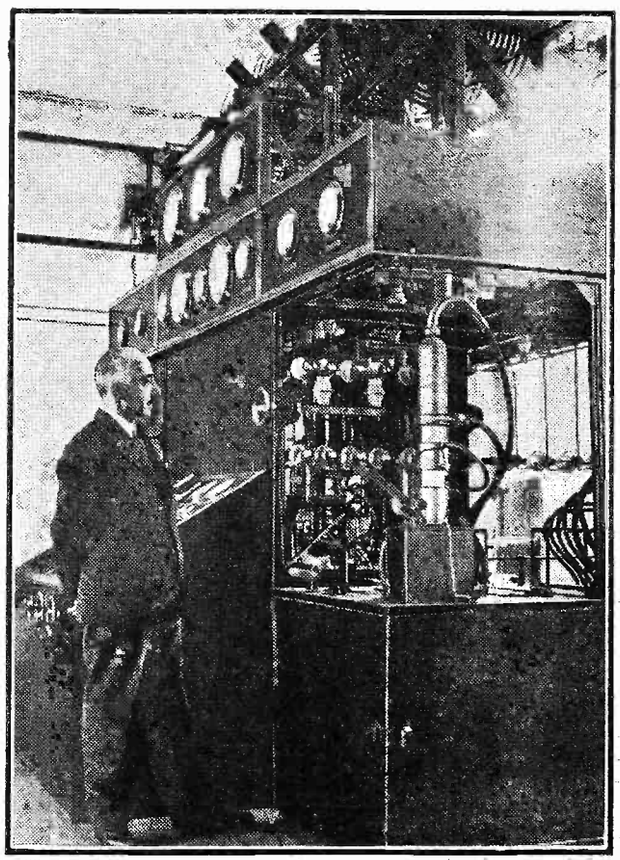
After a day's use, the positive terminal was heavily coated. The cure was exceedingly simple, and cheap. A tube of "Certofix" liquid glue, obtainable at any Woolworths. All we did was to clean up the terminal and clear away the exeess acid around the stem with a piece of cotton wool.

A fairly generous application of the glue made a perfectly acid-tight joint between the pitch and the stem of the plate: the glue hardened to a solid mass, in spite of the trace of acid which must still have been present, and after a fortnight's use there is no sign whatever of acid tending to creep. It seems to be the perfect cure, but as a precaution it would be wise to neutralise any acid on the stem and surrounding case with ammonia.

One of our batteries came to a premature end through lengthy charging at too high a rate. Scientists talk in puzzled tones of the difficulties of disintegrating matter. All you need is a small accumulator and a really hefty amperage to watch the process taking place before your eyes.

The rate at which the positive plate disintegrates will surprise you!

A FAMOUS FRENCH SCIENTIST



M. Belin, one of France's foremost scientists, and a well-known radio engineer, standing in front of some of his latest apparatus. He has many radio inventions to his credit, particularly in connection with picture transmission.

THESE RADIO COMPONENTS

(Continued from previous page.)

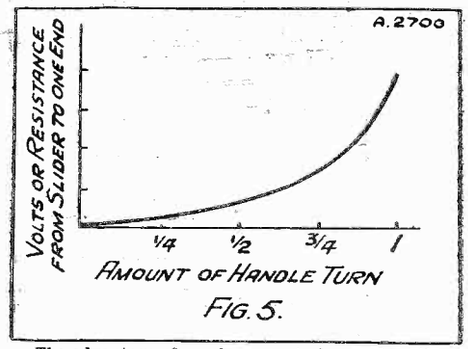
times. For the next ten decibels your voltage is increased 33 times the original and for the next, one hundred times.

Now in Fig. 4 you will see that I have plotted something proportional to the position of the slider *if the resistance was uniform* against change in volume. Starting at one end it takes only a small turn, O A of the handle to make 10 decibels difference to volume, a bigger turn A B for the next 10 decibels, a bigger one yet B C for the next, and C D only does another 10 decibels still over two-thirds of the travel.

What We Really Want.

So for volume controls we don't want the slider position to be proportional to resistance at all. Take it in four steps then for the first quarter of a turn, the resistance should change from 1 to 3·3 for the next quarter, from 3·3 to 10, next 10 to 33, and finally 33 to 100. In fact, the voltage should be as shown in Fig. 5.

A LOGARITHMIC ARRANGEMENT

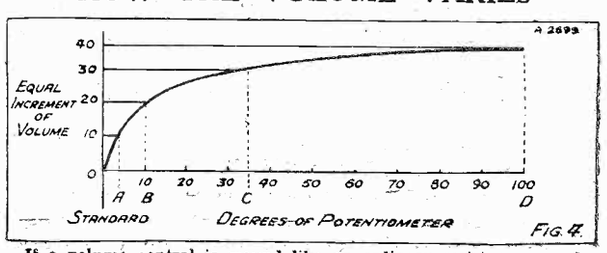


The advantage of a volume control wound on the logarithmic principle is that the variation in volume is proportional to the amount the knob is turned.

Thus for low-frequency volume controls you want to use "log law" potential dividers of high total resistance (so as not to overload preceding valve), and be *sure* to connect them round the right way.

I shall continue with this subject in my next article.

HOW THE VOLUME VARIES



If a volume control is wound like an ordinary resistance, equal adjustments of the knob giving equal variations of resistance, the alterations in volume will be represented by a curve similar to the one shown above.

EVERYTHING The G.E.C. your guarantee ELECTRICAL

OVER ½ MILLION

HOME CONSTRUCTOR'S KIT SETS are in use which employ a single stage screen-grid H.F. amplification.

All these sets would be improved by fitting an OSRAM S.22

PRICE 16/6

Osram S.22

The OSRAM S. 22 has the highest overall amplification of any 2-volt screen-grid valve in the world .... 1.75 ma/volt, using the wonderful

WEMBLEY FILAMENT

OSRAM 2-volt Valves with the WEMBLEY FILAMENT

REDUCED PRICES

		PRICE
S.22	High slope Screen Grid	16/6
S.21	Medium slope Screen Grid	16/6
H.2	High amplification Det. and RC.	7/=
HL.2	The non-microphonic Detector	7/=
LP.2	L.F. and Small Power	8/9
P.2	Super Power	12/=
PT.2	Economy Power Pentode	17/6

The OSRAM S.22, S.21, H.2, HL.2 can be supplied either metallized or clear.

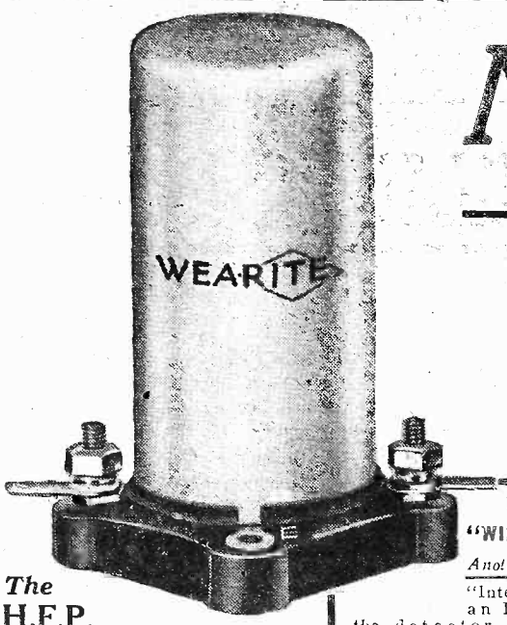
Osram valves

Sold by all Wireless Dealers

MADE IN ENGLAND

EXTRA QUALITY WITHOUT EXTRA COST

Advt. of The General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2



The H.F.P.

Write for special leaflet—If you have any technical query let our Service Dept. know.

NOW!

—A SCREENED H.F. CHOKE

HERE is something new in H.F. Choke practice. Designed on scientific lines, built in a scientific manner it meets a long-standing need of the constructor. This New Wearite Choke—the H.F.P.—is entirely enclosed in an aluminium "pot" which is provided with an earthing point—interaction between it and neighbouring components is eliminated. Tested under various working conditions it is suitable for all wavelengths from 15-2500 metres—and is free from marked resonance peaks—a sound component at the right price - - - - - - **3/6**

Extract from "WIRELESS WORLD"

Another source of Hum—

"Interaction between an H.F. Choke in the detector anode circuit and the power transformer is a possible source of hum. A.C. voltages induced into the circuit will be communicated to the grid of the succeeding L.F. valve."

THE NEW WEARITE CHOKE SOLVES THIS PROBLEM.

WEARITE

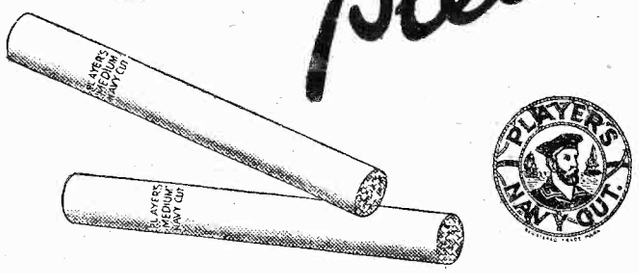
WRIGHT & WEAIRE, LTD.,
740, HIGH ROAD, TOTTENHAM, N.17.
Telephone: Tottenham 3847/8.

7.7.

THE MILLIONS WHO SMOKE THEM MUST BE RIGHT

They say

Player's Please



The Quality and Quantity Cigarette

NCC 104 B

"POPULAR WIRELESS" ADVERTISEMENT RATES

Whole Page £40 **Quarter Page £10**
Half Page £20 **Eighth Page £5**

Narrow Column Advts. (3 cols. to page) per inch 30/-
Minimum Space accepted - - - - half inch 15/-

NO SERIES DISCOUNT. ALL ADVERTISEMENT COPY SUBJECT TO EDITORIAL APPROVAL

COPY AND BLOCKS MUST BE IN HAND 11 DAYS BEFORE DATE OF ISSUE TO ENSURE PROOFS

ALL communications respecting ADVERTISING must be made to:—

JOHN H. LILE, Ltd., 4, Ludgate Circus, London, E.C.4.

Telephone: City 7261.

OSBORN

Model No. 219.

RADIO CABINETS
MADE BY CRAFTSMEN FOR PARTICULAR PEOPLE.

Model No. 219. A Radio or Radiogram Cabinet, 3 ft. 9 ins. high, 2 ft. 2 ins. wide, 1 ft. 6 ins. deep. Baffle board behind Fret 24 ins. × 24 ins. Metallic Fabric for Fret Front included. Opening at top and back. Takes Panel 2 ft. × 9 ins., or smaller. Complete with Motor Board. **PRICES: Machined Ready to Assemble:** Oak, £3.5.0; Mahogany, £3.10.0; Walnut, £4.0.0. **Assembled Ready to Polish:** Oak, £4.5.0; Mahogany, £4.10.0; Walnut, £5.0.0. **Assembled and Polished:** Oak, £5.5.0; Mahogany, £6.0.0; Walnut, £6.15.0. *All Models Carr. Paid. Send 3d. in stamps for new 1932 beautifully Illustrated Catalogue.*

CHAS. A. OSBORN
(Dept. P.W.), The Regent Works, Arlington St., London, N.1. *Telephone: Clerkenwell 5095. And at 21, Essex Road, Islington, N.1. Telephone: Clerkenwell 5634.*

STATIONS WORTH HEARING

Up-to-the-minute information for the long-distance searcher.

SOME time ago, when I gave a hint or two on dodging atmospherics, I did not mention one tip which occasionally produces very satisfactory results. This is the deliberate introduction of damping into the aerial-earth system.

Shock excitation, such as is produced by both atmospherics and powerful spark transmitters at moderate range, causes its greatest effects in circuits that have been made highly efficient by the removal of all possible damping. Conversely, if a circuit is deliberately damped, shock excitation effects can be very greatly reduced.

Reducing Atmospherics.

The simplest way of introducing damping is to connect a variable resistance straight across between the aerial and earth terminals and gradually to reduce its value (which, of course, means increasing the damping) until the interference is at a minimum.

Obviously the amount of damping that can be introduced in this way is limited by the strength of the incoming transmission. It is therefore useful only upon stations that are very strongly received. There are, however, a considerable number of these, after dark, at any rate, and experiments show that in some cases the method can be used with considerable success.

The only stations with which it can be used are those which normally require a little volume control. The set which I generally use for long-distance work has two screened-grid high-frequency stages, a grid-leak-and-condenser detector and a power output stage.

This is employed in conjunction with an indoor aerial stretched across the attic. With this set the medium-wave stations requiring the volume control after dark just now are: Langenberg, Prague, Rome, Toulouse, Brno (on certain nights), the Poste Parisien, Hilversum, Heilsberg, Turin, Trieste, Nürnberg (as a rule) and Fécamp.

On the Medium Waves.

Those upon which atmospheric interference is at its worst are the ones below 300 metres, that is Hilversum, Heilsberg, Turin, Trieste, Nürnberg and Fécamp. The reason, I suggest, is that there is comparatively little damping in the tuned circuits of the set, owing to the fact that the amount of parallel tuning capacity is small.

By means of the variable resistance atmospheric interference can be cut down to a very satisfactory extent before a particular station's transmission becomes too feeble for one to enjoy its reproduction by the loudspeaker.

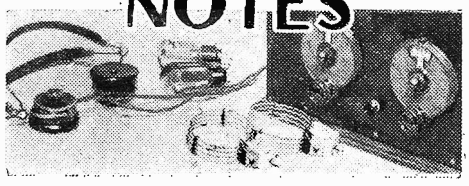
The reader who is of an experimental turn of mind will find this a most interesting field. I must, though, point out that he must make sure of avoiding the direct pick-up of undamped wave-trains by seeing that his set is as efficiently screened as possible and by reducing the length of all external leads as much as he can.

Some Good Advice.

Were it not for atmospherics the number of stations receivable with genuine pleasure would be very large indeed. Confine your attention to the most powerful on nights when interference is bad, but when you strike a night of comparative peace in the ether make a careful search and you will probably be surprised by the total of the stations received at full loudspeaker strength that can be added to your log.

R.W.H.

SHORT-WAVE NOTES



By W. L. S.

CONDITIONS this month can hardly be said to be *dull*, but they certainly are freakish. On most nights the regular "stand-by" Americans like W2XAF and W2XAD can be received at some sort of strength; and on roughly one night in every three they are excellent. But our eleven-year cycle certainly seems to be making its presence felt this summer.

Do not forget, though, that the "fifteen-month" cycle predicts a good period in the autumn this year. And don't be caught napping after the poor conditions of the summer without a receiver.

Are You an "H.A.C."?

I have been glancing through some old issues of "P. W.," and was rather interested to read, under the heading of "Short-Wave Notes" for February 9th, 1929, these words: "The amateurs have their 'WAC Club,' to qualify for which one has to 'WAC' (Work All Continents). Can any broadcast listener claim to belong to the 'HAC Club' by having *heard* all continents on telephony?" At that time there was no regular broadcast station in South America, so that the "HAC" presented difficulties that do not exist nowadays.

Nairobi, I fancy, was also not regularly on the air in those days, and Rabat certainly wasn't, so that Africa was not easy to "bag" on telephony.

"G. K. M.," a South African reader, has made a short-waver that gives him good results when no earth is used; as soon as the latter is tacked on a tremendous hum blots out everything. I should think, "G. K. M.," that the overhead power lines you mention are probably responsible; in any case you won't lose anything by leaving the earth connection out of it.

Concerning the "unearthly yell" to which your set gives vent when you use a pentode, I should suggest that you decouple the H.T. feed to the priming-grid of the valve. Use 20,000 ohms in series with it and increase your H.T. a little, and I think you will find that you have tied things down successfully.

Very Disturbing!

"A. E. B." (Oxhey) has received a letter "in lieu of a QSL" from WAJ which is a grim reminder of the "divulgence" clause in our licences. The letter explains that WAJ is not a regular short-wave broadcast station, and that it "radiates addressed programme material between the United States and points abroad."

With frigid politeness the authorities point out that no one except the observers at the point to which their programme is addressed has any right to make use of the programme, and that "the unauthorised divulging of the contents or simply of the existence" is in violation of the secrecy provisions of the International Radio Convention!

So now we know! If I hear a station like WAJ on the air, without knowing whether it is broadcasting or not, I am not allowed even to "divulge its existence"! I must indeed "gang warily."

A Wonderful Log.

"W. W." (Exeter) sends in a beautiful log for the period May 19th–June 3rd, which must have taken him several hours to write out! Analysis shows the most consistently-received stations to be W2XAF, W2XAD, W8XK (25·25-metre wave), and (rather unusually) W1XAZ (31·35 metres).

"W. W." also mentions that he receives the English programmes through an unknown station that relays them on about 65 metres. Does anyone know *this* one? He also finds Fécamp good on 52 metres.

Incidentally, "W. W.'s" log (broadcast only) for a fortnight occupies six closely written pages, which seems pretty good going. Can anyone rival that?

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

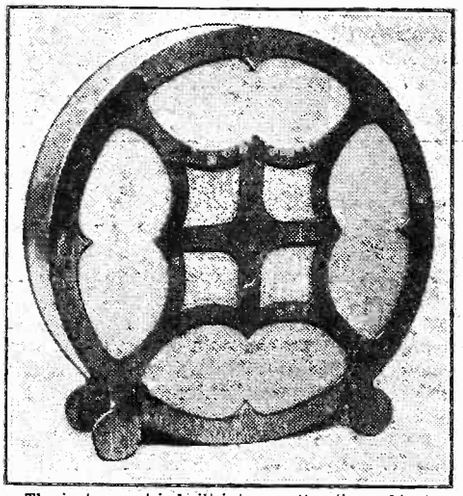
Tested and Found—?

OVERCOMING RESONANCE.

ONE of the most common failings of cabinet-type speakers is due to resonance effects in the cabinet. At times this is so bad as to be quite objectionable.

Especially is this so with the cheaper type of speaker in which no real attempt has been made to meet the trouble.

THE "DONOPHONE" SPEAKER



The instrument is built into an attractive cabinet moulded in a novel style.

But this is certainly not the case with the Donophone speaker I have recently been testing. It has full-size openings on both sides, and while this must inevitably diminish the bass-frequency distribution to some degree, it certainly almost entirely eliminates the box resonance.

And I should say the structure has been very happily planned, for in this regard the Donophone is certainly quite superior to many other speakers in the same price class.

Additionally, it gives a good all-round performance as to its frequency response and is sensitive. At the price of 30s., it is a speaker well worth consideration.

STOPPING BREAK-THROUGH.

Since the introduction of the Regional Scheme "break-through" has become a serious thing, and with the opening of the Scottish Regional many more listeners will encounter it.

You need have no doubts as to whether or not your set suffers from it, for "break-through" is the interference of a medium-wave station on the long-wave band.

It is due to the aerial circuit on long waves being roughly in tune at medium wavelengths instead of "aperiodic."

A cure is to arrange a "P.W." "Contradyne" adaptation of the existing circuit, i.e. insert a simple hank-wound coil which is brought into series with the long-wave primary winding or tapping of the tuning coil.

And in this connection it is interesting to note that Messrs. Lissen are marketing what is in effect a Contradyne coil in a compact, neat form.

They call it the Anti-Break-Through Choke, and it is perfectly effective. Sufferers from "break-through" have thus an inexpensive and efficient remedy at hand. Details for using the device are given with it.

AN INDOOR AERIAL.

Modern sets do not necessitate the meticulously efficient outdoor aerials that were once almost essential to good reception. A good indoor aerial is indeed all that is needed in many cases—greater aerial pick-up than is possible with such resulting in an increase in static and general background noises.

There are numerous ways of arranging an indoor aerial, and one of the best I have met is to be found in the Picture-Rail type of the Melbourne Radio Indoor Aerial.

This comprises 12 feet of excellent flexible conductor of braided construction having the colouring of old gold. (At least, I think it is that, as I said once before when describing the self-same material—anyway, I find it very pleasing.)

And, at intervals are picture hooks and stand-off insulators. The cost is 2s. 6d. It is effective in operation and its appearance will no doubt prove to be definitely attractive in the eyes of many.

SOME EXCELLENT NEW COMPONENTS.

I will not attempt to deal this week with all the new components which Messrs. Wright and Weaire are now making, so I have split the range into two batches and will describe the second lot in a future issue. Here is the first collection.

(1) The R.D. Resistance is an answer to the constructor's dream. It comprises a small, sectionised wire-wound resistance of a neat, entirely practical plug-in type. Obtainable in a wide range of values from 50 to 25,000 ohms (current-carrying capacities from 280 to 9 milliamperes), it is designed and made on completely sound lines and conforms with its specification.

The prices of the R.D. resistance vary with the resistance values, and range from 1s. 3d. the 50 to 600 ohms models up to 2s. for 15,000, 20,000 and 25,000 ohm values.

(2) The On-Off Push-Pull Switch costs 1s., and embodies a most original and effective action. Its contacts are reliable and self-cleaning, and it has a clean, easy snap action. In fact, it is as near perfection as can be visualised.

The same efficient construction is to be seen in the new Wearite Wave-Change, Change Over and 4-pole push-pull switches.

PLEASE NOTE.

Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department with the strictest of impartiality, under the personal supervision of the Technical Editor.

We should like to point out that we prefer to receive production samples picked from stock, and that we cannot, in any circumstances, undertake to return them, as it is our practice thoroughly to dissect much of the gear in the course of our investigations!

And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are, therefore, framed up in a readily readable manner, free from technicalities unnecessary for that immediate purpose.

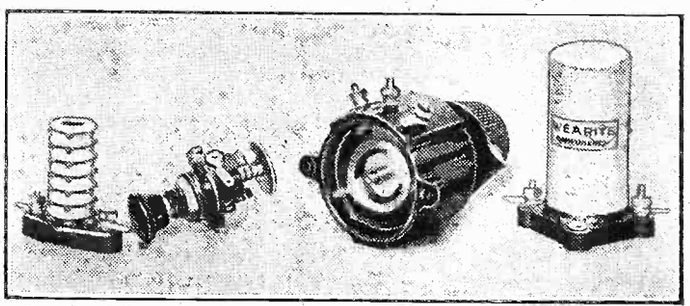
(3) The Volume Control at values from 600 to 50,000 ohms, retails at 4s. 6d., and an attachment for ganging is available at 1s. It has a beautifully smooth action, and this is made possible by means of a small roller which smoothly glides round the wire contact track. Resistance variation is even and flawless.

This component is also obtainable in values of from 50,000 to 100,000 ohms at 5s. 6d.

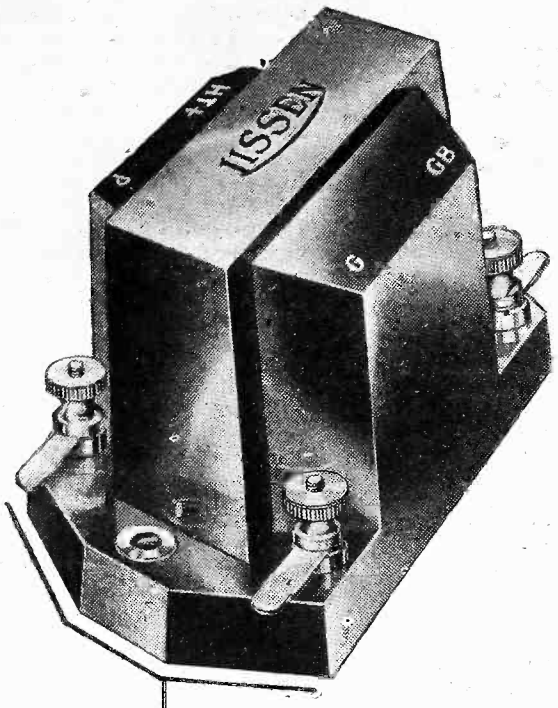
(4) The Screened H.F. Choke is a small component, unusually small, but it is universal in character and we find it adequately operates over the range claimed —15 to 2,500 metres. At 3s. 6d. it is excellent value for money.

I congratulate the makers of these Wearite components for they are doing the industry and the public a good service by producing such high-class gear at such reasonable prices.

FOUR FINE "WEARITE" LINES



Samples of the new resistance, switch, volume control, and H.F. choke now being made by Messrs. Wright and Weaire.



The transformer for the "Decade"

THE HEART OF A HUNDRED RADIO CIRCUITS

WHY do all the circuit designers specify the Lissen Torex Transformer? Because they know they cannot get any other transformer which gives such even amplification over all audible frequencies at anything like this price—because it makes a big cut in the cost of a receiver without sacrifice of quality—because it is a well-finished, well-designed component that is worthy of inclusion in any set.

PRICE 5/6

The Lissen Torex is a high grade silicon steel core transformer; its moulded bakelite case hermetically seals and completely insulates the windings. Atmospheric moisture cannot penetrate, therefore it never breaks down.

LISSEN TOREX
L.F. TRANSFORMER

LISSEN LIMITED, Worple Rd., ISLEWORTH, MIDDLESEX

Bring Your Music Out of the Instrument

Get rid of that tunnel effect by fitting the Howe Box Baffle. No ordinary loud-speaker cabinet is entirely free from resonance and resonance means distortion, a muffled tone, and unpleasant "boominess."
The Howe Box Baffle eliminates all resonance and is the scientific solution to this difficult problem.
The B.B.C. Year Book says "Actually, the results obtained from a Loudspeaker thus treated are . . . superior to those obtained using a flat baffle."
Any home constructor can fit a Howe Box Baffle. It requires no alteration to your set and no technical knowledge. The Kit contains full instructions and every single item required to construct it. Price, including royalty, **20/-** delivered free.
Don't put up with faulty reproduction any longer. Ask your dealer or post this coupon for full particulars to **F. McNeill & Co., Ltd., (Radio Dept. 10), 16, Lamb's Passage, Bunhill Row, E.C.1.**

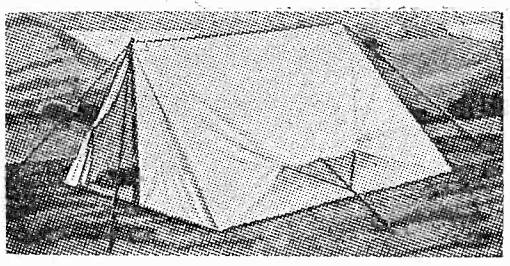
The Howe Box Baffle Kit

"The Doom of Boom"

Not suitable for Portables.

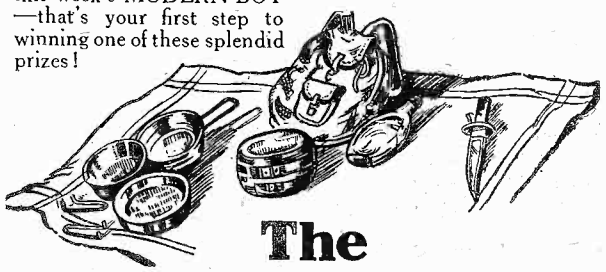
POST THIS FOR FREE BOOKLET
To F. McNEILL & Co., Ltd., (Radio Dept. 10), 16, Lamb's Passage, Bunhill Row, E.C.1.
Please send me details of the Howe Box Baffle Kit.
Name.....
Address.....

FREE To Readers of MODERN BOY



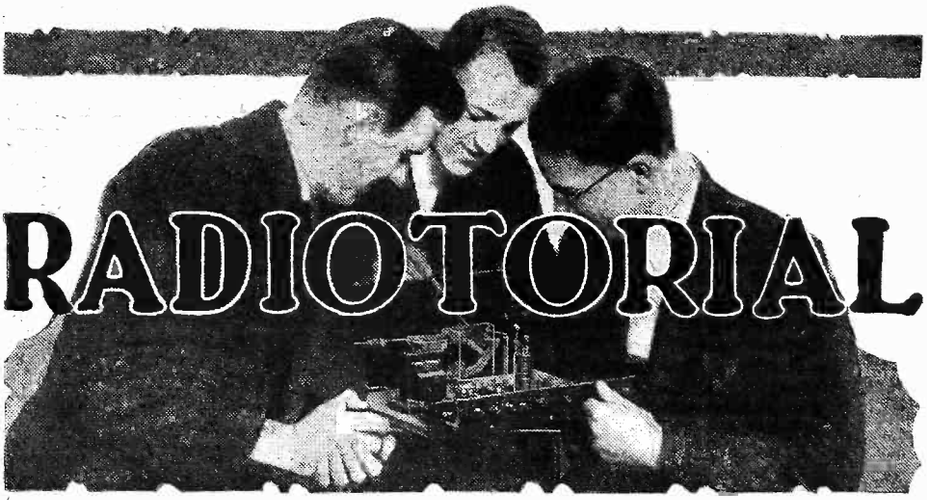
Grand Camping Outfits

will be given away as prizes in a simple and fascinating competition to readers of MODERN BOY. Each Outfit includes a Tent, Rucsac, Canteen, Sheath Knife, Groundsheet and Flask. *You* might win one. So get your copy of this week's MODERN BOY—that's your first step to winning one of these splendid prizes!



The MODERN BOY

Buy Your Copy To-day - - - 2d.



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 specialties 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.

QUESTIONS AND ANSWERS

FINDING THE CURRENT.

C. A. (Luton).—"The makers of the valve kindly give away what they call a 'characteristic curve,' and I have been trying to understand this, without much success. How do I find what my anode current should be for, say, 6 volts grid bias?

"The power valve I am working on at the moment has a curve with grid volts from 0 to 20 marked along the bottom, and anode current from 0 to 16 marked along the side. There are four actual curves drawn in, one marked E75, the next E100, the next E125, and the fourth E150.

"I take it these are the values (75, 100, etc.) from the H.T. battery. If this is so, how do I work out what anode current I should be taking for certain grid volts?"

The idea behind all graphs of this nature is that the actual curve relates the values along the bottom line to the values along the upright line, both the necessary measurements being laid off exactly at right angle to the scales. This simply means that the various upright lines and horizontals of the "characteristic curve" can be used to denote grid volts or anode current respectively when they meet on the curve at the same point, and any intermediate values can be indicated by lines running parallel.

The easiest way to understand that statement is to take a piece of square notepaper (or any similar right-angled straight edge), and place it so that one of the corners rests on the voltage line in which you are interested. If, for instance, you are going to employ 150 volts to the plate of the valve in question, slide the corner of your square of notepaper up and down the 150 line, *keeping one edge of the paper vertical, and the other exactly horizontal.*

Then the value of one scale, where the "straight-edge" touches it, is instantly and obviously related to the value on the other scale, which it touches also.

With the edge of the square of notepaper on, say, 6 volts grid bias, and the point or corner on the 150-volt characteristic curve, you will find that the other scale is cut at (say) 15 milliamps. This represents the anode current, at those two voltages.

Move the point of your paper down the curve and it shifts to the left, where it will cut, say, 8 volts grid bias, and 11 milliamps. A little further down you get 9 volts grid bias and a fraction over 9 milliamps and so on.

In this way you can see how the alteration in grid bias affects the anode current when the voltage on the anode is kept steady. Note too that with amplifying valves it is the long, straight part of the curve that must be used, for if any of the bent parts are used, distortion will be experienced.

As a matter of fact, the effect of the incoming "programme-voltages" on the curve in question is to alter the grid voltage about the mean grid bias point, and thus continually to alter the anode current about a mean or average value. For distortionless amplification it is necessary that equal voltages up and down around the grid bias point should result in equal current variations up and down round the mean anode current.

It sounds rather complicated, but it will be perfectly clear if you work out a few examples with a piece of square notepaper as suggested.

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 and answer them you can compare your own solutions with those that appear on a following page of this number of "P.W."

1. **Apart from the London area, which county in England has the greatest percentage of licence-holders to population?**
2. **What is the difference between the "actual" and the "ignition" capacity of an accumulator?**
3. **To what frequency does a wave-length of 5 metres correspond?**
4. **Does the thickness of a baffle-board affect reproduction?**
5. **Where is the B.B.C.'s present Empire Station, and where will the new one be?**

ANSWERS to the above questions will be found on page 484.

USING TWO ANODE RESISTANCES INSTEAD OF ONE.

D. E. S. (Wolverhampton).—"My set is a three-valver—Detector, resistance coupled to 1st L.F., which is transformer coupled (3 to 1) to power valve. Results quite satisfactory, though my friends who are 'noise-merchants' and who run three-valvers near me all said it was not as loud as it ought to be.

"It is a bit of an 'old-timer,' having been built in 1928, and the anode resistance (mounted in a strong clip, as there were no such things as spaghetti's then) was marked 150,000 ohms. I also had a second of these same wire-round resistances marked 150,000, left over from a prehistoric set. And I changed over the spare with the other anode resistance to see if it would make any difference.

"There was none to speak of, but when putting it back to try once again I held one resistance with its metal ends touching the metal on the other one—quite by accident. But up came the volume.

"It was decidedly better that way, so, as I could not see any harm in it I tied the two firmly together, (string!) and then poked one into place in the holder with the other making firm contact at both ends. Results very good.

"What I do not understand is why two resistances should give better results than one in the anode circuit? And have I made the coupling to the next valve stronger by passing more current than before?

"Or what?"

The effect of connecting one resistance "across" or in parallel with another resistance of equal value, is to reduce the total effective resistance by one-half.

Thus you now have, in effect, a 75,000-ohm anode resistance, instead of 150,000 ohms.

Normally, this reduction of the value of the coupling resistance of an R.C. stage would *reduce* the coupling by an appreciable amount. But your results are stronger, so evidently there is another factor at work.

In all probability this is the amount of H.T. applied to the detector. You were probably "starving" the plate of current by the use of a 150,000-ohm resistance, and this was causing the valve to work at low efficiency, even with a high-value coupling resistance.

When the lower anode resistance permitted more H.T. to reach the plate of the detector, the overall results (despite the lower valve of coupling resistance) were noticeably improved. It may easily happen with a valve that is rather critical of its H.T. voltage.

WHAT'S WRONG?

IS IT THE CONDENSER?

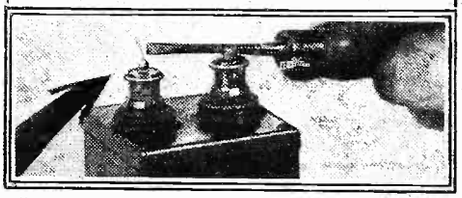
A dud condenser is one of the commonest causes of run-down H.T. batteries.

* * *

Large condensers (·5 mfd. or so) can be tested by charging from D.C. mains or H.T. Battery and after an hour or so's interval testing for a spark, as shown below.

* * *

A dud condenser will not hold the charge and show a spark even an hour afterwards.



THE SUNDAY NIGHT TIME SIGNAL.

S. R. (Cleckheaton).—"I wonder if you can help me to identify two stations which I have just logged at the bottom of the tuning dial on medium wavelengths?

"I cannot say the likely wavelength to

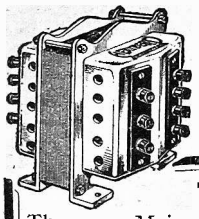
(*Continued on next page.*)

'P.W.' PANEL No. 77. THE VALVE: AMPLIFICATION FACTOR OR 'MU.'

Before signals are applied to a valve the working voltages ensure that a certain plate current is flowing. If the PLATE voltage is increased this plate current will increase by a certain amount. A similar rise in plate current could instead have been effected by a change in the GRID voltage. And this voltage change would have been much SMALLER, to get the same effect.

* * *

The amplification factor or mu (μ) of the valve then is equal to the grid volts required to produce a given anode current change divided into the plate volts required to produce a given current change. Thus if 20 volts on the plate produce the same effect as 2 volts on the grid, the amplification of the valve in question would be $\frac{20}{2}=10$.



NEW!

TRANSFORMERS

The new Mains Transformers, introduced by Heayberd for use with the latest Westinghouse Rectifiers, are proving extremely popular with Amateur Constructors wishing to build their own Mains Units. Send 3d. stamps *now* for new List 964, describing fully, with circuit diagrams, the models detailed below.

	Secondary Tappings	Capacity	Rectifier	Rectified Output
W. 33	240 v.	200 ma.	H.T. 9	300 v., 60 ma.
	4 v.	5 amps.	A.C. valves	
	4 v.	1 amp.	Power valve	
W. 34	150 v.	550 ma.	H.T. 10	200 v., 100 ma.
	4 v.	5 amps.	A.C. valves	
	4 v.	1 amp.	Power valve	
W. 35	300 v.	550 ma.	H.T. 11	500 v., 120 ma.
	4 v.	5 amps.	A.C. valves	
	4 v.	1 amp.	Power valve	

Prices: W.33 35/-, W.34 45/-, W.35 65/-

HEAYBERD

MONARCH OF THE MAINS.

10, FINSBURY STREET, LONDON, E.C.2

(One minute from Moorgate Underground Station).

GENUINE BARGAIN. Full-size, up-to-date British-made Fountain Pens, beautifully engraved with 14-ct. Iridium-tipped nibs, lever self-filling device, and safety cap, at **3/-** each; usual price 6/6. ½-doz. lots at **16/-**. Sent on approval, cash or C.O.D. Cannot be repeated.—**Brookman Rapid Radio Service, 77, Hockley Street, Birmingham.**

The Goods as Advertised! From TWO to TWO THOUSAND metres, we can solve your Radio Problems, including Amateur Transmission! Whatever your difficulty, write us. Charges: **3/-** per query, four or more **2/6** each, including diagrams.

RADIO TECHNICAL AGENCY, DEPT. P.W.
2, Westgate Chambers, Newport, Mon.

"ENGINEERING OPPORTUNITIES." This is a book you must not miss. It contains brilliant articles by Prof. A. M. LOW, our Employment Supdt., etc., shows how to pass A.M.I.Mech.E., A.M.I.C.E., A.M.I.A.E., I.E.E., M.I.M.T., Matric., G.P.O., and all other Exams, and outlines over 100 Home-Study Courses in all branches of Engineering. Send for your copy to-day. FREE and without obligation. We alone guarantee—"NO PASS — NO FEE." **BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY, 401, Shakespeare House, 29, Oxford Street, London, W.1.**

EXACT TUNERS

250 to 2,000 metres.

Thousands of these tuners are in use, and we can strongly recommend them. No further coils are required. Send P.O. for particulars and circuits—FREE.

THE EXACT MANUFACTURING CO.,
Croft Works, Priory Street, Coventry.

THE PICTURE PAPER WITH THE *MOST* NEWS
SUNDAY GRAPHIC
and Sunday News

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

within a few metres because it is a home-made coil intended to go down lower than its predecessor, on which the bottom station I could tune-in was Trieste.

"In that coil there was a total of 60 turns, but I have rewound, same wire, former, etc., but only 51 turns, and on this Trieste came in at 13 degrees.

"There were several other stations below this, and the two which interested me particularly were right at the bottom of the dial between 0 and 5 degrees. (I want to know these so that I can tell how low my tuning goes, and what new stations to look for in these lower degrees.)

"One of these was playing gramophone records, and speaking in French as well, I believe, as in English. But the other station, which was weaker, also appeared to be butting in with English announcements. The time was 11 p.m. (Sunday), and judge of my astonishment when the weaker station suddenly put out the familiar 'six pips' of the Greenwich time-signal. As no B.B.C. stations were working at that hour on Sunday, I am wondering if it was a test, or who it could be?"

HOW ARE YOUR RESULTS NOW?

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 scales of charges, can be obtained direct from the Technical Query Dept., POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

A postcard 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.

In all probability the station giving gramophone records was "Radio Normandie," the French station at Fécamp.

It is supposed to employ 10 kw. on a wavelength of 223 metres.

Immediately above it, on 224·4 metres, is Cork, and this was the station you heard giving the six pips at 11 p.m. Cork relays the Dublin programme, and Dublin is connected with Greenwich, just as the B.B.C. stations are.

But Dublin and Cork close later on Sundays, and generally give a news bulletin and time signal before closing down.

THE SELECTIVITY CONDENSER OF THE "ECKERSLEY" THREE.

W. J. S. (Stratford, London, E.15).—"I built the 'Eckersley' Three about two months ago. The only fault I find with it is the inconvenience of having to get inside the set to alter the series condenser.

"I wondered if an aerial coupler could be used instead, if so, what would its maximum capacity be?"

A ·0003-mfd. variable condenser, (solid dielectric type), could be mounted on the panel and wired up in place of the ·0003 compression type.

If the leads are kept short and well spaced, you would probably find it worked as well as the original arrangement favoured by Capt. Eckersley.

CARBORUNDUM AS A DETECTOR.

P. C. (Reading).—"I propose to use a carborundum crystal which I understand never needs readjusting. The trouble in fitting this

(Continued on next page.)

PILOT AUTHOR'S KITS

Exact to Specification

CASH—C.O.D.—H.P.— *Immediate Delivery.*

The DECADE KIT "A" **Author's Kit** with Ready-Drilled Panel less valves and cabinet

CASH or C.O.D. **£3-9-5**

or 12 monthly payments of 6/5

KIT-BITS *Selected C.O.D. Lines—Post Charges Paid on Orders value over 10/-.*

Set of Specified Valves	£1	6	0
Specified Peto-Scott Cabinet		15	0
Colvern Dual Range Coil, R.M.3A		8	6
Lissen ·0005 Variable Condenser with Formo Slow-motion Dial		9	0
Moderator Coil		2	6

COSMIC III KIT "A"

Author's Kit with Ready Drilled Panel less valves and cabinet

CASH or C.O.D. **70/-**

or 12 monthly payments of 6/5

Specified Valves, £1:6:0

Specified Cabinet, 17/6

COSMIC III STAR KIT "A"

Author's Kit with Ready Drilled Panel less valves and cabinet

CASH or C.O.D. **87/6**

or 12 monthly payments of 8/-

Specified Valves, £1:6:0

Specified Cabinet, 17/6

EASIWAY ITEMS

JUST RELEASED

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**. Balance in **11** monthly payments of **14/6**. Send **14/6** Only.

W.B. PERMANENT MAGNET MOVING-COIL SPEAKER P.M.3. Complete with 3-ratio input transformer. Cash Price **£2/12/6.** Balance in **11** monthly payments of **4/10.** Send **4/10** Only

EPOCH "20 C" PERMANENT MAGNET MOVING-COIL SPEAKER. With 3-ratio input transformer. This speaker will handle up to 5 watts. Cash Price **£1/15/0.** Balance in **5** monthly payments of **6/6.** Send **6/6** Only

EPOCH J.1 PERMANENT MAGNET MOVING-COIL SPEAKER with 3-ratio input transformer. Cash Price **£2/5/0.** Balance in **11** monthly payments of **4/2.** Send **4/2** Only

R & A CHALLENGER PERMANENT MAGNET MOVING-COIL SPEAKER. With special Ferranti multi-ratio input transformer. Cash Price **£1/15/0.** Balance in **5** monthly payments of **6/6.** Send **6/6** Only

R & A "100" PERMANENT MAGNET MOVING-COIL SPEAKER. Complete with multi-ratio input transformer. Cash Price **£2/17/6.** Balance in **11** monthly payments of **5/4.** Send **5/4** Only

BLUE SPOT SPEAKER UNIT AND CHASSIS, TYPE 100U. Cash Price **£1/19/6.** Balance in **7** monthly payments of **5/5.** Send **5/5** Only

ATLAS ELIMINATOR, TYPE A.C.244. 3 Tappings, S.G., Detector and Power. Output: 120v. at 20 m/a. Cash Price **£2/19/6.** Balance in **11** monthly payments of **5/6.** Send **5/6** Only

PETO-SCOTT CO. LTD.
77, CITY ROAD, LONDON, E.C.1.

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.25/6/32 .....

West-end Showroom: 62, *High Holborn, London, W.C.1.*

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from previous page.*)

up is that I am not quite sure about the pressure to apply to it, although I understand it can be a good strong contact.

"Also, I am very uncertain about the battery which should be used with it. Could you give me the connections for this, when joined to an ordinary plug-in coil and condenser tuning circuit?

"If you will give the detector side of the leads which go to the tuning circuit that will be sufficient, as I understand everything except the unusual detector connections."

A carborundum crystal in contact with a steel point or plate should make an excellent crystal set.

The pressure may be quite considerable, say, up to 1 lb. or more, and once set with correct voltage applied by the small battery, the set will remain sensitive and without the slightest need for adjustment of any kind.

To get the correct voltage required by the carborundum you can use an ordinary 1½-volt bell battery, and a 1,000-ohm potentiometer (or thereabouts). There will also be required a fair-sized by-pass condenser, such as ·001 mfd., the steel contact and carborundum crystal, and, of course, a pair of telephones.

The connections will be as follows:

The earth side of the tuned circuit will go to one telephone terminal. The remaining telephone terminal will go to the carborundum detector.

The steel contact side of the detector will go to the slider of the potentiometer and also to one side of the by-pass condenser (·001 mfd.). The remaining side of this by-pass condenser will go to the other end of the tuning circuit, and will go also to the negative terminal of the battery and to one end of the potentiometer.

The other end contact of the potentiometer should be joined to an ordinary on-off switch. The remaining side of this switch should go to the positive terminal of the bell battery.

This completes the connections. If you do not get good results at the first attempt, try the effect of reversing the leads to the terminals of the dry battery.

THE ANSWERS

TO THE QUESTIONS ASKED ON PAGE 482 ARE GIVEN BELOW:

(1) Hertfordshire, with 15%.

(2) The "actual" capacity is that for CONTINUOUS discharge, as distinct from intermittent discharge. In the latter case the accumulator "recovers" during the pauses between use, and its intermittent-discharge-capacity (or "ignition" capacity) is about double its actual capacity.

(3) Sixty thousand kilocycles per second.

(4) Yes, noticeably. The baffle-board should not be less than abo ut ½ in. thick.

(5) At Chelmsford, Essex. The new one is being built at Daventry.

DID YOU KNOW THEM ALL?

TECHNICAL BRIEFS

A few short paragraphs which contain valuable information for the set-builder presented in a concise manner.

Constructors of portable sets in doubt about the number of turns required for frame aerials of various sizes should remember that the best rough-and-ready rule is to use 75 feet of wire, with the usual small spacing between turns, for the medium wavelengths. (The number of turns will then, of course, depend on the size of the frame.)

* * *

A useful guide in determining the number of turns required for the long-wave frame aerial is to wind on 240 feet.

* * *

An often unsuspected cause of microphonic howling is the vibration of variable condenser vanes.

One rather puzzling form of distortion is caused by a faulty output choke in which some of the turns are shorting.

* * *

The ill-effects of the high internal resistance of a battery are well known and guarded against by decoupling, but it is often forgotten that these are greatly increased by corrosion of the terminals.

A PORTABLE POINT.

Portable sets which show a tendency to howl on account of microphonic vibration from the loudspeaker may often be cured by placing over the valve a valve box lined with some cotton-wool.

* * *

A faulty by-pass condenser or a broken lead to a decoupling condenser may set up motor-boating troubles difficult to trace.

* * *

When looking for interference, it is often recommended that the aerial should be removed in order to find whether the interference is coming into the set from outside or is present in the receiver. The earth wire should be removed at the same time as the aerial as it sometimes happens that such external interference is brought to the set via the earth.

* * *

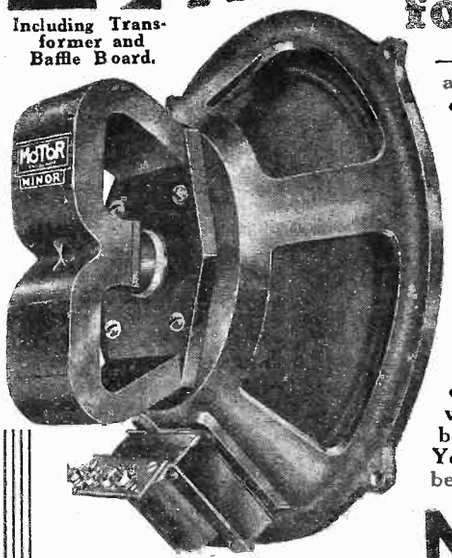
One of the most difficult forms of interference to overcome is that of electric signs at cross-roads.

* * *

A good method of testing a potentiometer for a fault is to connect a suitable voltage battery across it and then join a voltmeter between the slider and one end of the resistance. (A smooth variation as the slider is moved along the potentiometer indicates that the instrument is O.K.)

45/- Including Transformer and Baffle Board.

The PRICE was MADE for YOU..



—but the only consideration that governed the design of the MoToR MINOR was a fixed determination to produce a Moving Coil Loudspeaker that would positively defy comparison in sensitivity, tone quality, and value. Only the best components could achieve this object, so only the best were used. Only comparison can convince you, so compare before you choose. Your choice will surely be a

MoToR MINOR

Permanent Magnet MOVING COIL

BRITISH MADE

Overall Diameter, 9¾".
Overall Depth, 4½".
Cone Diameter, 7".

D.C. Resistance: 10 ohms.
Impedance of Speech-coil: 5 ohms.
Approx. Coil Gap: 1 mm.
Transformer Tappings: 25:1, 20:1, 15:1.

Available also in handsome walnut cabinet The CHESTER 75/-

Write for free descriptive pamphlet.

TEKADE RADIO & ELECTRIC LTD.
147, Farringdon Road, London, E.C.1

WESTINGHOUSE

METAL RECTIFIERS

"THESE RADIO COMPONENTS"

—*RECTIFIERS*

An A.C. eliminator is no better than its rectifier. Therefore, make certain that the rectifier incorporated in YOUR eliminator is reliable, has a long life and high efficiency, and will give a constant and adequate voltage . . . make certain that it is a WESTINGHOUSE METAL RECTIFIER.

Capt. P. P. ECKERSLEY, M.I.E.E., "P.W.'s" Chief Radio Consultant, says:—

"It seems to me their use is highly desirable because *they do not want replacing* . . . these metal rectifiers are really reliable. . . . Metal rectifier costs are higher than valve rectifiers, but the metal lads 'last for ever,' and the thermionic certainly do not. In years to come I should think that everyone will use METAL rectifiers."

Why not start now by sending 3d. in stamps for a copy of "The All-Metal Way"? It contains full particulars of these reliable rectifiers, and gives circuits for building suitable eliminators. Please mark your application "Dept. P.W."

THE WESTINGHOUSE BRAKE & SAXBY SIGNAL CO., LTD., 82, YORK ROAD, KING'S CROSS, LONDON, N.1

READERS' REMARKS

Some representative letters from "P.W." set builders.

THE "S.Q. STAR."

The Editor, POPULAR WIRELESS.

Dear Sir,—I have finished building the "S.Q. Star," and have tried it out thoroughly. I have made several "P.W." sets before, and dismantled that magnificent set, the "New Coil" Five in favour of it, and it is all you say about it. I have put everything of the best into it, and use a Blue Spot 29R speaker, and the results are truly wonderful, clear, sweet music, without mush and a lot of squeals, and also selectivity.

I should like to congratulate you on the splendid results and design of a magnificent and up-to-date receiver.

Good luck to the good old POPULAR WIRELESS.

Yours sincerely,

Middleton, Leeds. LEWIS BERRY.

THE "ECKERSLEY" TUNER.

The Editor, POPULAR WIRELESS.

Dear Sir,—I have made the "Eckersley" Tuner, and I am very pleased with results. It is fitted in the "Comet," and has had three weeks' trial before I would write and let you know what a thing Captain Eckersley invented for the public. It took me a few hours of work to find out different things, and I found them, so would you mind thanking Captain P. P. Eckersley for his wonderful invention. So cheerio, and all the best to "P.W."!

Yours respectfully,

South Bermondsey. P. J. HOBBS.

HIS FIRST THREE-VALVER.

The Editor, POPULAR WIRELESS.

Dear Sir,—I think I must thank "P.W." for the wonderful "Comet" Three circuit.

I have had no experience with valve sets yet I found the making of the "Comet" Three was a simple matter.

I have tuned in 44 stations, all at good loudspeaker strength. Those on the long waves are: Huizen, Radio-Paris, Konigswusterhausen, Daventry National, Eiffel Tower, Warsaw, Kalunborg, and Croydon.

Medium waves are: Brussels No. 1, Milan, Langenberg, North Regional, Beromunster, Rome, Sottens, Mid-Regional, Frankfurt, Toulouse, Muhlacker, London Regional, Strasbourg, Brussels No. 2, Breslau, Goteborg, Cardiff, Bordeaux-Lafayette, North National, Hilversum, Turin, Bratislava, Heilsburg, Moravska-Ostrava, Nurnberg, Bordeaux-sud-ouest, Cologne, Cork, Helsinki, Konigsberg, and Fécamp.

Yours faithfully,

FREDERICK SMITH.

Upper Norwood, S.E.19.

WONDERFUL "SUPER-QUAD STAR."

The Editor, POPULAR WIRELESS.

Dear Sir,—I should like to compliment the staff of "P.W." for such a magnificent receiver as the "S.Q. Star," appearing in your journal in last December.

Having constructed the set, same was tried out on Sunday, using a 12-ft. indoor aerial, 120 volts H.T., and large Blue Spot speaker. From the outset it was obvious that, notwithstanding its inexpensiveness and paramount simplicity of construction, it ranks very high indeed among the super-het. type, for I experienced not the slightest trouble from background, harmonics, etc.

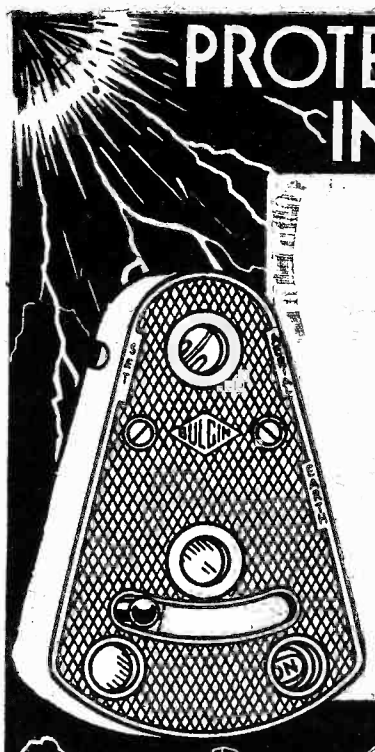
The selectivity is truly startling, station after station being dismissed and all the time no suspicion of overlap. Every station of note in Europe seems to come in at full loudspeaker strength, and, to quote one example, Toulouse at 8 kw. absolutely crashed in, necessitating the use of volume control.

In a nutshell the "Super-Quad" has a performance only matched by the most expensive of factory productions, and transcends any receiver I have yet tested as regards super knife-edge selectivity.

Wishing "P.W." all success in the future.

Yours faithfully,

London, S.E.15. F. VINGOE.



PROTECTS YOUR HOME
INSURES YOUR SET

A genuine lightning switch incorporating the 4 UNEXCELLED FEATURES enumerated.

£100 INSURANCE GUARANTEE

Free Insurance Policy against damage to your set by lightning, given with every Bulgin Lightning Switch.

Note the Exclusive Features and Price.

EXCLUSIVE FEATURES:

1. Fuse in circuit when set is in operation.
2. Discharge gap.
3. Indicator denoting "ON" or "OFF"
4. Quick make and brake action. (A unique feature never before incorporated in a lightning switch. SELF CLEANING CONTACTS under control of a powerful spring.)

The whole mounted in a handsome Bakelite case, with insulated control lever.

NOTE THESE WONDERFUL FEATURES AND THE PRICE

Now obtainable from all dealers.

Send 2d. Postage for 75-pp. Catalogue and Manual.

A. F. BULGIN & Co., Ltd., Abbey Road, Barking, Essex

Telephones: Grangewood 3266-7.
London Showrooms: 9, 10, 11, Cursitor Street, E.C.4.
Telephone: Holborn 2072.

BULGIN
PAT. The Choice of Critics PEND.
LIGHTNING SWITCH
2/6

LOUD SPEAKERS REPAIRED, 4/-
(*Blue Spot a Speciality*, 5/-)
Transformers 4/-, Headphones 4/-, all repairs magnetised free. Eliminator Repairs quoted for. 24 Hours Service.
Discount for Trade. *Clerkenwell* 9069.
E. MASON, 44, EAST ROAD, LONDON, N.1.

1/6 HOLDER 6°

The GRAHAM-FARISH "OHMITE" RESISTANCE
BETTER THAN WIRE WOUND

WEEDON POWER LINK RADIO CO.
New service to their many clients. Transformers, Loud Speakers, Pick-ups, any make, or item, repaired as new, 3/6. Articles returned to you C.O.D. Post. Eliminator repairs quoted for. Supervised by specialists. Note new address:
185, Earlham Grove, Forest Gate, London, E.7.

FREE A Luxury Wireless Set
or components of equivalent value
Wonderful offer to introduce the Radialaddin Club. Write, enclosing 1½d. stamp for particulars.
Radialaddin Club (Dept. P.W.), 47/48 Berners Street, London, W.1. Museum 1821.

SUMMER SALE!!!
ELECTRADIX BARGAINS
1,000 Wonderful Radio and Electrical Bargains at Rock Bottom Prices.
SEND FOR NEW LIST.
ELECTRADIX RADIOS,
218, Upper Thames St., London, E.C.4.

WE invite readers to support our Advertisers—care being taken to accept only announcements of reputable firms!

3-prong Spring Grip
BELLING-LEE WANDER PLUG.
Stays "put," even in portables under vibration.
Side-entry: the whole flex gripped—copper, rubber and braiding.
Loaded without tools.
Resilient hard drawn spring wire prongs (not soft brass).
Grips every battery socket; each plug tested in sockets smaller and larger than any known H.T. battery socket.
Write for complete list of Radio Connections.
2D
12 PERMANENT INDICATIONS
BELLING-LEE
FOR EVERY RADIO CONNECTION
Advert. of Belling & Lee, Ltd., Queensway, Ponders End, Mdx.

New Times Sales Co

EVERYTHING RADIO EASIEST TERMS

JUST RELEASED!

COSSOR MELODY MAKER

Model 335. Complete with valves, Speaker and Cabinet. Employs Cossor Variable-Mu S.G., H.F. stage Detector and Power. Cash Price £7/17/6. With **14/6** order
Balance in 11 monthly payments of 14/6.

SUPER V.3.KIT ("Radio for the Million") for mains, including valves, cabinet, speaker and A.C. mains equipment. Cash Price £15/11/3. Send **28/6** only
Balance in 11 monthly payments of 28/6.

COSSOR ALL-ELECTRIC MELODY MAKER, Type 235. Complete with Valves and Cabinet. Cash Price £9/9/6. With **17/4** order
Balance in 11 monthly payments of 17/4.

★W.B. PERMANENT MAGNET MOVING-COIL SPEAKER P.M.3. Complete with 3-ratio input transformer. Cash Price £2/12/6. With **4/10** order
Balance in 11 monthly payments of 4/10.

R & A "100" PERMANENT MAGNET MOVING-COIL SPEAKER. Complete with multi-ratio input transformer. Cash Price £2/17/6. With **5/4** order
Balance in 11 monthly payments of 5/4.

BLUE SPOT SPEAKER AND CHASSIS, TYPE 100U. Cash Price £1/19/6. With **5/5** order
Balance in 7 monthly payments of 5/5.

W.B. PERMANENT MAGNET MOVING-COIL SPEAKER. Type P.M.4. Complete with Transformer Cash Price £2/2/0 With **5/9** order
Balance in 7 monthly payments of 5/9.

R & A CHALLENGER

PERMANENT MAGNET MOVING-COIL SPEAKER With special Ferranti multi-ratio input transformer. Will operate from a 2-valve set up to a power amplifier. Cash Price £1/15/-. With **6/6** order
Balance in 5 monthly payments of 6/6.

CELESTION P.P.M. PERMANENT MAGNET MOVING-COIL SPEAKER, with impregnated diaphragm and dual-impedance input transformer. Cash Price £2/7/6. With **6/6** order
Balance in 7 monthly payments of 6/6.

ULTRA IMP PERMANENT MAGNET MOVING-COIL SPEAKER, with input transformer. Cash Price £2/15/0. With **5/-** order
Balance in 11 monthly payments of 5/-.

BLUE SPOT PERMANENT MAGNET MOVING-COIL SPEAKER R.100, with input transformer. Cash Price £3/15/0. With **6/11** order
Balance in 11 monthly payments of 6/11.

CELESTION MOVING-COIL SPEAKER R.P.M.12. Complete with step-down transformer. Cash Price £7/0/0. With **12/10** order
Balance in 11 monthly payments of 12/10.

ATLAS A.C. 188 ALL-MAINS UNIT. Two variable and one fixed tappings. Trickle charges 2, 4, or 6 v. at ·5 amp. Cash Price £6/0/0. With **11/-** order
Balance in 11 monthly payments of 11/-.

★ATLAS A.C. ELIMINATOR, TYPE A.C.244. Three tappings S.G., detector, and power. Output, 120 volts at 20 m.a. Cash Price £2/19/6. With **5/6** order
Balance in 11 monthly payments of 5/6.

EPOCH J.1 PERMANENT MAGNET MOVING-COIL SPEAKER with 3-ratio input transformer. Cash Price £2/5/0. Send **4/2** only
Balance in 11 monthly payments og 4/2.

ANY ITEMS ADVERTISED IN THIS JOURNAL SENT C.O.D. IF VALUE OVER 10/- SENT ALL C.O.D. CHARGES PAID.

To NEW TIMES SALES CO.
56 Ludgate Hill, London, E.C.4

Please send me (*a*) **Free 1932 Catalogue**

(*b*).....*for which I enclose*

first payment of £...,..s.....d.....

Name.....

Address.....

.....P.W. 25/6/32

THE LISTENER'S NOTEBOOK

(*Continued from page 472.*)

It seems to me rather ungrateful on the part of the B.B.C. so to treat the theatre, seeing to what extent it is indebted to it. For does it not in its own radio drama employ all the forms of the theatre, and its traditions, besides absorbing into its programmes all the machinery? Mr. Agate might remember this, and in future think twice before having his little joke.

* * *

I was shown over a garden the other day and the owner with obvious pride referred to it as a "Middleton." "I have carried out his instructions to the letter," he said.

"Well, it does you credit," I replied.

"Does *him*, you mean," replied my friend.

"And now," went on the amateur gardener, "I must begin lifting my bulbs. I've always let 'em stay where they are, but Mr. Middleton says 'No!' He told me all this last Monday."

I wonder how many more Middleton gardens there are. A good number, I guess.

* * *

It was something new for the B.B.C. to include in an entr'acte an excerpt from a play coming a week later. The idea isn't new, of course, as it has been long practised at the cinemas. A case of more borrowing!

* * *

Commander Stoker's story of the forcing of the passage of the Dardanelles was one long thrill. It was a good story ideally told and with remarkable vividness.

His best descriptive passages were those relating how enemy craft passed and repassed over the A E 2 as she lay snugly on the bottom, her hazardous course through the minefields, and her contact with impedimenta of various kinds, all real sources of danger to her. The closing sentence of the story, too, was just perfect.

* * *

Music Hall No. 3 maintained the standard set by its predecessor No. 2. We played the eavesdropper again, and the studio audience seemed more formidable than ever.

Despite these irritations, the programme left the impression that John Tilley is *some* raconteur, that Jenny Howard is a girl with a future, that Nosmo King well deserves his popularity (by the way, I would like to know the significance of his reference to Thorpe Road, Peterborough—what's Wigan done?), that G. H. Elliott has lost none of his former glory, though through the loudspeaker he sounds more like a Swiss yodeller than a coon, that José Collins is very ordinary, probably because she is unseen, that Terence McGoveran & Co. make all tunes sound alike on that terrible instrument, the accordion, and finally, that Will Fyffe is a trifle too phlegmatic for my liking—his patter is very funny, of course.

The studio audience wasn't so discriminating as I, however, and seemed to enjoy them all equally.

* * *

Though I usually welcome variety, I would like the Roosters better if they stuck entirely to army stuff, as this is always certain of a good reception. The fact is that while they are, in my opinion, the premier exponents of the "Old Bill" type of comedy, their efforts at anything else seem to lack the same lustre.

TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio reception.

By Dr. J. H. T. ROBERTS, F.Inst.P.

Dual-Range Coils.

WITH some types of dual-range coil you will find that the effectiveness of the medium wavelength section of the coil is interfered with by the long wavelength part. The long waveband winding may be disconnected from circuit or may be shorted and when the above-mentioned trouble occurs it is because the long wavelength part is nevertheless tuning to a medium wavelength; this wavelength depends upon the self-capacity of the coil and upon its inductance and is naturally influenced by the other capacities in the circuit.

When conditions are as mentioned above you will find that for a part of the medium wavelength band you will require a good deal more reaction than usual and, in fact, if the efficiency of the medium wavelengths is very seriously interfered with by the long wavelength part of the coil, it may be impossible to get the circuit to oscillate at all over some part of the tuning range, no matter how much reaction is used.

A Common Fault.

You will naturally want to know how to overcome the trouble when it is present, but it is not always quite easy to get rid of it, especially in commercially-manufactured coils. One thing you can do, however, is to short-circuit the long wavelength part when not in use (unless this has already been provided for in the coil).

Another thing you can do, which is very useful sometimes, is to add a fixed condenser across the long wavelength part, so as to alter the tuning completely and so get rid of the trouble that way.

It is very important to have the coils as efficient as possible, because otherwise not only will you get poor signal strength and more difficult tuning, but also the tuning will be broad.

About Tuning Dials.

With the improvements which have been made from time to time in the selectivity of receivers we have had to use better and better types of tuning dial. Some of the slow-motion or vernier dials now on the market are very good, but I am sorry to say that there are a good many which, although they look very nice, cannot really be relied upon in use.

It is very aggravating to have a slow-motion dial which slips, or has backlash, or is stiff and jerky in operation so that it cannot be accurately and smoothly adjusted to within a fraction of a degree. Not long ago I came across a set with a dial of this kind and it was just like playing hide-and-seek with the station I was trying to tune in. This sort of thing, of course, is ridiculous and there is no excuse for it at all.

Now that the super-heterodyne is coming back into popularity so much, the need for

(*Continued on next page.*)

TECHNICAL NOTES

(Continued from previous page.)

razor-edge tuning is greater than ever. Sometimes a station will be received at full strength and disappear again, all within a fraction of a degree, so it goes without saying that nothing else than the very best will do in the way of tuning adjustments.

Standards of Selectivity.

Although we hear a good deal about selectivity, I should say that one of the chief faults with the great majority of receiving sets to-day is insufficient selectivity. The need for selectivity has increased very much during the past few years and goes on increasing, so that the standards by which we judged a receiver even as recently as three years ago will not do for the present day.

The tuning curve with many receivers is very poor and although reaction is used this really does not make up in every sense for a poor tuning curve.

The fact is that with the great magnification now obtainable—for instance, a couple of screen-grid H.F. stages and a large amount of L.F. amplification—requires much greater selectivity than is usually provided.

High Resistance Coils.

There are various reasons why selectivity is not as sharp as it might be. For one thing, fairly high resistance coils are often used to facilitate ganging and for another thing tuning is often far from accurate over the range, either owing to a fault in the tuning condenser or to wrong adjustment by the operator of the set.

I have mentioned before the advantages of the super-heterodyne in this direction and there is no doubt in my opinion that the super-heterodyne is destined to come very much into popular favour again. Not only has it many advantages in use, but it is also easy and cheap to build and can be operated with ease.

A six-valve super-het. may be built up to cost no more, or little more than a decent three-valve set. It is capable of giving excellent quality and as regards the building of the set, this is quite as easy as—if not even easier than—the building of some three- or four-valve sets of the ordinary type.

Powerful local stations can be tuned in and out within a couple of degrees (sometimes much less), and scores of distant stations brought in at full loudspeaker strength with very good quality.

A Popular Type of Set.

A good many people still use the det. and 2 L.F. type of set, and with this quite good results can be obtained if a proper tuner is used, but care has to be taken to avoid distortion. If the set is arranged for receiving a number of distant stations the local stations are apt to be very loud and so some sort of volume control becomes necessary, especially where the two L.F. stages are transformer coupled.

A suitable volume control consists of an adjustable resistance across the primary of the first transformer. This resistance may have a total value of, say, 100,000 ohms, and it enables the volume to be varied from the maximum down to almost zero.

By the way, when using two transformer-coupled stages in this way it is generally

(Continued on next page.)

POPULAR

For many reasons besides price

The J.B. "POPULAR" LOG CONDENSER—a typical J.B. product in its sound design, high electrical efficiency, and thorough finish.

Two models—plain or slow-motion—with rigid brass frames, vanes of extra heavy gauge brass, and end-plates highly finished in nickel-plate.

High-grade ebonite insulation. The slow-motion has a ratio of 35 to 1 and is smooth, silent, and sure in action.

SLOW-MOTION type, as illustrated, with 3-in. dial and knob.

·0005, 8/6 ·0003, 8/3
·00025, 8/- ·00015, 8/-

PLAIN TYPE (without dials)

·0005, 6/- ·0003, 5/9
·00025, 5/6 ·00015, 5/6

4-in. dial, 1/6 extra.

REG. TRADE MARK.

PRECISION INSTRUMENTS

Write for illustrated Catalogue.

Advertisement of Jackson Bros., 72 St. Thomas' Street, London, S.E.1. Telephone: Hop 1837.

For Manufacturers & Constructors.

OSTAR-GANZ

UNIVERSAL MAINS VALVES

One valve for both the A.C. & D.C. mains sets with heater voltage up to 250. No mains transformers. No breaking-down resistance.

G.P., Det. and Power Valves ..	17/6
Super Power Valves	18/-
Rectifying—50 M.A.	14/6
125 M.A.	15/6

Full details from:

EUGEN FORBAT,
Sole Representative for Gt. Britain,
c/o Nivalight, Ltd., 1, Rosebery Avenue, E.C.2.

Sensational! Revolutionary!

UNIVERSAL ALL MAINS KIT

This Kit can be used for either A.C. or D.C. at will without any alteration with **Ostar Universal High Voltage Valves and all-British Components.**

Complete, ready for assembling, with 2 Valves and Rectifier .. £6-0-0

When ordering please state voltage only.

Full particulars from:

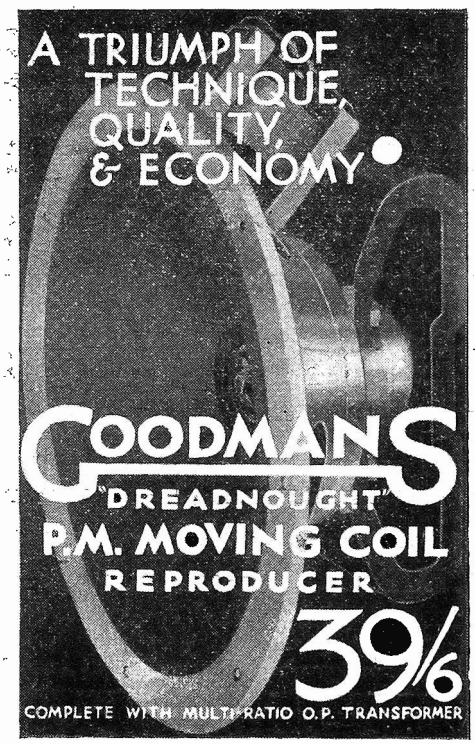
EUGEN FORBAT,
c/o Nivalight, Ltd., 1, Rosebery Avenue, E.C.2.
Tel. Number: Clerk. 1825.

Make

The DAILY SKETCH

YOUR Picture Paper

PLEASE be sure to mention "POPULAR WIRELESS" when communicating with Advertisers. THANKS!



To see a Goodmans "Dreadnought" Permanent Magnet Moving Coil is to realise that here is a quality production. To hear it is to know that such care in manufacture is worth while. Equipped with a powerful magnet, it has a remarkably wide frequency range, is extremely sensitive, and free from resonances. Its low price, scientific construction and remarkable performance, are the culmination of 7 years' manufacture of moving coils.

From your Dealer or direct from P.M Dept., GOODMANS, 69, St. John Street, LONDON, E.C.1

Ask for free descriptive literature.

THE
LONDON RADIO SUPPLY COMPANY
FOR
QUICK EASY PAYMENT SERVICE

We supply all good quality Radio Receivers, components and accessories on deferred terms. Large stocks are carried and orders are executed promptly. Send list of requirements and a quotation will be sent by return of post. Price list free on request.

NEW EPOCH A2 PERMANENT MAGNET MOVING COIL UNIT. Cash Price £3/3/0. And 11 monthly payments of 5/9. With 5/9 order

HEAYBERD A.C. ELIMINATOR KIT. C 150, output 25 M/A. Cash Price £3/16/0. And 11 monthly payments of 7/- With 6/6 order

ATLAS ELIMINATOR, A.C.244. 3 H.T. Tappings. 20 M/A output. Cash Price £2/19/6. And 11 monthly payments of 5/6. With 5/- order

ORMOND PERM. MAGNET MOVING COIL UNIT. Cash Price £3/5/0. And 11 monthly payments of 6/-. With 5/- order

MARCONIPHONE PICK-UP AND TONE-ARM, still the finest pick-up available. Cash Price £2/5/0. And 9 monthly payments of 5/-. With 5/- order

NEW R & A "CHALLENGER" PERM. MAGNET MOVING COIL UNIT. Cash Price £1/15/0. And 6 monthly payments of 5/8. With 5/- order

SET OF THREE NEW VALVES, MULLARD or COSSOR. S.G., Detector and Super Power. Cash Price £1/15/6. And 6 monthly payments of 5/8. With 5/6 order

12 EXIDE HIGH-TENSION ACCUMULATORS (120 volts WH-10 super-capacity, 5,000 milliamps). The cheapest form of high-tension supply where electric light mains not available. Cash Price £3/15/0. And 11 monthly payments of 7/-. With 6/6 order

NEW W.B. PM4 PERM. MAG. MOVING COIL UNIT. Cash Price £2/2/0. And 7 monthly payments of 5/9. With 5/6 order

To avoid delay will customers kindly send deposit with order.

THE
LONDON RADIO SUPPLY COMPANY
(*Established* 1925)
11, Oat Lane, Noble St., London, E.C.2
'Phone: National 1977

REMEMBER!
"POPULAR WIRELESS"
has the largest sale of any
WEEKLY WIRELESS JOURNAL

TECHNICAL NOTES

(Continued from previous page.)

better to use fairly low-ratio components because otherwise you may get too much magnification, with consequent bad quality. Another point to remember is that a decoupling condenser and resistance should be put in the anode feed to the detector and also in the second stage; in the latter position, however, it is not always necessary.

Contact Resistance.

In a variable resistance unit, such as a rheostat or potentiometer, unless the contact between the slider and the resistance element is very good, you get what is called "contact resistance"—that is, the resistance set up between the two metallic members at the actual point of contact.

Now, contact resistance is bad for two reasons: for one thing it may be comparable to the total resistance in circuit (it may, in fact, in some cases be large compared to that resistance); and, for another thing, it varies enormously from point to point and from time to time. It is obviously very unsatisfactory to have a resistance in the circuit which is liable to vary in this way, as this will upset the stability and adjustment of the whole circuit.

It is really surprising how often one finds bad contacts in rheostats and potentiometers. Generally I have found that the contact is good at one part of the resistance element and bad at another. Naturally, the makers of the unit do not want to have the spring bearing too heavily on the contact point, as this will cause wear and stiffness in operation. The result is that they often err in the opposite direction, making the bearing spring much too light, so that the troubles mentioned above take place.

Smooth Operation.

In some rheostats the slider is divided into three or four separate fingers or tongues, each of which bears independently upon the element. The pressure of each of the fingers is quite light, and if bad contact occurs in one it will most probably be a place where a good contact is obtained by another, so that on an average a good contact is obtained all the way round the element. This arrangement is a great improvement, and not only gives satisfactory results electrically, but is very smooth working in operation.

The Pentode Stage.

I was talking about pentode valves in these Notes a week or two back, and I forgot to say that readers often ask me what sort of loudspeaker should be used when a pentode valve is used in the last stage.

As you probably know, a moving-coil instrument is generally considered particularly suitable for working with a pentode output stage, probably because the moving-coil speaker generally has a fairly uniform impedance as compared with other types of speaker. But all speakers vary to a greater or less extent in their response to different frequencies, and consequently for best results some sort of correction is desirable.

A filter can be used to reduce the impedance of the speaker at higher frequencies—as I have described before in these Notes—which improves the tone; it consists of a condenser and resistance in series across the loudspeaker or the output.

Using a Corrector.

With a pentode output, however, it seems more appropriate to put in a filter circuit or corrector at an earlier stage in the low-frequency amplifier, so that the extra voltages which the corrector circuit is designed to reduce shall be cut down *before* instead of *after* being handled by the pentode valve.

The pentode should be loaded with an external impedance which bears the proper relationship to the impedance of the valve, exactly as with ordinary three-electrode valves, except that the load in the case of a pentode is generally between about 8,000 and 12,000 ohms; whereas with an ordinary valve you will find that best results are obtained when the load is about twice the impedance of the valve itself.

Usually when a pentode is used it is placed directly following the detector, because the comparatively weak output from the detector is as a rule sufficient to load the pentode fully, whereas if intermediate low-frequency stages of amplification are introduced the pentode is apt to become overloaded.

Pentodes For Power Detection.

Turning to another use of the pentode which I have mentioned a little time back, it can be employed as a power detector, the speaker being connected directly to it. In this case the anode current sometimes becomes very considerable, and a good choke is desirable so as to deal with the relatively large H.T. current.

When a pentode is used in a mains set, instead of ordinary three-electrode power valves, you will sometimes find that the A.C. hum is rather more difficult to get rid of, partly owing to the extra sensitivity of the pentode and partly perhaps to the greater current consumption.

Remember that in addition to the current flowing to the anode there is also quite an appreciable current going to the auxiliary grid, and these two put together will probably be distinctly greater than the H.T. current consumed by an ordinary three-electrode power valve. If a small mains unit is used the smoothing may not be able to cope adequately with this extra current.

Ideas Wanted.

I think one of the most important things which will have to be looked to if home recording is to be really successful as a home entertainment is the question of the power of the gramophone to drive the recording disc. I have experimented quite a good deal with different home-recording outfits, and I came to the conclusion that it is by no means every gramophone upon which they can be got to work properly.

NEXT WEEK
Full constructional details of
THE "B.P." BOOSTER
A simple "add-on" unit that
INCREASES
POWER & SELECTIVITY

The WIRELESS CONSTRUCTOR

Another fine selection of articles by

JOHN SCOTT-TAGGART, F.Inst.P., A.M.I.E.E.

IN THE JULY NUMBER. **NOW ON SALE 6d.**

The MYSTERY of the METAL RECTIFIER

Some "inside" information of these useful components.

FROM MY ARMCHAIR

One of the most popular "S.T." features ever published.

HINTS FOR "S.T.300" USERS

Everyone interested in this set should read these tips.

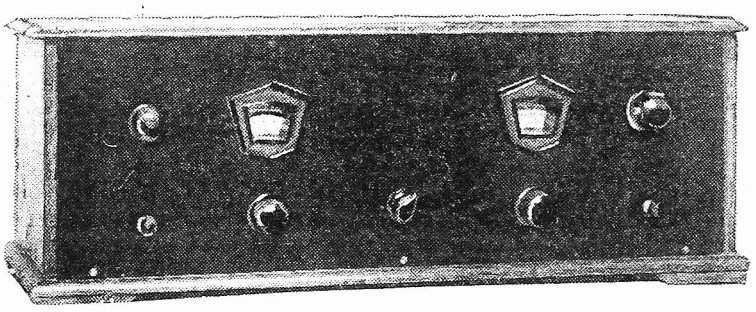
ALSO FULL DETAILS FOR BUILDING

The "FLEXIDYNE"

— AN ORIGINAL AND POWERFUL BAND-PASS DESIGN —

By VICTOR KING

In this fine four-valver, Victor King has excelled himself! For the "Flexidyne" has a "Range" switch on the panel — and when you push it in, you have a one-knob tuning set for family use; pull out the switch and you have a highly-selective long-distance four!



You simply must read about this remarkable set and examine the clear diagrams that make its construction so extremely fascinating and simple.

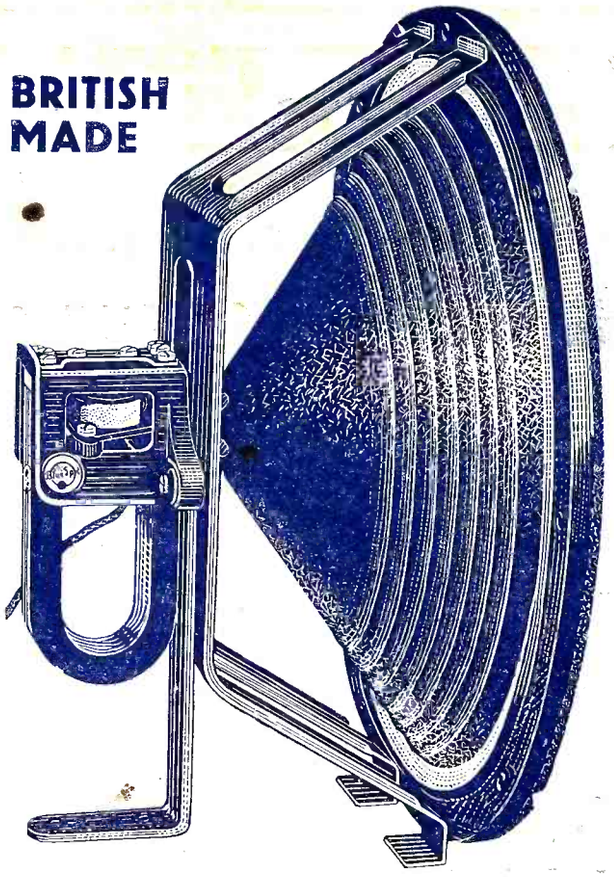
Among the other contents of this remarkable sixpennyworth are:—

The Editor's Chat
"On the Grid"
The Month on Short Waves
The "Localisor"
All Britain Endorses Progressive Design Work
Pick-up Hints and Tips
B.B.C. News
This "Portable" Problem
A Practical Man's Corner
The Valve Made Readable
Queer Queries
As We Find Them
Round the Dials
With Pick-up and Speaker
Our News Bulletin
Where to see "S.T.300's" and "Cosmics"

YOU CANNOT AFFORD TO MISS THE JULY

WIRELESS CONSTRUCTOR

NOW ON SALE, PRICE 6d.



MOVING COIL PERFORMANCE *for the* SMALL RECEIVER

BLUE SPOT 100U·39/6

Gives Moving Coil Performance

IF you are running a small set with a dry battery H.T. supply here is your chance to get Moving Coil performance with very little outlay and no structural alteration.

Blue Spot 100U is designed to work satisfactorily on very small inputs. In consequence it may be used with battery-operated receivers with every confidence as well as all mains sets.

Its performance is remarkable. It has all the sensitivity and richness of tone that distinguishes the *good* (and expensive) Moving Coil speaker. It gives the finest rendering of the difficult bass notes without detracting from the clear high notes of the treble.

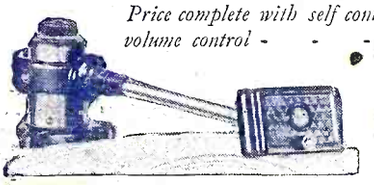
For the man who wants a really good top notch speaker 100U provides good Moving Coil quality at economy price.

Send for Catalogue No. P.W. 40U.

BLUE SPOT PICK-UP

You simply can't believe that music so beautiful can be had from gramophone records until you hear them played through a Blue Spot Pick-up.

Price complete with self contained volume control - - - - - - - - **63/-**



Blue Spot

ALL BLUE SPOT PRODUCTS ARE NOW OBTAINABLE BY INSTALMENTS.

THE BRITISH BLUE SPOT COMPANY LTD

BLUE SPOT HOUSE · 94/96 ROSOMAN STREET · ROSEBERY AVENUE · LONDON · E.C.1

Telephone: Clerkenwell 3570. *Telegrams: "Bluospot, Isling, London."*

Distributors for Northern England, Scotland and Wales: H. C. RAWSON (Sheffield and London), Ltd., 100, London Road, Sheffield; 22, St. Mary's Parsonage, Manchester; 37, 38, 39, Clyde Place, Glasgow.

Printed and published every Thursday by the Proprietors, The Amalgamated Press, Ltd., The Fleetway House, Farringdon Street, London, E.C.4. Advertisement Offices: Messrs. John H. Lile, Ltd., Ludgate Circus, London, E.C.4 (Telephone: City 7261). Registered as a newspaper for transmission by Canadian Magazine Post. Subscription Rates: Inland and Canada, 17/4 per annum; 8/8 for six months. Abroad (except Canada), 19/6 per annum; 9/9 for six months. Sole Agents for Australia and New Zealand: Messrs. Gordon & Gotch, Ltd.; and for South Africa: Central News Agency, Ltd. Saturday, June 25th, 1932. S.S.