

# HOW THE "P.W." RECORD WAS MADE (See Page 45)

# Popular Wireless

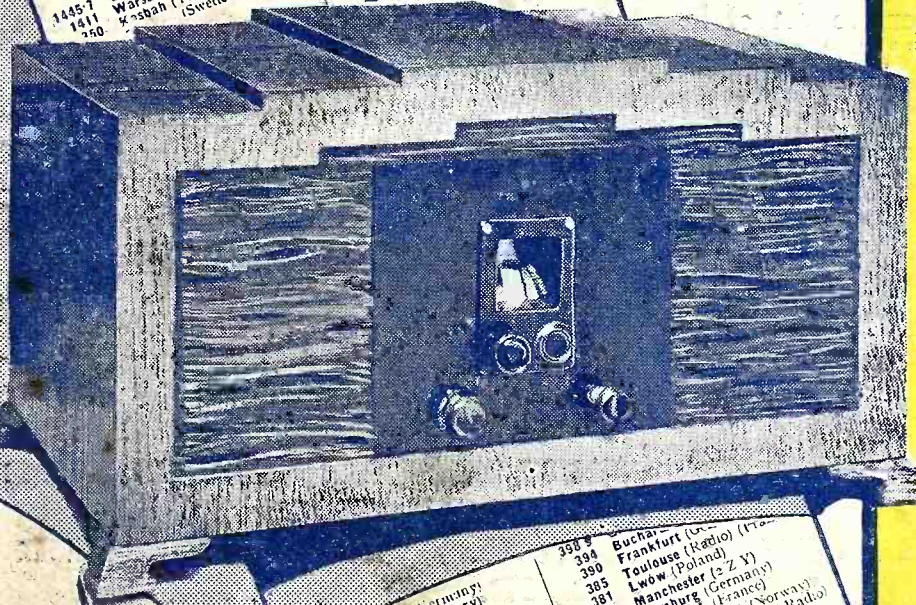
Every Thursday  
PRICE  
3d.

No. 512. Vol. XXI.

INCORPORATING "WIRELESS"

March 26th, 1932.

## OUR "SINGLE-DIAL SUPER" DESCRIBED INSIDE



### ALSO THIS WEEK:

#### THE EPILOGUE MYSTERY

Some new facts about this Sunday programme feature.

#### REGARDING OVERLOADING

A practical article concerning one of the most common causes of distortion.

#### TEACHING TELEVISION TECHNIQUE

#### CAPT. ECKERSLEY'S QUERY CORNER

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A contribution from Our Northern Correspondent of especial interest to North of England and Scottish readers.

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This is not an imaginary interview, but a real-life glimpse of home radio in the land of dykes and windmills.

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S. America; Costa Rica; Porto Rico; Malay Straits;  
U.S.A.; Java; Canada; Dutch E. Indies; in addition  
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For Kit prices see page 63.

## COSMIC STAR

(Adet.)



# HAVE YOU SEEN IT? THE APRIL NUMBER OF THE WIRELESS CONSTRUCTOR

**NOW ON SALE. PRICE 6d. OBTAINABLE EVERYWHERE**

Commencing in the April number of "The Wireless Constructor" is a magnificent new feature entitled

## FROM MY ARMCHAIR

In this—the first of a unique series of articles—the great radio expert talks interestingly and intimately about the radio tendencies of to-day.

*Delightfully Informal  
and Informative!*



—By John  
Scott-Taggart

In addition to his new series, "From My Armchair," Mr. Scott-Taggart contributes a vital article:

### "IS BAND-PASSING A CRAZE?"

and also constructional details for

**GRAMOPHONE  
MUSIC ON  
YOUR S.T.300.**

and other striking features.

An unusually comprehensive list of how-to-make articles is a very strong feature of the April "Wireless Constructor," and among the items are

#### THE UNI-AMP

An extremely handy dual-circuit single-valve amplifier.

#### REMOTE CONTROL

Full details for making a simple "switch-at-a-distance" unit.

#### FITTING A PENTODE

An easily constructed "filter" for using a pentode to the best advantage.

**ALSO IN THE APRIL "CONSTRUCTOR"**

## THE S.T.300 FOR A.C. MAINS

*By John Scott-Taggart*

**MAKING RADIO READABLE  
ROUND THE DIALS  
FIVE-CHANNEL TELEVISION**

**PUSH-PULL DETECTION  
THE MONTH ON SHORT WAVES  
CHOOSING A LOUDSPEAKER  
ON THE GRID, ETC., ETC.**

**WITH PICK-UP AND SPEAKER  
QUEER QUERIES  
A PRACTICAL MAN'S CORNER**

# THE WIRELESS CONSTRUCTOR

**SIXPENCE**

**APRIL NUMBER NOW ON SALE. GET IT TO-DAY.**

***Insist on—***

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Whenever you think of coils, you think of Colvern.

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REMEMBER COLVERN SINGLE DIAL SUPER-HET  
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Colvern Coils were exclusively specified for  
the S.T.300 and have now been chosen for the  
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Set of 3 coils (mounted on aluminium base)  
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Colverdyne Intermediates, for use with the  
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### COSSOR VALVES FOR THE "P.W." SET DESCRIBED IN THIS ISSUE

"Single Dial Super-Het."

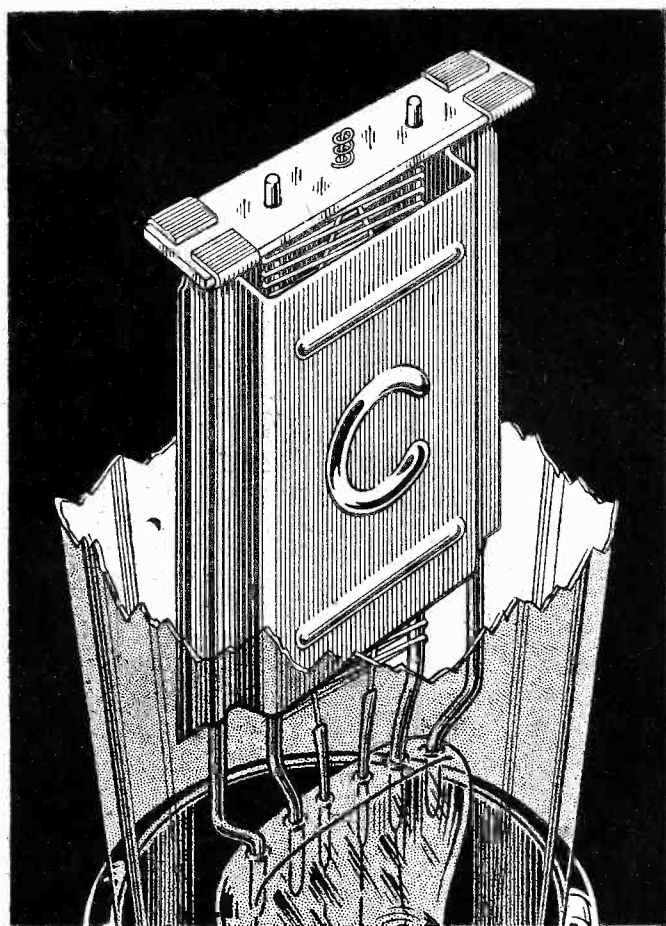
210D.G. 220S.G. 220S.G. 210H.F.  
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which ensures

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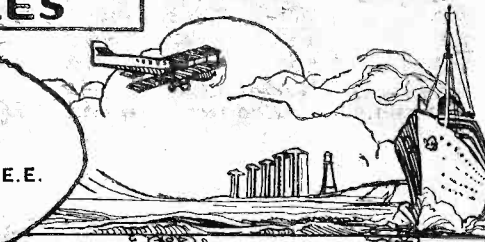
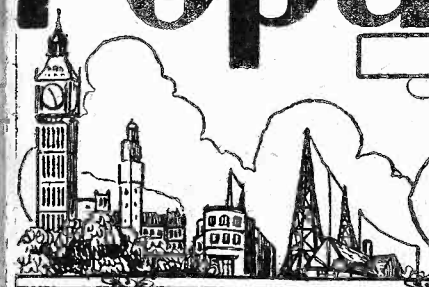


# Popular Wireless

**LARGEST NET SALES**

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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.



**MASSES AND MASSES**  
**RADIO ISLAM**  
**LINDY'S BABY**  
**THANKS, LADS!**

## RADIO NOTES & NEWS

**CRUELTY TO SHARKS**  
**SCHOOL LESSONS**  
**SHANGHAI HEROES**  
**WHO IS A. J. ALAN?**

### This Early Easter.

**O**WING to the vagaries of the moon, Easter this year falls earlier than it has done for about twenty-five years, I believe. So early, in fact, that the Easter Eggs won't be laid!

What the chances of the usual outdoor junketings are I dread to think, but I am not banking on a "picnic-and-portable" holiday. Seems to me that (miracles apart) this Easter was designed by Nature to be a fine opportunity for busy men to have a long orgy of "Cosmic."

By the way, I wish some of those ultra-short-wave magicians would find a wave which would destroy a two-ton dump of sodden leaves—my Easter problem!

### Masses and Masses.

**T**HOUGHTS of the Easter festival urge me to point out a curious example of how some so-called "Radio critics" give themselves away. One of them recently said, in reference to the B.B.C.'s production of Delius's "A Mass of Life," "this work is considered by some to rank with the great Masses of Bach and Beethoven." He must have invented this, for the idea of comparing this work to, say, Beethoven's "Missa Solemnis" is ludicrous.

Delius's "Mass" is a musical setting of passages from Nietzsche's "Also Sprach Zarathustra," an anti-Christian book glorifying the "superman" and deriding the meek and humble. As well one might compare the "Gotterdammerung" with "The Messiah."

### Radio-Islam.

**F**ROM the Cross to the Crescent! Hereby be it known that, uniquely in the history of Islam, the Koran has been relayed from the famous mosque of St. Sophia at Istanbul. This innovation is the work of Mustapha Kemal—and I hope that the faithful approve of it, as well as of his other job of replacing the Arabic Koran in

some mosques by a Turkish translation.

Truly it is a long step from the shoulder-blades of sheep, on which (we are told) Mahomet wrote the Koran, to the modern microphone.

### Lindy's Augustus Charles.

**I**N common with all normal people, I hope that before these lines are published the son and heir of the redoubtable Col. Lindbergh will have been restored to his parents, safe and sound. Thanks to

radio and the Press, almost the whole population of the U.S.A. has been looking for the baby.

Apropos of American crime, what is there behind the announcement that the guard of three policemen, which have been kept at the grave of Edison day and night, is to be continued? Putting two and two together, one gathers that the "non-assimilated" elements of the mighty American nation don't "hold much stock" in their national celebrities.

### CURBING CRIME IN NEW YORK



New York's Flying Squad is kept informed of the moment-by-moment moves of criminals by this new police broadcasting station. A message radiated from this source is simultaneously picked up by over 400 police centres, moving or fixed, in different parts of the city and suburbs.

### Press versus Radio.

**M**Y controversy with a 'P.W.' Californian reader about the efficacy of radio advertising seems to have taken a new turn by the announcement that the Pepsodent Company, who suspended their press advertising in favour of radio, have returned to the aforesaid press, with a national campaign. I understand that their advertising manager refused to commit himself to the statement that radio advertising is more effective than newspaper or magazine advertising. Looks as if Pepsodent's "hae their doots."

### There's a Moral.

**I** CAN now supplement my report that the home radio construction game in the U.S.A. is practically dead, with the news that this, having been brought to pass by the manufacturers of ready-made sets, has in its turn produced diminishing interest in radio.

They say that radio exhibitions were much more crowded in the "hook-up" days than they are now. Naturally! A living hobby must have nourishment and air.

### Thanks, Lads!

**M**Y second appeal for support of Mr. Rendle's efforts to build up a system of sub-stations in connection with his short-wave laboratory and club at Bromley met with  
(Continued on next page.)

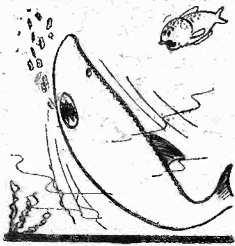
# NEWS—VIEWS—AND INTERVIEWS (Continued)

a most gratifying response. He tells me that your letters were so nice that it was really hard for him to have to turn down some of you because of the unsuitability of the localities in question.

He is very grateful to all who wrote—and I am proud of you. No more applications just now, please. I hope that Mr. Rendle will let us know something more of his organisation and its results.

## Cruelty to Sharks.

**A**FTER pecuniary problems the greatest modern conundrum is—how to dispose of old safety razor blades. I know of one man—a rich 'un—who waits till he has about a thousand and then takes a trip to Gibraltar and dumps them in the Bay of Biscay. But that's cruelty to sharks and divers! One way is to wrap them up and leave them in a



railway carriage. But they would only be sold by auction and resold to you by Cohen! Mr. Steanson, of Newcastle, has put 63 of 'em "in abeyance" by using 'em as condenser vanes in a one-valver! Coward! He has only put off the day of reckoning, because he'll have to scrap that set and build a "Cosmic" shortly!

## B.B.C. Sets the Fashion.

**I**T looks as though England, besides having the "Mother of Parliaments," is going to be the mother of national broadcasting organisations, too. In Australia it has been decided to transfer the control of broadcasting programmes to a Commission which eventually is to have powers like those of the B.B.C.

In Canada, where the Canadian Radio League has been demanding an improvement in broadcasting, the Government is to consider the question, now that the Privy Council has confirmed that the Government has authority to control radio all over the Dominion.

## Is It Irritating?

**W**HILST on the subject of licences I may pause to remark that a Wellingborough man has made a jolly good suggestion, namely, that wireless licences should be affixed in metal holders to house doors. The Post Office has turned the suggestion down (though the L.C.C. permits the scheme as regards motor vehicles), on the grounds that



many listeners would regard the requirement as unnecessary and irritating. As if we don't find the Income Tax irritating—and a thousand other things which we have to do in order to comply with the Law!

## Back to the Gee-Gees.

**A**GENTLEMAN who signs himself "A Fellow Who Knows," and addresses his epistle to "The Professor," warns us that, "You are doing harm to Mother earth, things won't last for ever." He alleges that exhausts from motors and machines generally, and even cigarette smoke, are "taking all the goodness out of the air, earth and sea." We think that the Smoke Abatement Society would be glad to hear from him!

## "Killed" by Kindness.

**W**E are used so much nowadays to hearing how radio has "killed" the theatre, the orchestra and so on, that it is enlightening to hear that Philip Ridgeway's "Parade" Company, who have

## Where to see "P.W." Sets.

### An Important Announcement.

Our readers will be interested to learn that we have been able to make arrangements for the famous "Cosmic" Receiver to be demonstrated at leading radio retail shops throughout the country. Thanks to the co-operation of many retailers—who thus become officially recognised exhibitors of leading "P.W." sets, as well as the "Cosmic" in particular—"P.W." readers in the majority of the towns in this country will soon be in a position to examine actual "P.W." sets, and to have them demonstrated locally.

In an early issue we shall begin publication of a series of lists of names and addresses of those retailers who have agreed to co-operate in this scheme—a scheme which will not only enhance the popularity of the "Cosmic" but which will in many ways greatly assist "P.W." readers generally.

Any retailer desiring to exhibit a "Popular Wireless" "Cosmic" set—whether purchased through a wholesaler, or built up from parts as specified in the description of the set published in "Popular Wireless"—may apply to the Editor to be placed on our official list.

Look out for the first list of retailers' names in an early issue of "P.W."

been touring the provinces, following their last broadcast about last Christmas, have been an enormous success. At the Theatre Royal, Huddersfield, they broke all record by fetching in the largest audiences ever seen there in the last half a century.

## Shanghai Radio Station.

**A**LTHOUGH the Chen-ju radio station near Shanghai was only slightly injured during the recent fighting, the facts are that the control lines connecting the actual transmitting plant with the operating office in the heart of Shanghai were broken by shell and bomb fire, and were repaired by the engineers under fire.

Chen-ju is a great commercial station owned by the Chinese; it was built by

Americans, and communicates with San Francisco. I have read a report from a man on the spot and am bound to say that the Chinese operators carried on the service during 72 hours of heck, like heroes.

## Radio Rules Remote Robots.

**T**HAT'S a whale of a headline, eh? While chattering of inventors I must not overlook Mr. C. Keeling, of Buckhurst Hill, who claims to be able to control by radio a fleet of aeroplanes or ships. His controlling signals cannot be jammed, either.

I confess that I enjoy the stories about gold manufacture much more, because I don't believe that ships on the sea or in the air will ever be able to dispense with a trained, human, thinking being, for the reason that the "elements" don't keep to the rules.

I don't know what Mr. Keeling has got hold of, but I do know that the navigating and handling of ships needs men of skill, experience, courage and endurance. Man cannot make anything greater than himself.



## Receiver Testing.

**I**T is not generally known that the National Physical Laboratory has developed a very elaborate section for testing "broadcast" receivers, consisting chiefly of a model transmitter in a screened metal room. By means of this and subsidiary apparatus the selectivity, sensitivity and audio-frequency fidelity of receivers can be determined.

Readers will doubtless be pleased to know that we are installing two screened, sound-proof and acoustically adjustable cabinets at Tallis House for special receiver tests similar to but not quite so precise as those made at the N. Phy. L.

## Who Is A. J. Alan?

**W**E all love to receive confirmation of our judgments, don't us? And in that "Ariel" is as human as the best of you. Hence, I may be pardoned for pointing out that the "Sunday Chronicle" has been trying to pierce the veil obscuring the identity of A. J. Alan. It failed, but managed to get

the B.B.C. to admit that he holds a responsible position in the Foreign Office. Very good! In "P.W." for August 15th, 1931, whilst discussing this question, I said, "I plump for the Foreign Office or the Treasury." And it is to be remarked that I had no information save that A. J. is a Civil Servant! It's a "bull" for "P.W."!

ARIEL.







# HOW THE "COSMIC" RECORD WAS MADE

Those who listened on 42.9 metres last Friday to the "Cosmic" broadcast from CT1AA heard a particularly interesting test record of a speech by Capt. Eckersley given for the special benefit of "P.W." readers. Here is an "eye witness" account of the making of that historic record.

By K. D. ROGERS.

A FEW minutes before noon on a dull, uninviting sort of day a few weeks ago, four figures approached an ordinary-looking house in the north-west of London.

## A Famous Firm

No. 3, Abbey Road is the postal designation of that house, which in reality is not by any means ordinary, as one realises as one comes within reading distance of the large shining brass plate on the post by the gateless drive.

The plate gives no detailed description of the building; it merely and tersely remarks: "The Gramophone Co., Ltd."

But behind that plate lies a world of romance that can only but dimly be realised by those who have not passed the portals of "No. 3." For this building is, in fact, the latest recording studios of that giant gramophone combine that is known the world over as "H.M.V."

And when I say the latest, I mean in conception of design as well as the mere date of their acquisition. The largest studio is capable of seating an orchestra of some 300 players, and an audience, or chorus, of about 1,000. It is, in fact, the very last word in recording halls, with its adjustable echo device, its lofty spaciousness and acoustically perfect walls.

But I am digressing from our story.

## On an Important Mission

Towards this place, I say, and through its doors went the four figures. They carried no musical instruments nor music cases; in fact, they bore not the slightest appearance that they had anything to do with the gramophone industry, or with recording in particular.

And yet the reason of their visit to this mecca of the arts where world-famous artistes in every branch of music continually congregate was to make a special gramophone record that was destined to leave an indelible mark on radio history.

The record is the special short-wave test record that was broadcast from the studios of CT1AA, at Lisbon, on March 18th, at 10.35 p.m., G.M.T. It is a record that is unique, for it enabled thousands of POPULAR WIRELESS readers who have built the famous "Cosmic" all-wave receiver not only to test their sets on a definite transmission, but at the same time to listen to a really intimate

chat by that perfect microphone personality, Captain P. P. Eckersley.

The cat is out of the bag, and you will have guessed who one, at least, of the four, was. Besides "P. P. E." were Mr. Kelsey, "P.W.'s" short-wave expert, the "P.W." photographer, and myself.

On arrival at the studio which was to be used for this recording (it was the large

studio I have just described) a series of voice tests were made. These consisted of a brief run-over by the recording engineers of the strengths of Captain Eckersley's and Mr. Kelsey's voices.

A few words were said by each so that the distances from the microphone could be fixed before the actual recording trial began. The record was to be a double one, Mr. Kelsey saying a few words in introduction to Captain Eckersley.

## Accurate Timing

In recording, the main consideration is time. The talk, or musical item, has to be timed just right so that the disc is properly filled, without the recording being carried too near the centre of the disc.

As the "P.W." record was to be a twelve-incher, the time allotted was between four and four and a half minutes. So the

## "DOES MY VOICE LOOK LIKE THAT?"

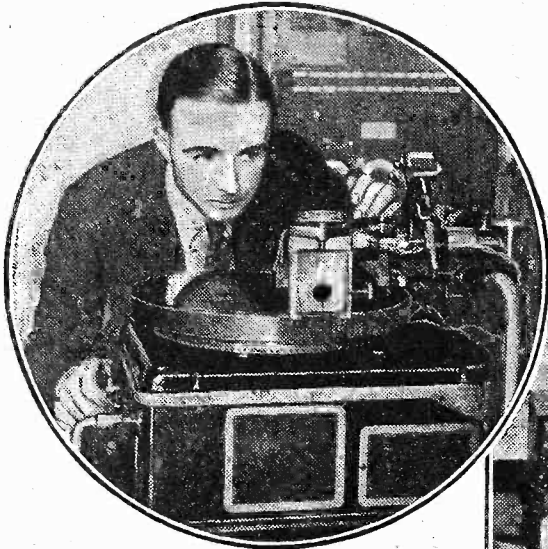


In the heading you see Capt. P. P. Eckersley and Mr. Kelsey in action before the recording microphone at the H.M.V. Studios. In the illustration immediately above, Capt. Eckersley is seen examining the wax "blank" that holds his voice, after the recording has taken place. Note the very high polish.

(Continued on page 47)

# STAGE BY STAGE

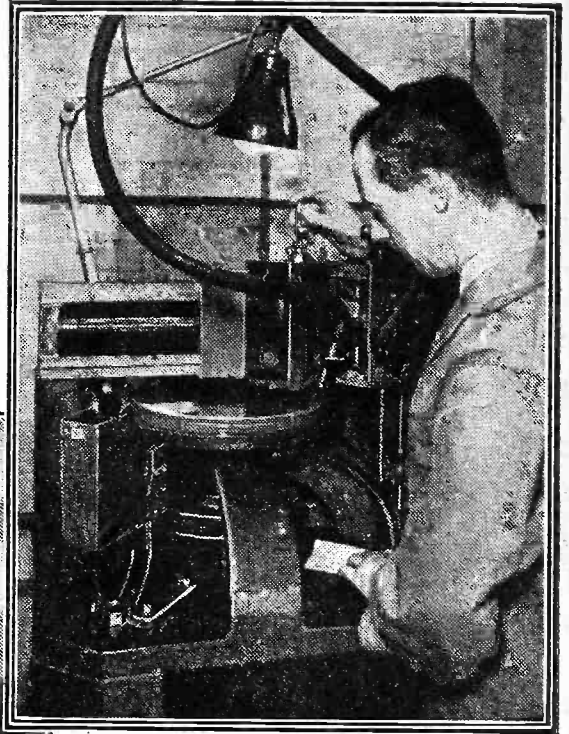
Behind the scenes during the making of the "Cosmic" special test record.



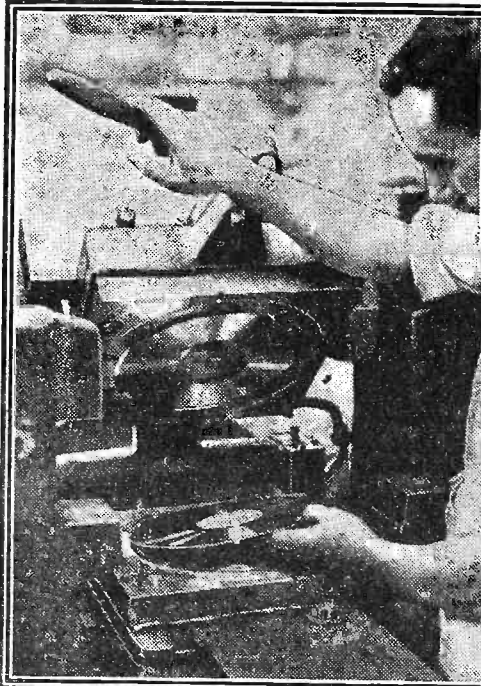
In the above photograph we see the H.M.V. recording engineer setting the cutter on the wax blank before switching on the red light to signal the commencement of the actual recording. This process follows the one illustrated on the extreme right—the polishing of the wax blank prior to recording on it. A very high polish is essential.

III

The photographs on this page show the various processes through which the "Cosmic" record had to pass before emerging as a 12-inch H.M.V. disc, similar in type and appearance to those you all know so well. From the actual recording a record goes through a surprisingly large number of steps before it is ready for issue to the public.



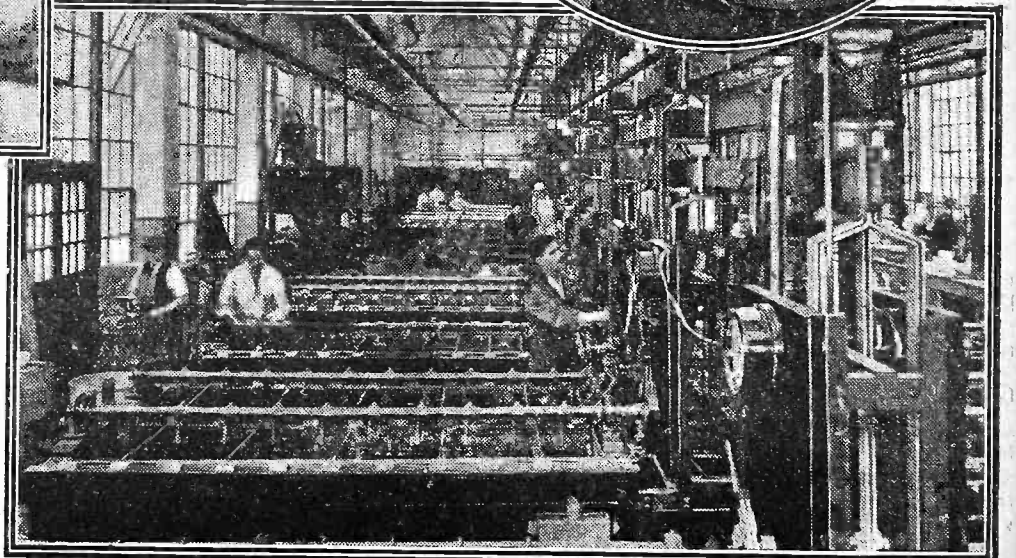
After the recording has been satisfactorily accomplished the wax holding the precious words or music is sent to the factory, where it is carefully covered with graphite to enable a copper-plated "negative" or master to be made. This dusting process is shown below.



In the photograph shown above the final stages are being reached, for the "plastic biscuit" is being placed in the press ready for the stamping of the record. Innumerable copies can thus be made. Note the two stamping dies with the labels already placed in their centres. A few seconds later the record itself (as shown on the left) is ready to be removed from the press, trimmed, carefully examined and packed off for dispatch.



After the wax has been dusted with graphite it is hung for something like 15 or 16 hours in an electroplating bath. Thus is a copper negative made, from which the "Cosmic" record is stamped. In normal cases, however, further positives and then more negatives are made. This photograph (right) gives a good impression of the plating-room of a modern gramophone company, with the many rows of plating baths each holding a large consignment of "waxes."





## HOW THE "COSMIC" RECORD WAS MADE

(Continued from page 45.)

next test was one of time as well as quality recording. And the result was afterwards played through by means of a moving-coil loudspeaker from the wax impression.

Two such tests were made so that the final record should be above reproach, and then the O.K. was given for the last run.

### The Starting Signal.

Standing before the microphone Captain Eckersley and Mr. Kelsey awaited the buzzer signal for silence. Suddenly it came, and in a silence that could be felt they awaited the red light that signals "Begin recording."

While they were busy before the microphone, however, let us peep inside that mysterious room of which we can see a glimpse through the small glass window close to the microphone, below the red light.

Two tall panels with their amplifying valves and controls stand at opposite ends of the room, a small, close-atmosphered

itself rests the thick wax "blank" on which the voices are to be "fixed."

Stop watch in hand, the engineer follows the course of the chat on a loudspeaker at his side. There is no need for silence in this room, for it is insulated from the studio by the latter's sound-proof walls.

### Nearing the End.

At 4.25 minutes he reaches out his hand and the red light in the studio goes out. Nearly time. Eckersley wishes his future hearers, yourselves, farewell, and the recording is over.

There is no chance of hearing that record over, the wax impression has been made and would be damaged by a "play through," so it is labelled "Special, POPULAR WIRELESS," and carefully packed off to Hayes to go through the intricate processes that every record has to undergo before it emerges as a beautifully polished black disc.

At Hayes that wax impression is taken into a draught-proof cubicle and a skilled artisan carefully dusts very fine graphite powder all over it, and into the grooves.

When this is completed, the record is taken and hung for many hours in an electroplating bath, where a comparatively thick coating of copper is deposited on it. After the allotted time the record is removed

stamping rooms and placed on one of the machines.

A chunk of the soft black "bisquit" of which the final record is made, is placed on the press. The "P.W." master is brought down on to it, at the same time steam is run through to heat the master, and then the press is cooled, and then opened.

The record has yet to be trimmed, of course, but otherwise it is complete, with its white label ready in place, and when it has been burnished up it will be ready for use.

In appearance it is exactly like any other twelve-inch H.M.V. record, but it contains the voices of two of the members of "P.W.'s" staff, and as I said before, it is ready to mark a red-letter day in the history of short-wave reception.

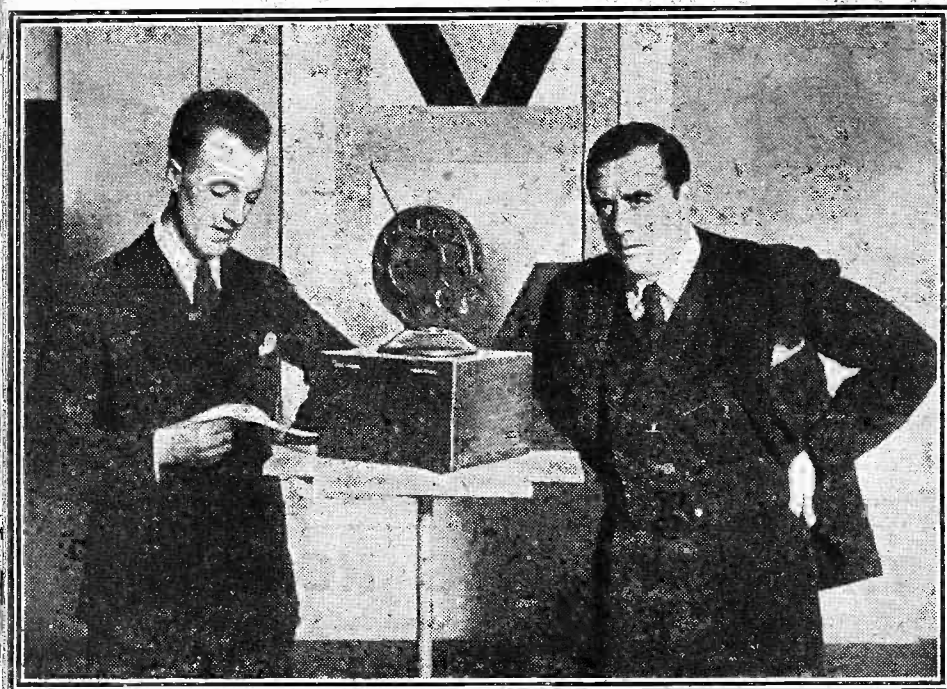
### Why Not Win It?

Such is, in brief, the history of the actual making of the special "Cosmic" test record, made possible through the kind co-operation of The Gramophone Co., who placed their recording studios and staff at our disposal in order that our test should be a complete success.

The record cannot, of course, be purchased by the public, and at the present time it is on the high seas en route back from Lisbon, whence its broadcast on March 18th on 42.9 metres enabled thousands of listeners all over the world to hear our Chief Consultant speaking to all home constructors and amateurs a special message of vital interest to them all.

In due course, this historic record, autographed by Capt. Eckersley, will find its way to the home of the fortunate "P.W." reader who wins the contest described in our last issue.

## "HULLO CQ. THIS IS CT1AA CALLING!"



Here are the two gentlemen during the process of recording. Behind Mr. Kelsey, and to his left, is the small sound-proof window through which the recording engineers can watch the proceedings, hearing the whole business on a loudspeaker in the next room.

chamber that is kept to a fairly high temperature in homage to the wax discs that are used in recording.

By the panel at one end (near the little window through which he can see what is happening in the studio) sits the recording engineer with the revolving turntable and the highly sensitive sapphire cutter.

### Constant Speed Essential.

A slowly-falling weight, after the fashion of the mechanism of the grandfather clock, supplies the driving force for the rotation of the turntable, a rotation that must not vary a fraction in its speed, and on the table

and the wax interior of the copper shell (for the back of the wax will not have been dusted with graphite, and therefore not plated) will be removed, and the copper "master" will be ready for polishing and nickel-plating.

At this stage the process through which the POPULAR WIRELESS record goes differs from that of the record that is sold to the public, for the latter must be sold in thousands.

So the making of the many matrices (impressions from the copper master), and from these of the stamping dies (used to stamp the commercial discs) is not required, and the master is taken to the

## "SHORT WAVES"

### THE NEW CRITICS.

Labourer (sitting by kitchen fire, listening to wireless): The pizzicato for the double basses in the coda seems to me to want body, Alf.—"Punch."

"Radio without reaction. Set which cannot be made to howl," runs a headline. Who wants it to, anyway?

### SOUNDS LIKE THE DEVIL?

"...and two stages of IMP DANCE coupled audio," concludes an advertisement in an American magazine.

It's more than imps that have been dancing around in our set lately.

### SOME USEFUL HINTS.

When using a crystal set, it is always best to connect the aerial and earth—this procedure greatly facilitates the art of tuning-in.

Never listen-in while it is lightning; the results may be "shocking."

A better way to amplify your crystal set than by adding one valve is by adding two.

We jinglers greet you, potent, tireless, Encyclopaedic lord of wireless, Who proffer to a listening nation Pronouncements on pronunciation.

To satisfy the Muses' agent "Pageant" must yield the palm to "pageant," Scone may be "scon" or "scone," but doff That clumsy "l" and grants us "goff."

But give to us the fullest credence, And precedence (v.l. precedence) Nor circumscribe by your decree Our orthoepic liberty.

—"Punch."

THE MIRROR OF THE B.B.C.

By O.H.M.

**ACCOMMODATION AT BROADCASTING HOUSE****MADRID AND AFTER—THE LICENCE REVENUE CONTROVERSY—  
THE BIG MOVE—GOOD-BYE TO SAVOY HILL—Etc., Etc.**

**S**TATEMENTS that the B.B.C. staff is in a state of revolt about accommodation at Broadcasting House should not be taken seriously.

It is true that on the whole the offices in the new building are not as spacious or indeed as comfortable as the offices at Savoy Hill or in any of the three or four other buildings occupied by the B.B.C. But, as is right and proper, the new building is designed primarily for studios; whereas the old buildings were adapted in rough-and-ready fashion, and did not serve the main purpose of broadcasting.

Even so, however, the offices in Langham Place are quite adequate for their purpose. Of course, there are bound to be complaints about any move from any one place to any other place, if those concerned happen to be British. But I would venture to say with assurance that those members of the staff of the B.B.C. who are really interested in the progress of broadcasting are glad to think that the service to listeners is first and foremost at Broadcasting House.

**Madrid and After.**

The Conference at Madrid in September should be important to broadcasting. It is the quinquennial session of wireless administrations, that is, of the Post Offices or other official government authorities, assuming the responsibility for the control and distribution of ether channels, but administrations have been notoriously reluctant to do anything about broadcasting; they are much more concerned with the other wireless services—naval, military, and commercial.

Those who are in a position to speak with authority do not believe that Madrid will yield anything of substantial help to broadcasting. There may be an attack on the B.B.C. for not making full use of the wave-lengths it at present devotes to the Regional Scheme. I profoundly hope that Mr. S. W. Phillips, the able policy spokesman of the British Post Office, will insist on at least retaining for broadcasting in this country the frequencies already allotted.

If the status quo in this respect is established with some assurance of continuity, the British Broadcasting System will be able to assume its final form without further delay.

**The Licence Revenue Controversy.**

Lady Snowden's suggestion the other day that sixpence of the wireless receiving licence money should be reserved as a subsidy for opera has revived the controversy about the distribution of the two million pounds odd which the British Public pays annually for the right to operate wireless receiving sets. I gather that the B.B.C. now gets only 4s. 11d. of the 10s., the balance going to the Post Office for collection, and to the Treasury for revenue.

**The Big Move.**

Preparations for the big move from Savoy Hill to Broadcasting House are now

practically complete and by Whitsun very few, if any, of the staff will find their duties take them to the Strand. As I have already stated, the change-over will be carried out in stages, but even so, a certain amount of inconvenience is inevitable.

This will, however, be trifling compared with what might have happened had not the administrative officials so carefully planned ahead and provided for the thousands of contingencies inseparable from so big a task.

**Good-Bye to Savoy Hill.**

The final broadcasts from Savoy Hill are arranged for Saturday, May 14th. One

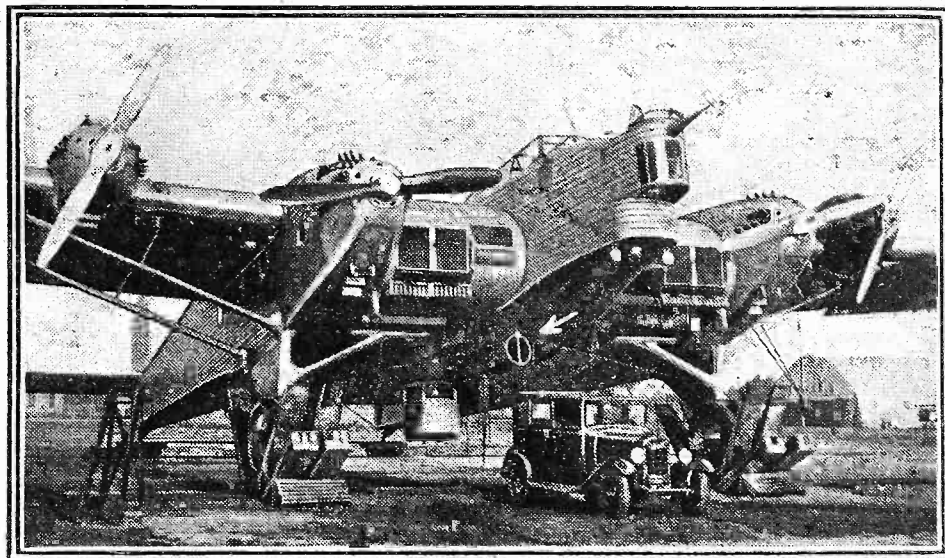
item on the programme will attempt to portray some of the many phases of broadcasting which the studios at Savoy Hill have witnessed during the eventful years since the B.B.C. first occupied them.

Mr. Lance Sieveking, who is responsible for devising this programme, has already spent much time to ensure it being truly representative of the people—speakers, singers, actors, musicians—whose work before the microphone has contributed to the building of British broadcasting as the best in the world.

**The New Studios.**

But before Savoy Hill closes down we shall be hearing programmes given in the new studios at Broadcasting House.

This must be so, not only because of the spreadover period of the move, but to ensure that the new conditions are tried out, and that when Savoy Hill is finally vacated the B.B.C. will really have finished with a building that has imparted an atmosphere of culture into millions of homes throughout Great Britain.

**NO WONDER THE GENEVA CONFERENCE IS ANXIOUS!**

This formidable engine of war is an all-metal French bombing plane, fitted with the latest radio and other equipment to render it really effective. Note the aerial, indicated by an arrow just above the car in the foreground.

**THE LISTENER'S NOTEBOOK**

A rapid review of some of the recent radio programmes.

**E**VER since the days of John Henry there has always been some special favourite with what one might call "The Man-in-the-Street Listener." It would be interesting to see the result of a popular vote, and I am certain the Sisters Elsie and Doris Waters would be high up, if not top of, the list. Their voices are ideal, and their repertoire is pleasing and varied. A recent imitation of Flotsam and Jetsam was exceptionally clever. It recalled the days when all London used to talk of Cissy Loftus and Marie Dainton.

And here, by the way, is a suggestion. Why not a series of old music and old singers on the lines recently carried out by Tom Clare, with drawing-room entertainers of the Corny Grain type. The elderly, and even middle-aged, lovers of the old-time music hall would revel in good

impersonations of such ideal favourites as Charles Godfrey, Herbert Campbell and Dan Leno.

The success of old hands, like Gus Elen, Charles Coborn, and many other veterans still with us, in the last few seasons, proves that stirring up of old-time memories affords pleasure to thousands.

**That Musical Programme.**

After suffering for about a quarter of an hour the other night, while the musical plans for the next fortnight or so were run through, I wondered more than ever that time could be wasted over the matter, while it was being seriously contemplated whether the theatre was worth even three hours a year. That the bare details were not of the slightest interest to even one

(Continued on page 78.)



# ON THE OTHER SIDE A TALK WITH A DUTCH LISTENER

Hilversum, Huizen and the short-wave station P C J are so often heard by British listeners that this account of what a Dutchman thinks of them makes uncommonly interesting reading.



MY Dutch wireless pal is an official on the staff of the short-waver P C J, at Hilversum, now temporarily closed while they are fitting new plant.

I warned him that I wanted to cross-question him about Dutch broadcasting, for the benefit of British readers, and started the ball rolling by mentioning the Hilversum-Huizen mix-up.

"Well," he said, "our trouble is that in Holland there is everlasting fierce discussion between religious bodies.

## Powerful Religious Bodies.

"There are several newspapers provided for various Catholic and Protestant authorities, and there are powerful unions which, in a way, correspond to your trade unions. The result is that when broadcasting came along, all the parties tried to get microphone publicity, and the three societies having enough money to carry on a regular broadcasting schedule were the non-partisan association called Avro, the Socialist organisation Vara, and the special branch of the Catholic organisation formed when broadcasting started and called, in English, the 'Catholic Broadcasting Organisation.'"

"Do they make much difference?" I enquired.

"Why, of course!" he explained. "It

is difficult for you to understand why Dutchmen get so enthusiastic about these unions, but in the newspapers and in daily life they play such a big part that the fierce struggle of each to get adequate time in the broadcast programmes is quite understandable to us."

"And how does it work out?"

"Hilversum and Huizen are the two chief stations, the other station which you may hear on 1,071 metres, Scheveningen-Haven,

is a Government station like Rugby. Kootwijk is now testing on the broadcast band.

"There is even yet no definite settlement about Hilversum and Huizen, as to which station shall broadcast the programmes of any particular party, but the present arrangement is that the non-partisan association and the Socialists broadcast from Hilversum, while Huizen broadcasts under the auspices of the Catholic Broadcasting Organisation.

"The three bodies went carefully into this and made an arrangement between themselves to allot the programme time according to the number of members belonging to each. At present there are about ten thousand paying members of the

allotments and wave-length changes."

"And news?" I enquired. "We often hear news bulletins in progress at Dutch stations. Where does the news come from?"

"Hilversum and Huizen get their news from the big Vas Diaz agency in Amsterdam. There is a tape machine in one of the station offices, and bulletins are sent by hand before the late-night broadcasts.

## The News Bulletins.

"There used to be trouble because some of the small newspapers in country districts run as a side-line by one of the Catholic or Socialist organisations used the news from the broadcast bulletins, often without even giving an acknowledgement. The Vas Diaz, and not Hilversum, had to take action. They did take action, and now these papers subscribe to the Vas Diaz direct!"

"What about the licence question?" I enquired.

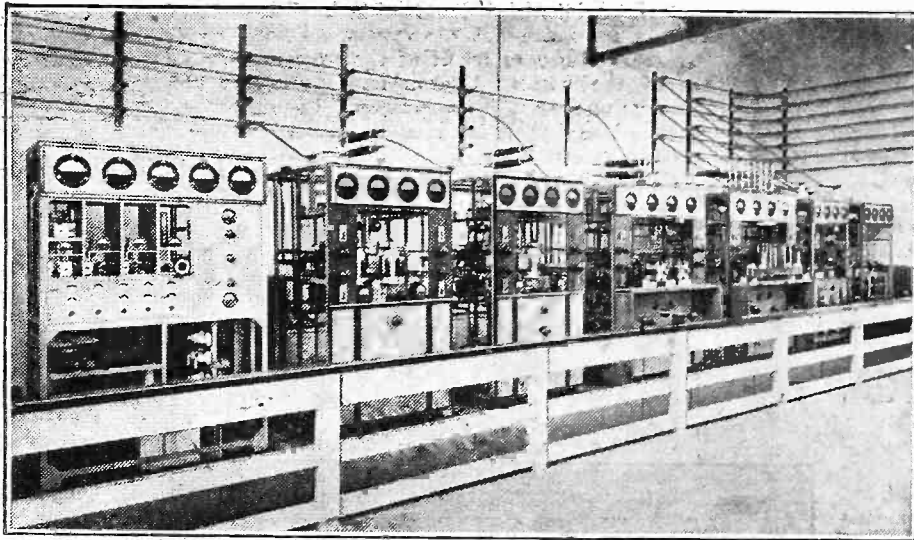
"We haven't had any bother so far," it was explained to me, "because the paying members of the Avro, Vara and other societies provide more than enough money for broadcasting; but there is a standing scheme down for discussion which would bring about a licensing system very similar to your own, and the Radiograad would act like your British Broadcasting concern, and take the listeners' licence money. But the scheme is still

standing, and is hardly likely to come up for discussion until the funds of the workers' societies run low!"

"Can you give me any tips identifying the programmes from Hilversum and Huizen?" I asked. "The announcements always seem so long, and after the first 'hier Hilversum,' or 'hier Huizen,' as the case may be, the rest is only a blur."

"It's not easy to explain things to anyone (Continued on next page.)

## HOLLAND'S LONG-WAVE STATION AT HUIZEN



This is the gear that produces the programme radiated on 1,875 metres from the Huizen station. The wave-length is crystal-controlled, the actual quartz crystal being incorporated in the first panel on the left.

Avro non-partisan association."

"Do they settle these things themselves," I asked, "or is there a central body which decides it by law?"

## The "Suggestions" Department.

"Not by law," he said, "but there is a kind of central body known as the Radiograad. The chairman of this is an official of the Postal Department. The Radiograad makes suggestions for programme

## SHORT-WAVE REACTION

A useful "differential" tip.

IT is well known by now that a differential reaction condenser is of very great value on the medium and long wave-lengths, but readers will have noticed that these designers are hardly ever used in receivers designed exclusively for short waves.

There are two reasons which account for this: First we find that the double action, which is the special feature of differential condensers, tends to make reaction control on short waves rather

sudden, thus creating the need for slow-motion adjustment. Secondly, oscillation on wave-lengths below about 19 metres becomes difficult to obtain, owing to the by-passing effect of the extra set of fixed vanes and their associated wiring.

Fortunately, however, the addition of a simple two-pole "on-off" switch to your set can give you the choice of either differential reaction for long waves or the older plain type for short.

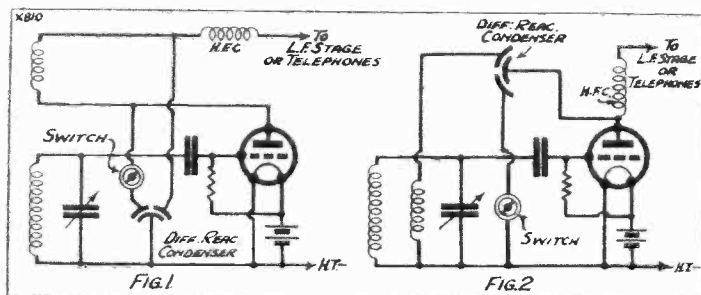
Mounted on the Baseboard.

In order to keep the panel as "clean" as possible, it is desirable to mount this switch in a convenient position on the baseboard or, better still, to gang it with some existing switch.

Connections are easily altered; just break the lead from the differential condenser's extra set of fixed vanes (those with which the moving vanes inter-mesh when reaction is at zero) and join the two ends to the switch. The accompanying diagrams make this clear. Keep these leads as short as possible and well spaced.

For long waves the switch should be "on," when reaction will be differential as before.

### HOW THE SIMPLE SWITCHING IS FITTED



As shown here, the place for the switch depends on the type of circuit used.

## MORE "COSMIC" SUCCESSES

Some letters from "P.W." readers.

### ANOTHER SATISFIED OWNER

"CANNOT SPEAK TOO HIGHLY OF IT."

The Editor, POPULAR WIRELESS.  
Dear Sir,—As a reader of "P.W." no doubt you will be pleased to learn that I have made up a "Cosmic III" as advertised, and I cannot speak too highly of it. I think it is the best three-valve set that I have heard, and so easy to build; it is simplicity itself by following the instructions, as everything is so plain and straightforward, thanks to "P.W." engineers. It is the first set that I have built, and when I had finished and switched on I was more than surprised to get the signal straight away, which goes to prove how perfect the engineers have got their circuit, and considering the price, I do not think there is a set to touch it.

Thanking all that are concerned with such a genuine set,

I remain,  
Yours truly,

J. NASH.

98 Heatherside Road,  
West Ewell,  
Surrey.

### "THE BEST YET!"

AN EXPERT'S TRIBUTE TO "THE COSMIC."

The Editor, POPULAR WIRELESS.  
Dear Sir,—I cannot too highly praise your "Cosmic" Receiver. It is the best I have tested out as yet. I have been a regular reader of your wonderfully instructive book, "P.W.", since the first publication, and am even now using your "Magic" III, which I find good on DX work.

Wishing you every success, and thanking you for the help I have received from your publications,

I am,  
Yours very faithfully,  
W. J. BLIZZARD,  
Wireless Specialist,

Warrington House,  
Thornbury, near Bristol.

who doesn't understand Dutch properly," he said, making a sly dig at my rather German pronunciation of his language! "But, anyway, the name of the association giving the concert is always announced immediately following the 'hier Huizen,' or whatever it is. For instance, there is the Katholieke Radio Omroep, the Nederlandsche Christelijke Radio Vereniging, the Vrijzinnige Protestantsche—"

But I called for a halt!

### Abbreviations Often Used.

"Never mind," he said, "these societies all have their abbreviations, and the abbreviations are generally given between items. The Katholieke society, for example, is cut down to K.R.O., and you will often hear the K.R.O., A.V.R.O., and V.A.R.A. abbreviations broadcast during short programme intervals."

"Is it true," I asked, after thinking about these announcements, "that the Dutch stations are the only ones from which the announcers bid you sleep well?"

"Depends how you look at it," said my friend, amused. "We have a phrase 'Goeden avond, wel te rusten,' which really means 'Good-night, sleep well.' But it's so colloquial that I don't think our announcers would claim any merit for bidding the world sleep well."

"When you hear the man at Hilversum say: 'Ik wensch U Goeden avond,' and so on, 'wel te rusten,' he is only saying 'Good-night' in a rather old-world but—to us—quite ordinary fashion."

"I suppose," I pressed, "that all these religious societies result in your Sunday programmes being a bit dull?"

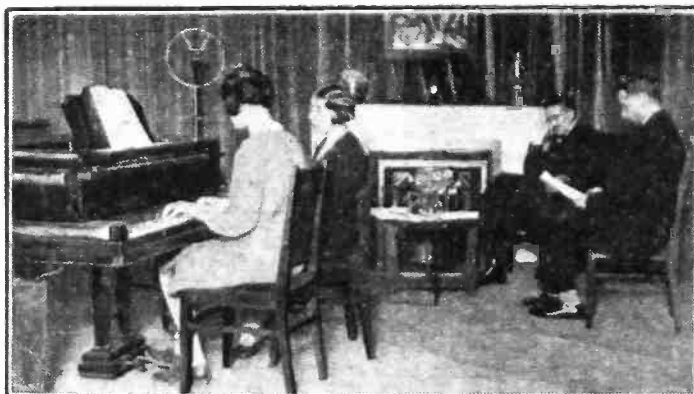
## A TALK WITH A DUTCH LISTENER

(Continued from previous page.)

"Not a bit of it," he countered. "The programmes are not of a very religious nature. The only result of the squeezing in of the various Church and Workers' associations to the programmes of one station is that there are some extraordinary programme timings."

For instance, on Sundays, Hilversum is almost invariably working by eight o'clock in the morning, and the Vara put out a programme until just before ten o'clock. This Vara session usually consists of physical culture talks, football notes, gardening talks and gramophone records—the sort of thing, you see, that would appeal to the average working man.

### ONE OF THE HILVERSUM STUDIOS



This studio at Hilversum has been the source of many fine musical programmes enjoyed by listeners in this country.

"Then, as a rule, the Liberal Protestant people have their session. They sponsor a service from Amsterdam and an organ recital is generally given in this part of the programme."

"After this the Avro people take over and their concert continues until the end of the afternoon. They give ordinary orchestral concerts. The Vara give radio plays and orchestral concerts very similar to those of the Avro, and their session is usually next."

### Sunday Programmes.

"On some occasions the Avro people have a further session at the end of the evening and carry the programme on until just before midnight. Generally speaking, the only strictly religious part is the service given by the Protestant Association in the morning."

"On Sundays Huizen is always the more religiously inclined because of its sponsoring by the Christian Radio Society (N.C.R.O.) and the K.R.O. Huizen generally gives a Church service in the late afternoon, about the same time as your B.B.C. service, but we hear the B.B.C. services later because of the difference in your Greenwich Mean Time and our Amsterdam time."

"By the way, Huizen has an Epilogue, usually just before ten-thirty on Sunday evenings, which is a copy of your Epilogue. It might interest British listeners to hear this, which they will generally do before the British Epilogue comes on at the end of the Sunday programme."

ED. NOTE: The next article in this interesting series will be "A Talk with a Czech Listener."



# TEACHING TELEVISION



## TECHNIQUE

By J. F. CORRIGAN.

The Radio Colleges of Italy are world-famous for their thorough training, and now they have turned their attention to Television. Here is an article describing their methods and the different types of apparatus used.

ITALY is a land of radio colleges and technical schools. There is a radio faculty in nearly every town of any size and importance.

Marconi himself, you may perhaps remember, in his youthful days attended lectures at one of the technical schools, and probably it was during a lecture-demonstration that his attention was turned for the first time towards the subject of Hertz's then recent experiments with electro-magnetic waves.

### How They Start.

Italian technical schools stress the subject of radio much more than similar institutions in England do. In fact, in many Italian towns you find an entire technical college devoted to nothing else but the teaching of radio science in all its branches. These schools and colleges take in youths from the age of sixteen upwards.

Some aspirants to a radio career are trained to be radio operators in the various branches of the Italian Navy. Other individuals, after having acquired their radio knowledge and technique, drift to other lands, notably to America, and become radio or telephone engineers in the big electrical concerns of that country, whilst a smaller number of graduated students of these Italian radio colleges settle down to a life of technical teaching, experimenting and consulting.

There is, you see, nothing quite like an Italian radio college in this country. The *Scuole Radiotecniche Italiane*, of Milan, is one of the largest and the oldest of these Italian radio colleges. For years it has imparted sound radio instruction to a variety of students, both young and old.

Many eminent Italian radio and telephone engineers have passed through its courses of study and have entered upon successful careers as a result of their training at this school.

### The First Courses.

The Milan *Scuole Radiotecniche Italiane* has now tackled television. It approached the task very tentatively at first on account of the very uncertain basis upon which the new science of electrical and radio vision was placed. Now, however, after more than a year's work on the subject, the *Scuole* has instituted definite courses in television for

the benefit of anyone who cares to undertake them.

It is, I believe, the first radio faculty in the world to place the infant science of television on its curriculum, despite the fact that in America there are no fewer than five stations broadcasting television pictures daily.

But the authorities of this Milan radio college are not only concerned with television in its ordinary form. They have for some time been conducting experiments upon the radio transmission of cinema films, a task which is also being undertaken by the Baird Company, the American Telegraph and Telephone Company, and the Bell Telephone Laboratories of New York.

There is likely to be a good future in this new application of radio science. Essentially, so far as present-day practice has

evolved, the feat of transmitting cinema films by means of radio vision is as follows.

A film passes through the usual cinema projector in the normal manner. The light from the luminant of the projector, after passing through the film and then through the projection lens, is made to impinge upon an auxiliary lens which projects a miniature replica of the picture upon the televisior proper. Details of this televising device are, at the present time, being held more or less secret.

### Cinema Relays.

The receiver operates in virtue of photo-electric cells and mechanisms, and it virtually recombines each separate picture of the cinema film as it comes through from the distant transmitter. Each recombined picture is then projected upon a screen, with, it is said, a very high degree of efficiency as regards detail.

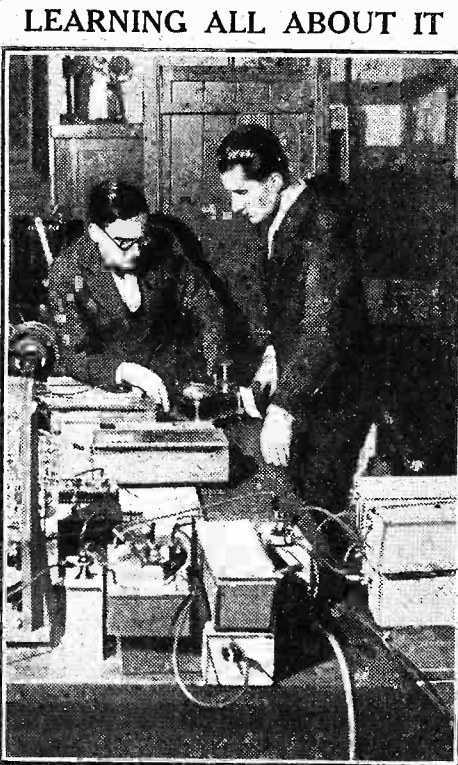
The radio-cinema, controlled from a distant master-projector, is, therefore, likely to materialise in actual practice within a few years, for the problems concerned in the transmitting of radio pictures from a flat surface, such as a cinema film, are less formidable than those involved in the televising of a scene "from life."

To come back, however, to television in the normally accepted sense of the term. The *Scuole Radiotecniche Italiane* at Milan is equipped with all the well-known television apparatus, particularly the Baird and the Jenkins receivers.

### They Make Their Own.

It has, one understands, devised many television modifications of its own, particularly in the direction of enabling several individuals to view the televised picture at the one time. Some form of optical projection is, of course, implied in this statement.

If you take up a television course at this Milan institute you must, of course, be equipped beforehand with a reasonable knowledge of the fundamentals of wireless science, both in theory and in practice. Then you begin your television studies by going thoroughly into the properties of photo-electric cells. Indeed, you even go so far as to make a photo-electric cell for yourself before the school initiates you into modern television practice.



Students at work in the Television Laboratory of one of Italy's training colleges.

## FROM THE TECHNICAL EDITOR'S NOTE BOOK.

# Tested and Found—?

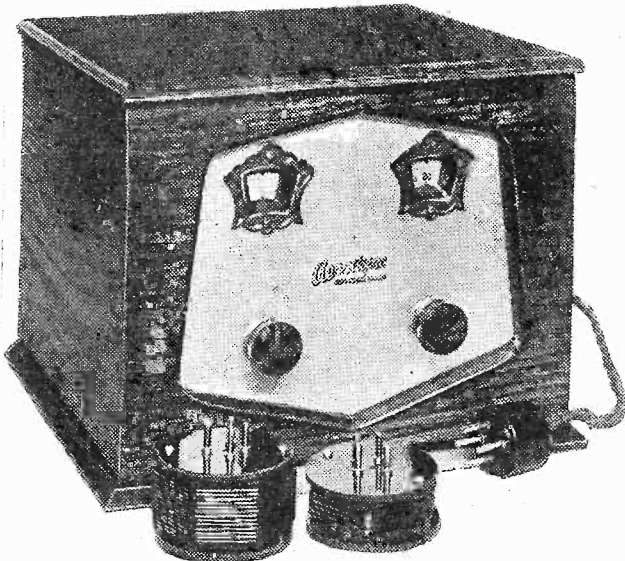


## SHORT WAVES FOR ALL.

THE success of the short-wave adaptor idea, due to Mr. G. T. Kelsey of the "P.W." Technical Staff, is most gratifying, and every year sees it reaching new heights of popularity.

And one of the best features of the whole thing is that, so far, commercial adaptors have been uniformly good, and the "junk" merchant seems to have ignored this oppor-

## THE "AERODYNE" ADAPTOR



The Short-Wave Adaptor made by Messrs. Hustler, Simpson and Webb.

tunity of plying his ignoble and inexpert hand.

The latest commercial model is due to Messrs. Hustler, Simpson & Webb, who have not only maintained the general standard, but actually risen above it with a unit that is first class in every way.

They call it the "Aerodyne," and it is sold, built up and ready for use, at the most reasonable price of 35s., including a handsome oak cabinet and two coil units covering 15-50 and 50-100 metres respectively.

It is a most attractive instrument both in appearance and operation.

There is an excellent slow-motion movement for tuning, and there is also slow-motion reaction—an invaluable aid to easy short-wave work.

For the benefit of new readers—and we seem to have many thousands such these days—it should be mentioned that the object of an adaptor of the nature of the "Aerodyne" is to transform an ordinary

set into a short-waver. You remove the set's detector valve and use this in the unit and then insert a plug, which is connected to the unit, in the set's detector valve holder.

The tuning controls on the receiver are ignored and the station searching is carried out entirely on the adaptor, for the set acts merely as an L.F. amplifier.

It is, of course, a completely practical scheme, and just as good results are obtainable as when a special short-wave receiver is used.

We obtained first-rate results with the "Aerodyne," and can thoroughly recommend it to our readers. We feel we can claim to know a good short-wave adaptor almost at sight, and had we not thoroughly tested the "Aerodyne" we would still have had little hesitation in giving it a most favourable report.

## AN INTERESTING INSTRUMENT.

There is now available a leaflet describing the Climax 22 guineas all-electric radio-gramophone—an instrument having many points of interest.

## LOEWE RESISTANCES.

I have recently received a brochure in which the Loewe High Vacuum Resistances are detailed. The case for these inexpensive British-made components is excellently presented.

## INEXPENSIVE H.T.

H.T. at a fraction over a penny per volt! That is what radio enthusiasts are offered by Pertrix with their new Junior H.T. batteries. And being Pertrix it is a safe bet that it will be good H.T.!

## A RECTIFIER FOR INSTRUMENTS.

The Westinghouse people have recently published a brochure describing The Westinghouse Metal Rectifier For Electrical Measuring Instruments. It is an intensely interesting and informative booklet.

## A USEFUL DEVICE.

One of the essential features of the "Cosmic" is the novel moderator system, whereby greater aerial circuit flexibility is achieved than would otherwise be possible.

That constructors were quick to realise the advantages of the idea is made clear not only by the great success achieved by the "Cosmic" set itself, but by the fact that there has been a large independent demand for Moderator coils.

In this connection it should be noted that

a long, illustrated article will shortly appear in "P.W." describing how the Moderator idea can be applied to various kinds of receivers other than "Cosmics," and it will be shown how it is often possible to improve both selectivity and power by this means to very attractive extents.

A Moderator outfit costs only at the most 5s., and there are numerous uses for it, as will be explained.

The Moderator Coil retails complete at 2s. 6d., and you can see exactly what it is

## 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.

by examining the photo of the Ready Radio version on this page.

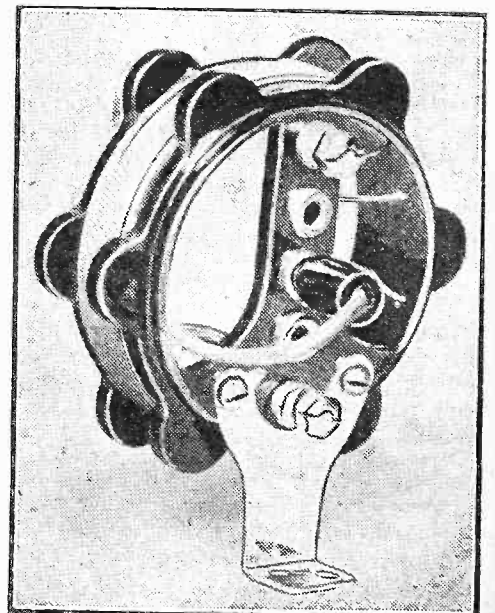
It is a neat, compact coil unit having scientifically arranged tapping points. And this Ready Radio model is exceptionally well made.

The former comprises a fine bakelite moulding—one of the most advanced small mouldings I have ever seen—and the finish is first class in every way.

The little flex lead is soundly anchored and the plug fits smoothly and efficiently into the sockets. And the mounting foot is rigidly bolted into position.

There is no need for me to predict big sales for it; it is achieving these already, I believe.

## THE READIRAD MODERATOR COIL



This is a particularly attractive little component, and is well-made and highly finished.



# 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.

## Using a Metal Baseboard.

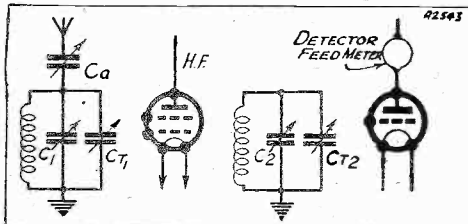
G. B. (Worthing).—"In the case of a set requiring a metal chassis or a metal-covered baseboard, is it in order to take the metal covering the whole length of the baseboard, even if the set is an all-mains one, and this baseboard is common to both set and eliminator portion? Or should only the set portion employ a metal baseboard?"

It'll be perfectly all right to take the metal right along and make one common metal earth throughout the set. What do you fear? Induction from the mains transformer? The metal won't make any difference to that.

## Adjusting Trimmers.

T. J. (Exeter).—"I have just made an H.F., det. and L.F. set with the condensers tuning the aerial and H.F. circuits ganged. I have some difficulty in adjusting the trimmers on the two sections of the ganged condenser.

## TO HELP IN TRIMMING



This sketch shows the controls and illustrates the methods of adjusting trimmers for best results.

Are there any simple 'rules of thumb' to follow when adjusting these trimmers?"

The skeleton schematic diagram which I have drawn may help you to understand the following instructions:

First understand that  $C_a$  must be reasonably small,  $C_a$  with the aerial is in parallel with  $C_1$  and  $Cr_1$ . So make  $Cr_1$  as small as possible.

Now tune in a station roughly. If you have a detector feed meter this should, if you are using leaky grid detection, go down. Make it go well down, even though quality is foul.

Now adjust  $Cr_2$  until the detector feed goes still farther down. When you have got a minimum reading by adjusting  $Cr_2$  the two circuits are properly in tune.

But over a range of wavelengths  $C_1$  and  $C_2$  may not keep exactly in step. But now  $C_a$  will act as a trimmer and should always be moved a little bit to bring the detector feed to a minimum.

Note.—(1) If you have not got a detector-feed meter loudness of signal is some guide, but a poor one.

(2)  $C_a$  must be small. If it is not,  $Cr_1$  must be made as small as possible, and you should add a little condenser in parallel with  $C_2$  and  $Cr_2$ .

(3) This all applies to ordinary circuits, as I have shown. With band-pass circuits—well! apply to the makers. I cannot understand how to trim in that case!

## Potential Divider and Potentiometer.

W. G. (Blackburn).—"I have noticed that, in a mains unit, a device consisting of a resistance across the source of voltage provided with tappings or a sliding arm is generally called a 'potential divider'.

"In a receiver a similar device, apparently fulfilling the same purpose, is usually called a 'potentiometer'.

"Is there any difference which has escaped my notice, between a 'potential divider' and a 'potentiometer'?"

A potential divider, as its name implies, divides a potential and a potentiometer measures a potential.

The real potentiometer is often made up in the form of a long, straight wire with a sliding contact. This wire becomes a ratio arm of a bridge and you balance out a current and then, knowing the length of wires on either side of the contact you may measure a potential.

People are sloppy and have called any resistance with a sliding contact a "potentiometer" when in fact usually potential divider is the accurate term. I frequently make the mistake myself.

But it's a nice sort of word potentiometer, and potential divider is all clumsy in comparison. If you're a purist don't use it.

## Coupling Tuned Circuits by a Resistance.

A. J. W. (Manchester).—"I notice that Captain Eckersley uses resistance coupling for his tuner. I am puzzled as to why it should work, because I have been led to believe that a resistance stops high-frequency currents.

"Surely this is so, otherwise why do designers recommend a resistance to be

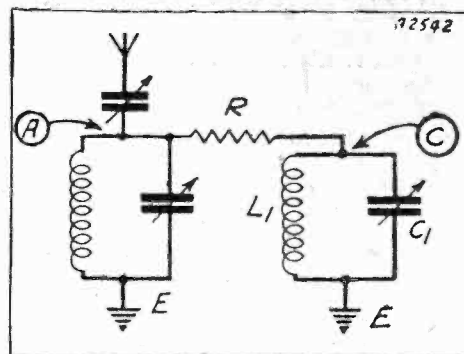
inserted in series with the grid of an L.F. valve to 'stop' H.F.?"

But it does work—and very well, too! Because, of course, high-frequency currents will pass through a resistance just like any other currents. In fact, if you have a pure resistance, then Ohm's Law applies, and the ratio of voltage to current is a constant which we call the high-frequency resistance of the resistance.

Thus in my tuner a voltage appears between A and E when the signal is tuned in. The second tuned circuit  $L_1-C_1$  has a large impedance looked at from C to E. This impedance is hundreds of thousands of ordinary ohms when the circuit is in tune.

It is only tens of thousands of ohms, out of tune.

## FOR SELECTIVE TUNING



The circuit arrangement referred to by Captain Eckersley in reply to A. J. W. (Manchester).

So when a signal is tuned in, only a little voltage is dropped along R, the coupling resistance. But when the signal is not in tune with the second circuit, then, this circuit presents a much lower impedance.

Then practically all the voltage is dropped in R, none goes into the valves, and the system is therefore selective. Moreover, of course, the aerial circuit is itself selective, and so you get a double effect.

## Metallised Valves.

R. A. (March).—"With the modern types of metallised valves is there a standard method of connecting this covering to earth? I understand that this covering is always taken to the filament pin which is to be joined to L.T. —

"Would any advantage be gained by taking a lead direct to earth by placing a metal band round the valve?"

No, not if it's already done efficiently. I imagine the earthing as done by the makers is quite efficient enough.

## 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"

# NOTES FROM THE NORTH

A variety of topics of interest to North of England and Scottish readers, discussed by Our Northern Correspondent.

**A**LERT listeners in the North have already heard transmissions from Falkirk—engineers' tests. "Public" test transmissions from the new Scottish Regional 50-kilowatt transmitter will start before the end of April, according to the B.B.C. estimate at the moment of writing.

The new station is awaited with great interest, for the existing system of broadcasting in Scotland is years behind the times. In a few short months Scotland will be brought into line with the London, Midland, and Northern Regions.

## Is It a Failure?

The Scottish Regional transmission on 376 metres should be a good signal at the Northern end of the North of England (in Cumberland and Northumberland), as well as in Scotland, but I fear that the Scottish National transmitter will have a poor range, through working on 288 metres.

Indeed, the opening of the Scottish transmitters will be a severe test of the merits of the Regional Scheme. It is suggested sometimes that the scheme is a failure (and a costly one). So far as the North is concerned, the Regional Scheme unquestionably fails in these respects:

(1) The North Regional station gives no service to the densely populated Tyne-side area, to Northumberland and Cumberland.

(2) The Scottish Regional station will give no service to the Aberdeen district, and to North Scotland.

Whether the problem of these "neglected" areas will eventually be solved by ultra-short-wave transmitters remains to be seen.

So much for the engineering side. There are critics who shake their heads over the programme outlook as well. The question of the moment is: Will Scotland make good? Mr. Cleghorn Thomson (Scottish Regional Director) and his staff at the Edinburgh, Glasgow and Aberdeen studios are facing a crucial period.

They will provide the backbone of the Scottish Regional programme. Can they silence the critics who declare that Scotland lacks the native talent to support a Regional programme of serious proportions?

## Interchange of Programmes.

Of course, the Scottish Regional programme will include a good deal of material relayed from other Regions. How far we have passed from Captain Eckersley's idea when, as Chief Engineer, he planned these dual-programme stations and dreamed of one transmitter relaying the National programme and the other providing a contrast programme produced (at any rate to a very large extent) locally!

What heat was at one time generated over the question of how much home-rule Savoy Hill would permit in each provincial Region! Nowadays the talk is of co-operation betwixt the Regions.

Interchange of programmes is becoming freer. When (as now) the North Regional programme includes contributions from the London, West, and Midland Regions, the standard of the programme may be higher, but there is no denying that it is sapped of some of its Northern character.

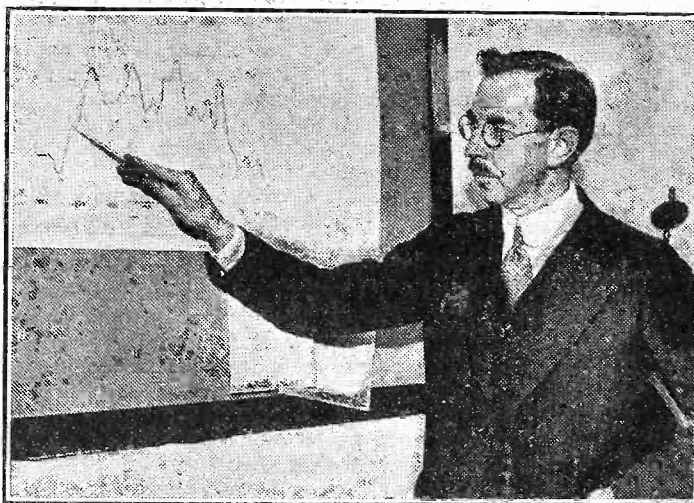
## An Altered Outlook.

And not long ago the B.B.C. used to talk such a lot about this programme reflecting the temperament, life, culture, etc., of the North.

The talent of the North has certainly been well exploited in North Regional transmissions. Even vaudeville, the weakest side of Northern activities, has shown distinct signs of life recently. Musically, the winter has been notable for a really fine series of outside symphony and choral concerts, as follows:

*Orchestral:* Ten Hallé, eight Liverpool

## SUN SPOTS AND RADIO RECEPTION



An American scientist checking a graph which records the relationship between the intensity of radio signals and the activity of solar storms. It is claimed that proof is provided that the stronger the storms the weaker are radio signals.

Philharmonic, four Leeds Symphony, and one from Huddersfield Town Hall.

*Choral:* Two each by Leeds Choral Union and Leeds Philharmonic Society, one each by the North Staffordshire District Choral Society (from Stoke), Huddersfield Choral Union, Sheffield Musical Union, Holme Valley Male Voice Choir, and Huddersfield Glee and Madrigal Society.

This makes a total of 32 first-class concerts, compared with 18 such concerts broadcast (from the old Manchester and Leeds transmitters) during the 1930-31 season. Readers of POPULAR WIRELESS will remember that when, a year ago, the Northern Wireless Orchestra was disbanded, one of the B.B.C.'s excuses was that it would be possible in future to relay a larger number of outside concerts. The B.B.C. has certainly kept its word.

Thirty-two symphony and choral con-

certs do not, however, make anything like a satisfactory substitute for the old orchestra. Looking back on a year's broadcasting without that orchestra, one realises with a shock what a bad blunder its disbandment was.

In outside broadcasting the North Region has maintained its fine reputation, and now Scotland is branching out in a similar direction. Variety turns are to be relayed regularly from the old Theatre Royal, Edinburgh.

An important policy decision regarding radio drama has been taken in the North Region. Hitherto, the B.B.C. has co-operated in towns such as Newcastle-on-Tyne and Leeds with local repertory companies. It is now decided to establish permanent companies of radio players.

## Their First Appearance.

The Newcastle Radio Players made their début in "The Battle of Hexham" (not too good a play) on February 22nd, and the Yorkshire Radio Players, at Leeds, will make their first appearance on April 13th in a dramatised episode from the novel, "Windyridge."

It argues well for the Yorkshire Radio Players that they will include J. R. Gregson, the actor and author, whose performance in the play "Sar' Alice," produced at Leeds on February 29th, was one of the finest pieces of character acting I have ever heard, whether from London or from provincial studios.

Leeds has also scored a great success with the Yorkshire Mummer's Concert Party. So far they have completely eclipsed their rivals, the Lancashire Mummer's, at Manchester.

The newspaper story that the Sheffield transmitter is to be reopened is, of course, rubbish. All the B.B.C. intends to do is to maintain a studio in Sheffield for occasional broadcasts of local talent and talks.

Leeds will remain the main B.B.C.

centre in Yorkshire. Poor progress is being made with the alterations at the new B.B.C. building in Leeds.

It was hoped to move into the new premises by March—but there is still no sign of a move.

## No Small Job.

The move is no small job, for, in addition to studios and offices, the Leeds centre includes the landline terminus, through which pass the lines from London to Manchester, to Newcastle, and to Scotland. Complicated switchgear, amplifiers, etc., have to be transferred to the new premises.

There will be no appointment of a programme official for the Sheffield studio. The B.B.C. representative at Leeds is Mr. G. P. Fox, and officials from Manchester frequently visit Yorkshire.



## MARCONI 2-VOLT OUTPUT VALVES ARE STRICTLY ECONOMICAL

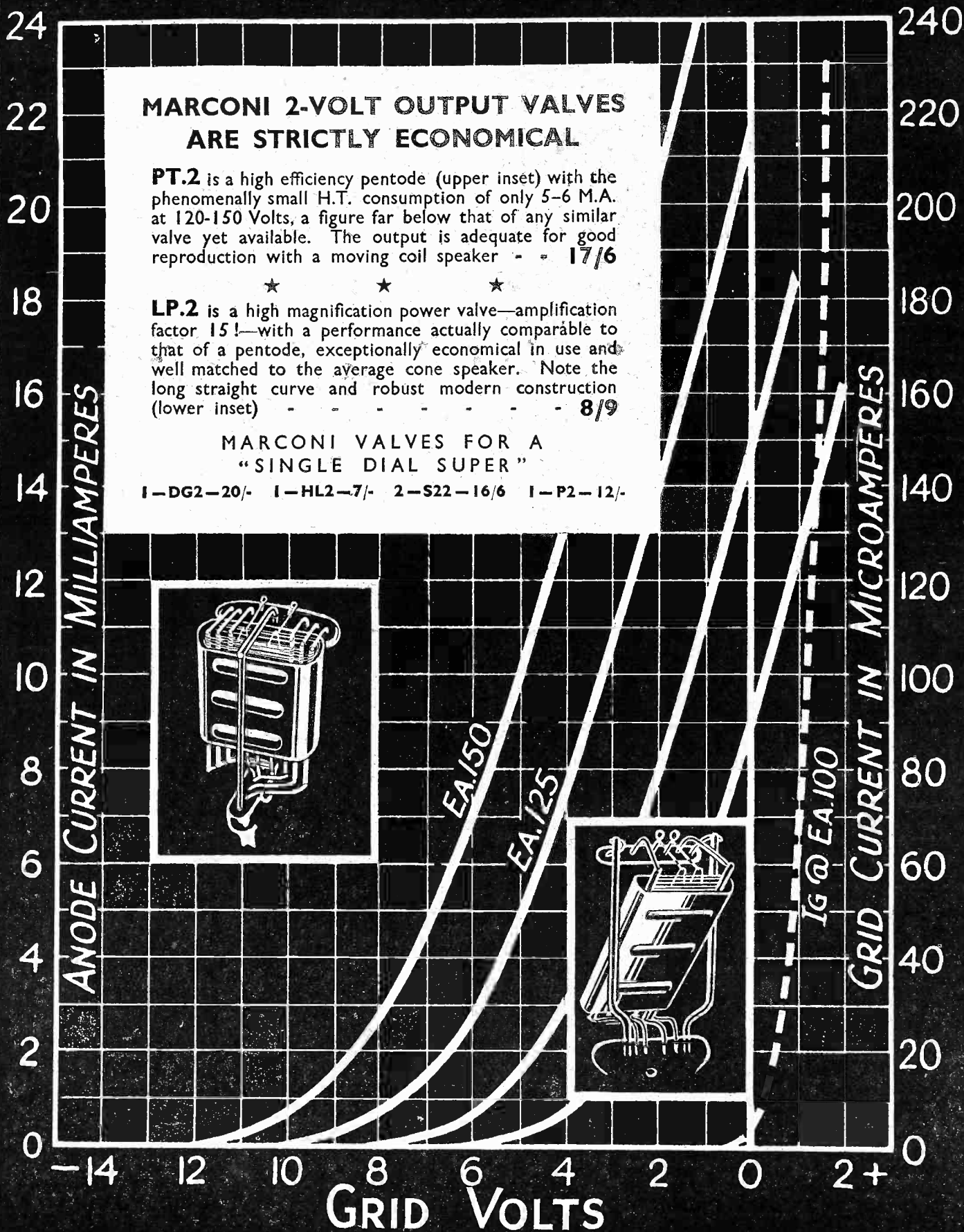
**PT.2** is a high efficiency pentode (upper inset) with the phenomenally small H.T. consumption of only 5-6 M.A. at 120-150 Volts, a figure far below that of any similar valve yet available. The output is adequate for good reproduction with a moving coil speaker - - 17/6

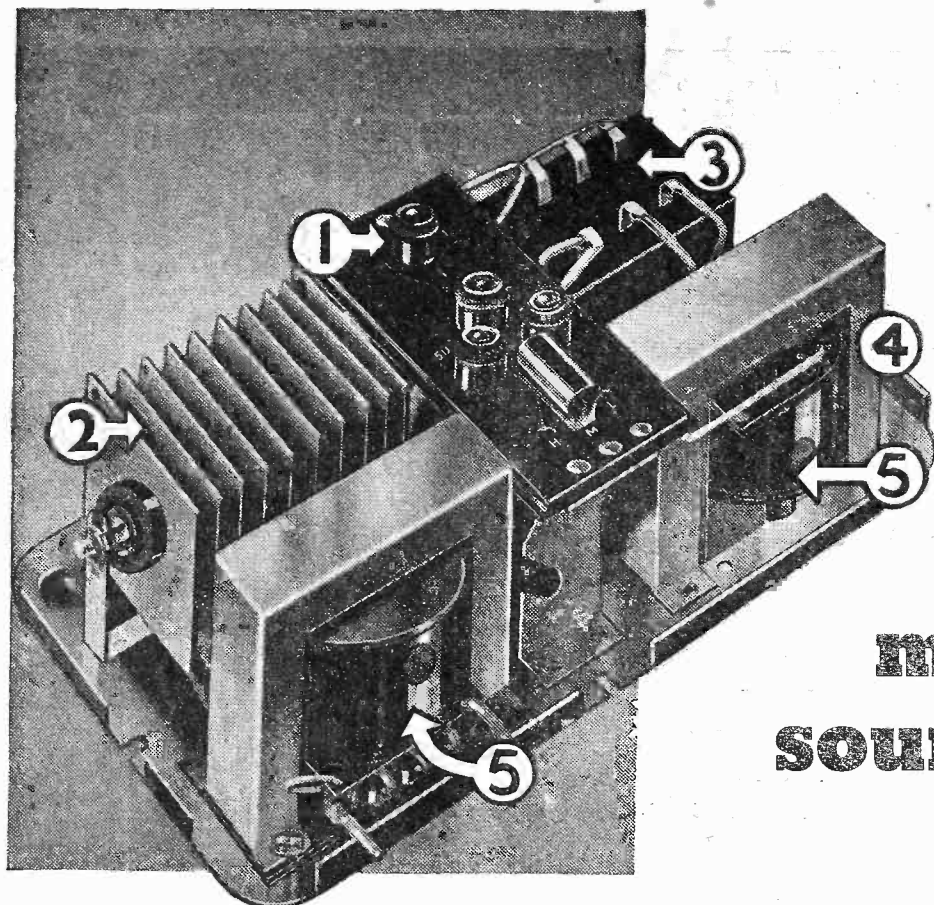
★ ★ ★

**LP.2** is a high magnification power valve—amplification factor 15!—with a performance actually comparable to that of a pentode, exceptionally economical in use and well matched to the average cone speaker. Note the long straight curve and robust modern construction (lower inset) - - - - - 8/9

MARCONI VALVES FOR A  
"SINGLE DIAL SUPER"

1—DG2—20/- 1—HL2—7/- 2—S22—16/6 1—P2—12/-





## The Best, Cheapest, & most Reliable source of power for your set

**1** Adjustable tapings giving three voltage ranges with perfect, noiseless contact. Patented plugs and sockets for quick and easy connection of wires.

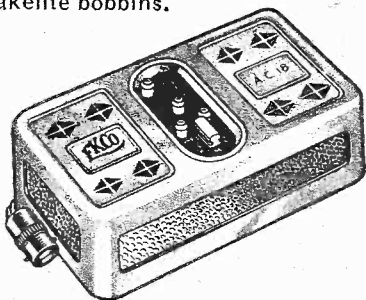
**2** Westinghouse Metal Rectification.

**3** Condensers tested to 500 volts.

**4** All metal parts cadmium plated to prevent rust.

**5** Choke and transformer coils wound on moulded bakelite bobbins.

**6** Housed in solid drawn steel case, oxidised copper finish. Connecting plugs recessed below surface of case. Size,  $9 \times 5 \times 3\frac{1}{4}$  (K.25 and 25 cycle models  $9\frac{1}{2} \times 5\frac{1}{2} \times 3\frac{1}{4}$ ).



The EKCO Unit will give you constant power permanently for a penny a month.

Fit an EKCO Unit in place of your present battery and your battery troubles are ended for ever. Your set will always be at its best because it will always have a constant power supply at full voltage.

No alterations to your set, valves or wiring. Just connect the EKCO Unit in place of your battery, plug in to the electric supply and switch on—that's all. There are EKCO Units which supply H.T., as well as Units which supply H.T. and keep your L.T. Accumulator constantly charged.

Prices from 39/6 or by Easy Payments from 3/8 per month. Post coupon now for full details, or consult your dealer.



To E. K. Cole, Ltd., Dept. A.6,  
Ekco Works, Southend-on-Sea.

Please send me particulars of EKCO Power Units.

Name .....

Address .....



# REGARDING OVERLOADING



EINSTEIN has it that all things are relative. He is a brave man who dares to argue with Einstein, so I have little fear in boldly stating that technical radio knowledge is no exception to the rule. That being the case, a little of it must be a dangerous thing!

There are multitudes of regular listeners who still talk about the number of "lamps" in their sets and whose technical knowledge ends when they have "twiddled the knobs." Bless them! The set manufacturers adore them and since they usually admit they know nothing, they are quite harmless.

The real dangerous class are those who, having built a straight one- or two-valver, and found (usually to their intense amazement) that it actually works, immediately dub themselves experts, and since experts are supposed to be capable of original thought, pass straight on to a self-designed "Super-Super."

Now I am no rabid believer in red tape, but it is always a mystery to me that anyone who has not followed wireless theory and development for some considerable time should even contemplate building an original receiver when there are so many really excellent and proved circuits in existence.

The circuits published by "P.W." for example, are such as to fit the tastes and purse of every constructor. They have been designed and tested by real experts and are guaranteed to give satisfaction. To ignore these and try to break fresh ground is comparable to a motorist who, having learned to drive in two lessons starts to build his own car!

## "Nothing But Howls."

But enough of generalities, facts speak louder than words and I really set out to describe one particular instance which I recently came across and which prompted the foregoing thoughts.

A friend rang me up asking if I could spare a few moments to pop over and look at his latest set which seemed would deliver nothing but howls from the loudspeaker. I knew that this was only his second set and so,

By A. R. ALMOND.

A radio expert, who evidently spends much of his spare time "servicing" his friends' wireless sets, describes some of his experiences, and shows how easily many of the troubles encountered could have been avoided had the enthusiasm of his friends been tempered with a little knowledge.

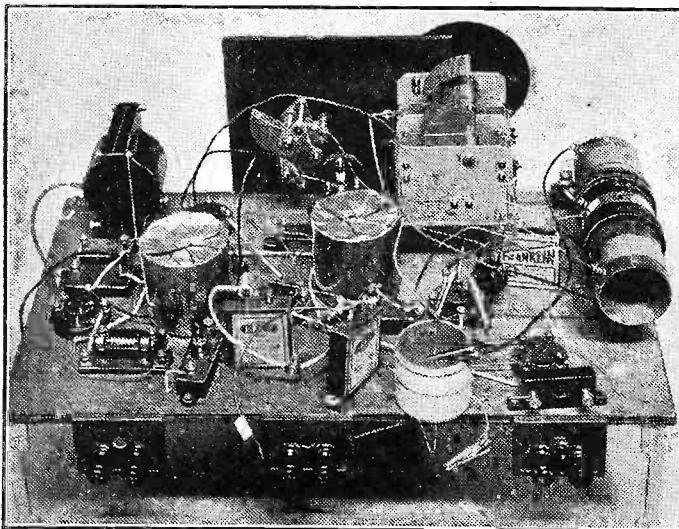
preparing for the worst, I packed up such kit as might prove useful and went.

I found him at the point of condemning every radio manufacturer and technical paper in existence. In his hand he held a 4 lb. hammer and he was casting furtive, but meaning glances from that to his masterpiece which ferociously howled back at him.

## "Weird and Wonderful."

The set itself I have no hesitation (and the owner's full permission) in dubbing the World's Worst. Yet it had been conceived as a quality receiver. No expense had been spared in its construction, and the workmanship—from the point of view of wiring and manufacture—was irreproachable.

## MERELY AN EXPERIMENT!



This is NOT the way a constructor should hash up one of our circuits! However, this photo is of historic interest, for it shows one of the earliest experimental models of that very successful "P.W." set "S.Q." Star. Note the "home-made" coil screens.

No regular reader of "P.W." would, I am sure, be guilty of the majority of mistakes contained in this Machiavellian Masterpiece, but since they were undoubtedly contained in one so-called Wireless Set, it is sufficient excuse for me to describe them.

It had this weird and wonderful sequence of stages. Leaky grid detector transformer coupled to a small power valve, again transformer coupled to a small power valve, again transformer coupled to a pentode and this again transformer coupled to a super-power valve!

It was intended primarily as a local station quality receiver and to this end a full (and really excellent) 100 foot aerial was used; and this despite the fact that it was under 10 miles from a "Regional" Station.

Yes, you may smile, you experienced amateurs, but put yourselves in the place of a "green-horn." Each stage he had culled from various standard designs. The detector, from a portable; the first L.F. from another portable; the pentode from a 3-valve S.G. and so on. Each admirable in themselves, but together ....! My ears are still ringing from the £50 worth of sheer din that cabinet contained.

Obviously, the main trouble was overloading, and it is illuminating to calculate approximately what was the amount.

The detector valve itself was the first culprit, from actual measurements it was found that this was capable of handling about 1 volt on the grid without distortion. In practice, it was actually receiving 2 volts, an overload of 1 volt.

## What a Load!

These 2 volts should have been transformed to 20 volts after the first transformer so that the first L.F. valve should have been capable of handling 40 volts grid-swing. The valve used asked for a grid-bias of 6 V., giving a grid-swing of 12 volts. Hence, another 28 volts overload! And so on to the last stage.

Even so, that is not the whole story. The three L.F. transformers were neatly parked about half an inch apart in a dead

(Continued on next page.)

## REGARDING OVER-LOADING

(Continued from previous page.)

straight line and on the same axis at the rear of the detector and first L.F. valves, so giving an ideal feed-back system from output to the detector, and an instability which would have compared favourably with that of a straw in a whirlwind.

Various methods had been tried to bring the set "down to earth," and in particular there were a whole string of chokes and resistances in the anode feeds of both the detector and 1st L.F. valves. Indeed, so lavishly had this been done that the actual voltage reaching the plates of these valves was reduced to a mere 15 and 30 volts respectively.

There were many other faults, but I fancy I have said enough to show the hopelessness of the whole combination, though I might add that the set is now giving excellent results—as a straight 2-valver, detector-pentode, whilst the majority of the expensive components rest comfortably but useless in the junk box—an expensive price to pay for experience!

### A Matter of Misapplication.

Perhaps this particular case may sound absurd or extravagant to some of my readers. If so, I would remind them that it *was* an actual case and that the same type of mistake is the easiest to make. It is simply the mistake of coupling together totally unsuitable component-circuits in an

endeavour to reap the benefits of the advantages of each.

If one is prepared to look upon the hook-up merely as an experiment, all well and good, if not—then "Please don't do it"—as P.P.E. was wont to remark.

But misapplication is not the prerogative of circuits. Take, for example, this case concerning our old friend Ohm's Law.

A two-valve set was equipped with a new, home-constructed D.C. high-tension unit with the unexpected result that quality deteriorated considerably due to violent overloading.

### Neglected Valve Resistance.

A m.a. test on the output valve showed this overloading, but also brought to light a more serious fault; it was only passing a mere pittance of 5 m.a. instead of the rated ration of 22. The substitution of a spare valve brought no relief, thus directing attention to the mains unit itself.

The supply was 210 D.C. and the dropping resistance in series with the output valve was 10,000 ohms. The owner-constructor had calculated the value of this resistance from Ohm's Law and was obviously most apprehensive when I substituted a 5,000-ohm resistance in its place.

This latter had, however, the effect of immediately improving the results beyond measure. I explained that the 10,000-ohm resistance was dropping too much voltage.

I was assured that he had calculated the value of that resistance with the utmost care, only to find that the theoretical value was more than 100 per cent wrong, since the anode current even now was only 16 m.a.

Now this was the manner of his calculation. Ohm's Law states that:

$$C \text{ (amp)} = \frac{E \text{ (volts)}}{R \text{ (ohms)}}$$

The current required is 22 m.a.; voltage is 210. Hence:

$$R = \frac{210 \times 1,000}{22}$$

= 9,500 ohms or 10,000 ohms as the nearest stock size.

At first sight this appears to be sound, but he had forgotten one very important point, namely, that the valve itself is in series with the resistance, and his argument assumes that the whole of the drop of 210 volts takes place across the resistance, which in its turn implies that the potential on the plate of the valve is—zero!

The actual working resistance (not impedance) of this particular type of valve, under the conditions stated, is about 6,000 ohms, and obviously such a value cannot be ignored.

In fact, the total resistance of the original circuit was about 16,000 ohms, and it is

Popular Wireless, March 26th, 1932.

across this total resistance that the 210 volts are dropped and, since the voltage drop across the individual resistances is proportional, the actual plate voltage becomes

$$\frac{210 \times 6000}{16,000} = 79 \text{ volts (approx.)}$$

No self-respecting super-power valve will give of its best under these conditions, especially if the grid bias is kept at the value required for a plate voltage of 150.

## "MARCONIPHONE MAGIC"



The only human member of the cast of "Marconiphone Magic," presented at Colchester (the remainder being Marconiphone outfits) and the diminutive ushers and door-keepers.

The correct method of calculating dropping resistances is, of course, to apply Ohm's Law to the voltage drop required and not to the total voltage. Thus:

$$R = \frac{\text{Voltage drop required}}{\text{Current}}$$

The above case works out as follows: Voltage drop required = (Mains Voltage —

$$\text{Plate Voltage} = \frac{210}{150} = 60 \text{ Volts.}$$

$$\text{Then } R = \frac{60}{22} \times 1000 = 2700; \text{ say } 2500.$$

## DETECTION, METERS AND MILLIAMPS

A trio of interesting and useful tips.

Although anode bend rectification was long claimed to be of superior quality to the grid leak, this latter, in the guise of power-grid detection, now definitely holds the field.

Although the volts scale of a voltmeter may be translated to read milliamps, the instrument usually has a much higher internal resistance than a proper milliammeter.

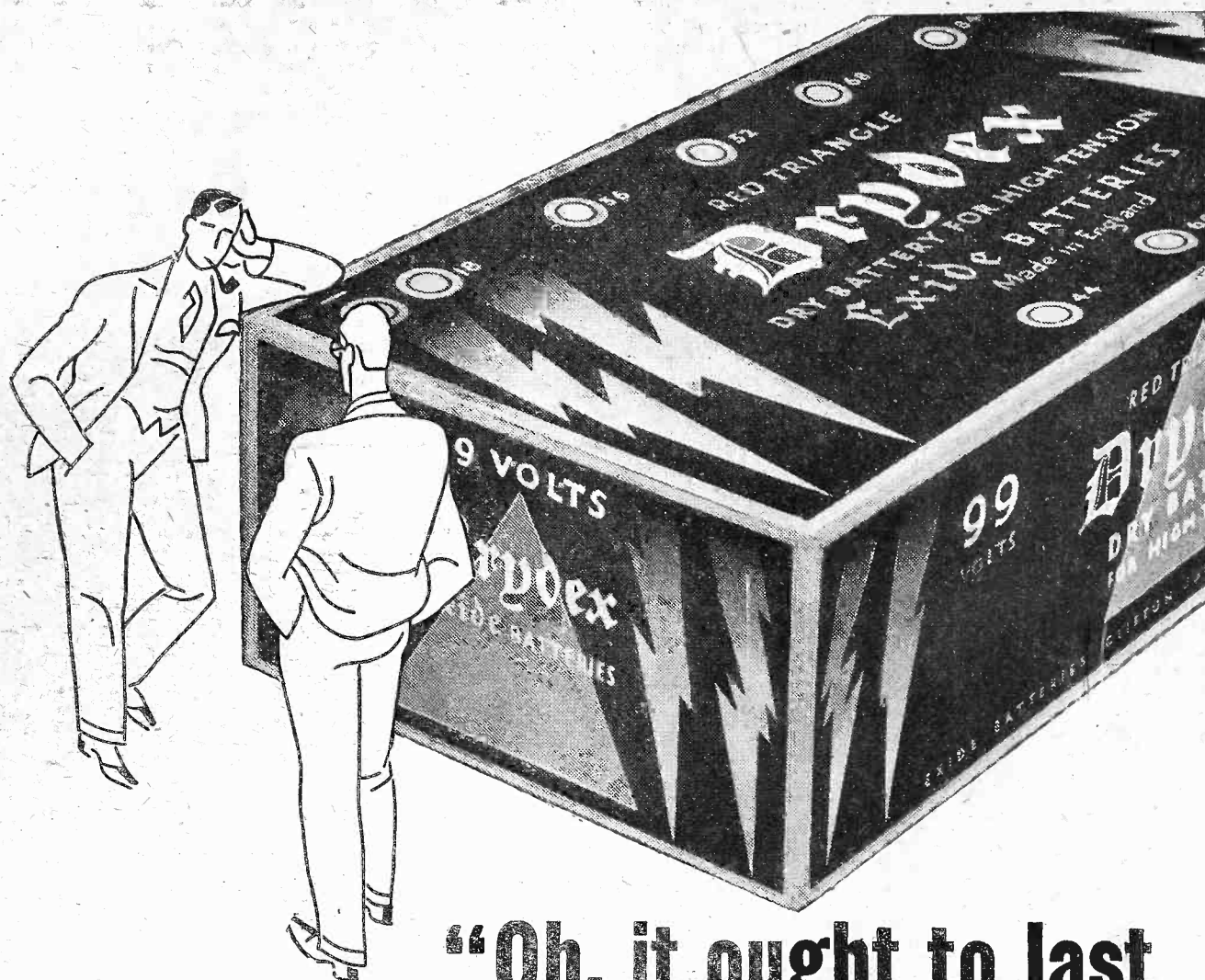
Among the advantages of regular milliammeter checks of plate current are the facts that such a test will show up a fault in the low-tension supply, in the H.F. supply, in the grid bias to the valves, and in valve emission.

## CONCERTS IN THE KITCHEN



Miss Frances Pierce, of Chicago, and the radio set she has built into a kitchen cabinet.





**"Oh, it ought to last  
longer than that!"**

**Why don't you get a**

**Drydex"**

### ● THE Exide DRY BATTERY

Made entirely in England employing British labour and British 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.

Mr. A. M., of Perth, writes :—

"I have had one of your Drydex Red Triangle 120 volt batteries in use for five months at an average of six hours a day and I am still getting thirty stations on Loud Speaker. It is amazing the resisting power your batteries seem to have."

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

It is inevitable that modern receiver design should lead to simplified control, particularly in the case of tuning condensers, where more often than not they are operated by non-technical members of the household. Indeed, it would not be incorrect to say that no up-to-date set, whether home constructed or commercial, can hope to be fully appreciated by non-technical users unless it includes only one main tuning dial, apart from such items as on-off switch and reaction condenser.

"Gadgets" are all very well for the man who likes them, but it is suggested there

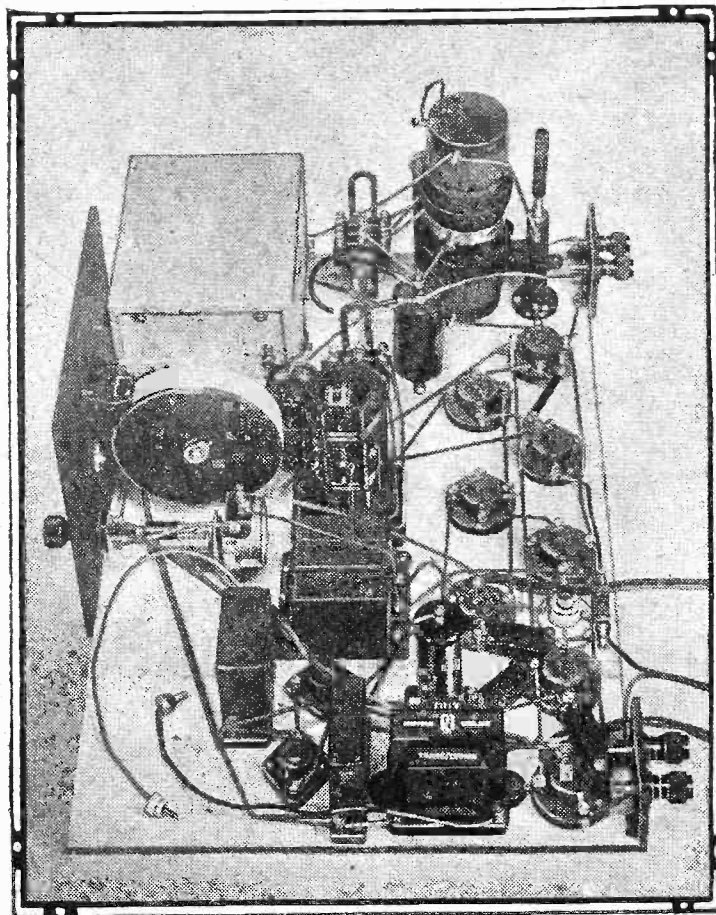
not difficult to manipulate, and include such devices as minimum trimmers on ganged condensers, pre-set condensers for tuned filters or auxiliary tuned circuits, and sometimes small variable inductances for "balancing" tuning coils.

In our Single-Dial Super the ganging of the tuning condensers has been accomplished in the manner described last week.

#### Simplified Oscillator Circuit.

Further experiments have been made, resulting in simplifications to the oscillator circuit and leading to practically perfect ganging (and consequently greater sensitivity) over the

### STRAIGHTFORWARD POINT-TO-POINT WIRING



This photograph shows the completed receiver with the valves and intermediate transformers removed. Note the special oscillator coupler just to the right of the single drum-type tuning dial. The triple-gang condenser is hidden inside the screening box.

are innumerable potential radio "fans" who have so far studiously avoided radio because it has tended to be more a science than a "pleasure," due to the number of controls to be mastered.

#### Avoiding Sacrifices.

There is no reason, of course, why refinements in the form of gadgets should not be incorporated in a receiver behind the panel and, if necessary, automatically controlled either electrically or by means of the available controls on the panel.

A radio set which includes simplified control can hardly be classified as an advancement if certain features, such as quality of reproduction or sensitivity, are sacrificed. It therefore becomes obvious that if circuit refinements are to be retained, certain initial adjustments have to be made.

Fortunately, these extra adjustments rarely exceed three or four in number, are

super-het. receiver represents the last word in simplified control, because it is not only capable of successful operation by an unskilled person, but its great sensitivity and ease of operation can lead to surprisingly large "logs" of stations. The set has been tested in many localities, both near to and well away from a powerful local, and in all cases performed most excellently. On medium waves there seems to be a station at every degree of the dial.

Among the many refinements incorporated in the design, the following are probably the most outstanding. First of all, there is the single-dial tuning by means of a triple-gang condenser unit and a drum dial geared 2 to 1.

#### Easy Station Identification.

The scale 0 to 180 degrees is spread completely around the circumference of the drum, and results in easier identification of

A HIGHLY EFFICIENT SUPER-HET. WITH ALMOST UNLIMITED RANGE, AND WHICH IS AS EASY TO TUNE AS A SINGLE-VALVER.

#### NOTE THESE POINTS

##### Single-dial operation.

Pitch control for correction of high notes from speaker and to eliminate heterodyne whistles on certain stations.

Combined on-off switch and volume control.

Ganged waveband switching as subsidiary control. Only three controls on panel.

No soldering and easy to build.

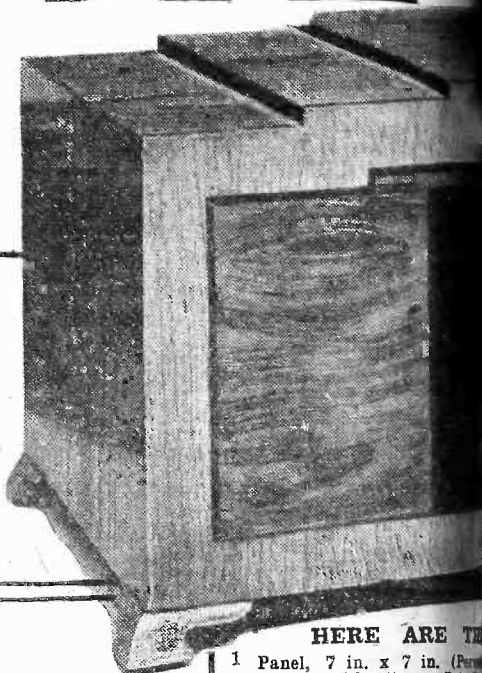
Power-grid detection.

lower part of the medium wave-band. There is no doubt that this "P.W."

stations. Provision is also made for a dial light, which can be fitted at will. A patented combination on-off switch and wire-wound potentiometer is the next panel control, and operates in a very simple manner.

To switch on the set by completing the filament circuit the knob is pulled out, while volume is controlled by rotating the same knob. Lastly, we have a tone or pitch control, which is simply a miniature variable condenser which controls the higher

# The "P.W." DIAL

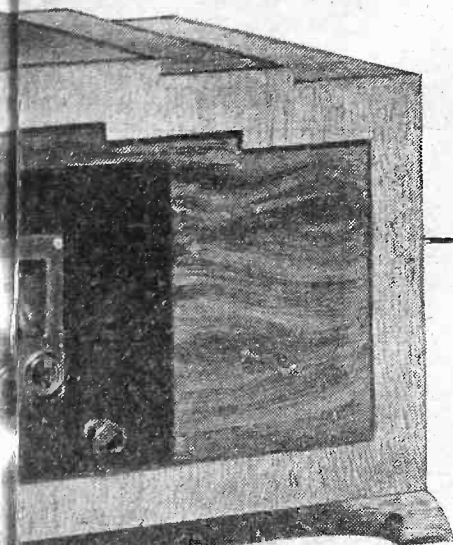


#### HERE ARE THE

- 1 Panel, 7 in. x 7 in. (Peco, Becol, Wearite, Peto-Scott, Ready Radio).
- 1 Cabinet with fret surround panel to take baseboard 12 x 12 in. ("Moreo").
- 1 Triple-gang condenser with minimum trimmers, (Wearite, Peto-Scott, Ready Radio).
- 1 Slow-motion drum drive above (Utility, Polar Tube).
- 1 3-in. collar with steel grub screws, 1 length of 1/2 in. diameter brass spindle 24 in. long (see text).
- 7 Four-pin valve holders (W.B., Graham Farish, Wearite, Lotus, Lissen, Clix).
- 1 Five-pin valve holder (Lotus, W.B., Graham Farish, Wearite, Lotus, Lissen, Clix).
- 1 L.F. transformer, ratio 1:1.
- 1 34 (R.I. Dux, Graham Farish, Ferranti, Telsen, Lewcos, Sovereign, Formo, Varley).
- 1 Square Peak coil, Extender (Varley).
- 1 Super-het. H.F. choke (Radio, or Lewcos Type 11, Dual Astatic, Varley, W.B., Telsen binocular).
- 1 Oscillator coupler (Goldstone).
- 4 1-mfd. fixed condensers (Dubilier, T.C.C., Igranite, ranti, Sovereign, Hydra, Lissen, Formo).
- 1 2-mfd. do. (Telsen, etc.).
- 3 0001-mfd. fixed condensers (Dubilier Type 670, T.C.C., Graham Farish, Lissen, Ready Radio, Peto-Scott, ranti).
- 1 .04-mfd. non-inductive condenser (Dubilier, T.C.C., Telsen).
- 1 .25-mfd. non-inductive condenser (Dubilier, etc.).
- 1 .0003-mfd. compression-type condenser (Formo, Polar, Lewcos, Graham Farish, well).
- 1 .0001-mfd. max. compression condenser (Sovereign, Polar, Ready Radio, Telsen, Peto-Scott).
- 1 .00075 solid-dielectric condenser (Ready Radio, Telsen, Peto-Scott).
- 1 Neutralising-type condenser (Dubilier, Peto-Scott).
- 1 3-pole change-over switch rod extended through centre bracket for mounting on baseboard (Wearite 1.23).
- 1 1,000-ohm Spagetti resistor (Lewcos, Varley, Sovereign, Magnum, Tunewell, Graham Farish, Lissen, Clix).



# SINGLE- SUPER



◆ ◆ ◆  
DESIGNED AND  
DESCRIBED BY THE  
"P.W." RESEARCH  
DEPARTMENT.  
◆ ◆ ◆

## WHAT YOU NEED.

do. with mounting bracket,  
2 1/2-in. connecting collars, and  
n. of 3/16th-in. rod (Wearite  
).  
n. collar, length of rod and  
inter knob for above.  
Combined three-pointed switch and  
100-ohm potentiometer (Wear-  
Type G.23).  
ocket base (Colvern).  
100-ohm wire-wound resistance  
variable, or Graham Farish  
Ohmite).  
100 do. (Sovereign, or Graham  
Farish Ohmite).  
ulated terminals (Belling Lee,  
anic, Clix, Bulgin, Ealex).  
meg. grid leak with terminals  
holder (Graham Farish Ohmite,  
bilier, Telsen, Lissen, Loewe,  
anic, Ready Radio, Watmel,  
ley).  
100-ohm non-inductive resist-  
e (Dubilier 1-watt type,  
we, Graham Farish Ohmite,  
).  
e and holder (Bulgin, Belling  
).  
5-kc. intermediate-frequency  
filters Two with Pigtail  
wires, Wearite).  
ry plugs (Clix, Igranic, Belling  
Ealex).  
s, flex, etc.  
e, Lacoline, Quickwyre, Solda-  
re, Jifflinx).

## ACCESSORIES.

OSPEAKERS.—Celestion,  
M.V., Amphon, R. & A.,  
F.H., Blue Spot, Undy, Graham  
icsh, W.B., Epoch, Ultra.  
AVES.—Double-grid valve (Cos-  
t, Tungstram, Mullard).  
B.G. valves (Mazda, Marconi,  
Mullard, Six-Sixty, Osram, Eta,  
Lissen, Cossor).  
H.L. or det. type (Marconi,  
ram, etc.).  
Output valve, such as P2,  
ram, etc.).  
TERIES.—H.T., 120 to 150  
its triple capacity (Pertrix,  
er Ready, Magnet, Lissen,  
yex).  
B. to suit output valve (Ever  
ady, etc.).  
MULATOR.—2-volt (Exide,  
iswan, Lissen, Pertrix, G.E.C.).  
NS UNIT.—To give 25 milli-  
aps at 120 to 150 volts (Heay-  
rd, Atlas, Formo, Tannoy,  
co, R.I., Lotus, Tunewell,  
egentone).

In publishing details of this out-  
standing receiver, we are confident  
that it is just the set for which many  
readers have been waiting. It is  
remarkably easy to construct, and  
when finished will bring in station  
after station by just turning one  
small knob.

audible frequen-  
cies, and not only  
compensates for  
the shrillness met  
with in certain  
balanced-arm a-  
ture loudspeakers,  
but also enables  
heterodyne  
whistles to be  
eliminated.

A knob which  
projects from the  
side of the cabinet  
in an unobtrusive  
manner for  
actuating the  
ganged wave-  
change switches,  
completes the  
controls, although  
in actual fact  
there are only  
three, as the  
latter is a very  
occasional one.  
Before proceeding  
with the construc-  
tional hints and  
tips, an examina-  
tion of the theo-

retical circuit would not be out of place,  
particularly as there are a number of re-  
finements included which have not been  
referred to yet.

It will be observed that the receiver  
makes use of five valves, the first being a  
bi-grid combining the functions of first  
detector and oscillator. The second and  
third valves are of the screened-grid type  
and act as intermediate frequency ampli-  
fying stages; while the fourth is a second  
detector, operating with power-grid charac-  
teristics and generally handling a larger  
signal grid-swing than an ordinary leaky  
grid type.

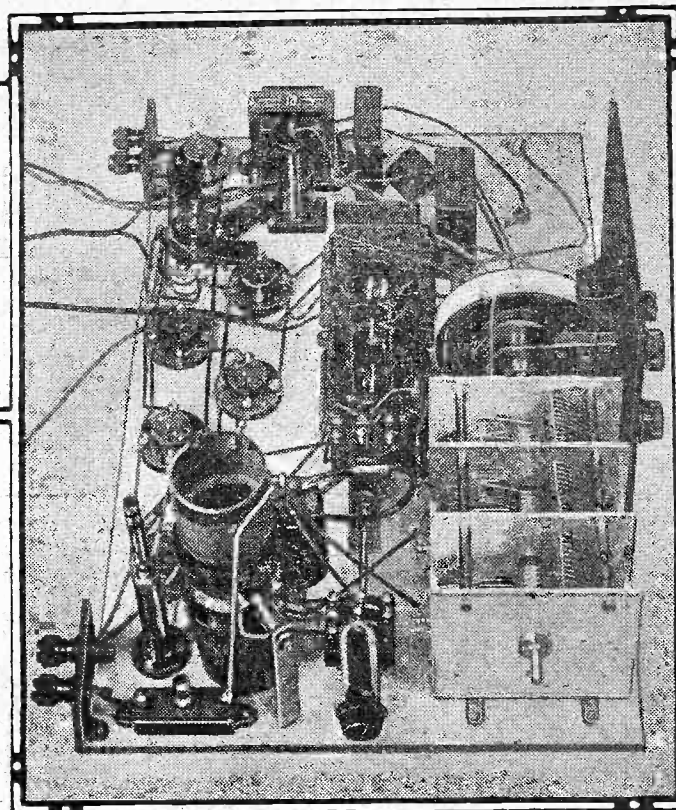
Finally, there is an  
L.F. stage, fed from a

denser effected a cure at the expense of gang-  
ing adjustments for the remainder of the scale.

Eventually it was discovered the effect  
was brought about by the aerial filter pro-  
ducing two distinct and sharp peaks at the  
bottom end of the scale. Since there was a  
deep "trough" between them, and the  
ganging of the oscillator condenser was  
found to be maintained in its centre, the  
result was a complete lack of signals (the  
trough representing the centre of the band-  
pass effect, but minimum signals).

Naturally, readjusting the oscillator trim-  
mer allowed this circuit to function on one

## A WELL-PLANNED LAYOUT



Here is the aerial end of the set, with the band-pass coil in the foreground. This time the ganged condenser is shown with the screening box cover removed, so that readers may see for themselves how the three separate sections are coupled up together.

parallel feed system  
and capable of being  
modified, in view of  
its simplicity, to  
suit the construc-  
tor's personal requirements and loudspeaker.

Owing to the rotors of the variable tuning  
condenser being arranged on one common  
spindle, it has proved necessary to connect  
the Varley "Square-Peak" coil (Extensor  
type) in a manner which allowed for the  
"grounding" of the rotors. In the same way  
the condenser tuning the oscillator anode  
coil had to be earthed, and the arrangement  
may be examined on the theoretical diagram.

A point of considerable interest is the  
function of the neutralising type of con-  
denser across the band-pass aerial coils, as  
this tends to give a mixed-filter having  
besides the two usual factors (mutual  
coupling and fixed capacity) a third one.

## An Interesting Feature.

During later experiments it was noticed  
that when tuned between 30 and 0 degrees  
on the medium wave-band the set went  
"dead" as if the bi-grid valve had ceased  
to oscillate or was "choked." A milli-  
ammeter in the plate circuit dispelled the  
former idea, and it was noticed that re-  
adjusting the trimmer on the oscillator con-

or other of the peaks, but the "N.C." com-  
ponent tended to reduce the trough without  
apparently widening the peak separation,  
and brought results back to normal.

## None of Those Whistles.

Another lesser but favourable effect of  
the neutralising condenser (which acts as  
capacity coupling to the aerial filter) is to  
increase the sensitivity of the set at the  
bottom end of the scale and very slightly  
decrease it at the top end. As stations  
working on lower wave lengths are usually  
of smaller power than those higher up the  
scale, the effect is not unfavourable.

A non-inductive resistance of 1,000 ohms  
has been joined in series with the oscillator  
grid of the bi-grid valve to reduce unde-  
sirable coupling effects between the two  
grids and consequently between the tuning  
coils. If this coupling occurs the effect is  
equivalent to a heterodyne whistle on each  
station received. The remainder of the  
circuit is fairly straightforward and calls  
for little comment.

(Continued on next page.)





# Build the COSMIC STAR

A wonderful ALL-WAVE Set  
that you will be proud to own.

## KIT "A"

Complete Kit of Components together with panel (ready cut and drilled), baseboard, Jiffilink for easy non-soldering wiring and free blue print.

# 89/6

OR BY EASY PAYMENTS  
10/3 down and 9 monthly payments of 10/3

## KIT "B" £5:12:3

Complete Kit of Components as Kit "A" together with specified Mullard valves and free blue print.

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## KIT "C" £6:13:3

Complete Kit of Components as Kit "B" together with beautiful Table Cabinet and free blue print.

OR BY EASY PAYMENTS  
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Fit a DUOTUNE in place of your present condenser and bring your present set right up to date.

The Readirad DUOTUNE is essential for the "Cosmic" and for every modern all-wave receiver. It is the only condenser of its kind. Not only does it provide automatic switching from medium to long waves (on the famous Extenser principle) but also at the flick of a switch it is converted from a '0005-mfd. condenser to a '00025-mfd. condenser.

## READIRAD DUOTUNE 15/6

(Extenser Model. Patent Pending)

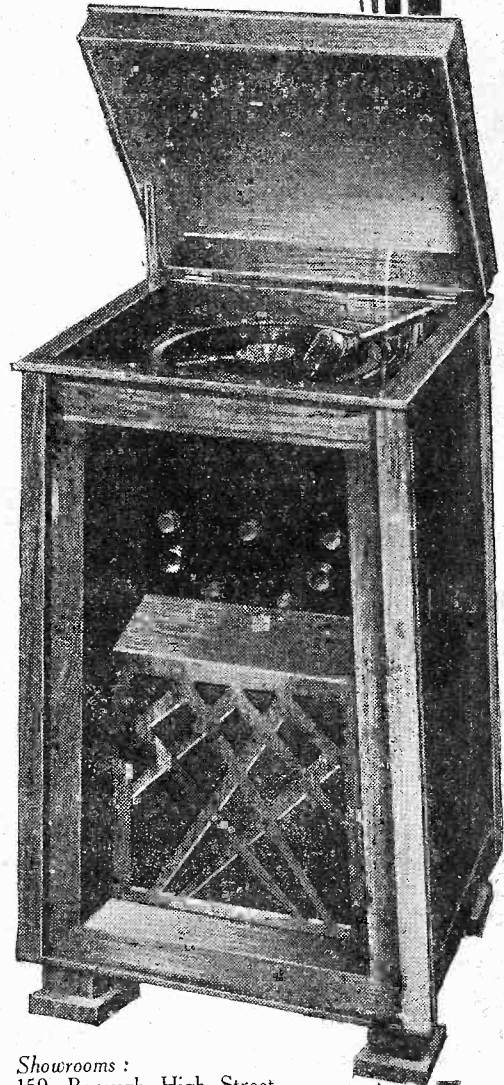
## READY RADIO RADIOGRAM CABINET.

With this beautiful cabinet you can convert your present set to a Radiogram of the most modern and artistic design. This cabinet is of highly polished walnut with lift-up lid, automatic support and a needle cup. Overall size 3' 3" x 22" x 17". Suitable for any receiver having a panel not exceeding 12" x 7" and a baseboard 16" x 10".

PRICE £3:7:6

or deposit of 15/- and 6 monthly payments of 10/-

Write for details of 'Cosmic' Radiogram Kits obtainable for Cash or by Easy Payments.



Showrooms:  
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'Phone: Hop 3000.

## READY RADIO KITS

FOR THE FAMOUS

## S.T. 300

KIT A less valves and cabinet £3:18:6  
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KIT B with valves less cabinet £5:10:9  
OR BY EASY PAYMENTS  
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KIT C with valves and cabinet £6:9:3  
OR BY EASY PAYMENTS  
12/- down and 11 monthly payments of 12/-

TO INLAND CUSTOMERS.—Your goods are dispatched post free or carriage paid.

TO OVERSEAS CUSTOMERS.—Everything Radio can be supplied against cash. In case of doubt regarding the value of your order, a deposit of one-third of the approximate value will be accepted and the balance collected by our Agent upon delivery of the goods. All goods are very carefully packed for export and insured, all charges forward.

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'Phone: Lee Green 5678. 'Grams: Readirad, Blackvil.

## CASH or COD ORDER FORM

To: READY RADIO, LTD.,  
Eastnor House,  
Blackheath, S.E.3.

To: READY RADIO, LTD.,  
Eastnor House,  
Blackheath, S.E.3.

## EASY PAYMENT ORDER FORM

Please dispatch to me at once the following goods.....

for which { (a) I enclose (cross out line) £  
(b) I will pay on delivery (not applicable)

Name.....  
Address.....

P.W. 26/3/32

Please dispatch to me the following goods.....

for which I enclose first deposit of £.....

Name.....  
Address.....

P.W. 26/3/32





# ANOTHER 'SQUARE PEAK'

REGD. TRADE MARK

## SET TO BUILD

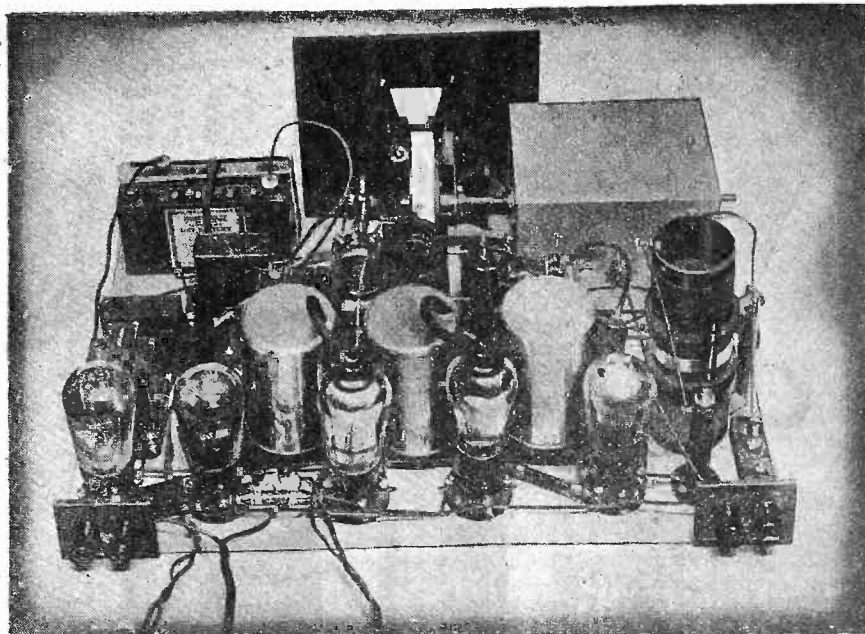
*The*  
**"P.W. Single Dial Super"**

"Square Peak" means band-pass at its best. No other band-pass tuner combines such high selectivity with ample signal strength and natural full-toned reproduction. Designed on an entirely new principle, Varley "Square Peak" coils are the subject matter of patents and are the first commercial band-pass tuners to do their job

This is why so many "Square Peak" sets for home-constructors are being designed by the leading radio journals. Band-pass beats everything—when it's "Square Peak."

**If you wish to build yourself a really modern band-pass receiver—S.G., simple detector or super-het—write to-day for the FREE "Square Peak" Circuit Booklet.**

The "P.W. Single Dial Super" uses Varley "Square Peak" coils type BP7, price 15/- each.



**BAND-PASS  
BEATS EVERYTHING**  
*for* **SELECTIVITY—**  
*with ease of tuning and*  
**QUALITY OF REPRODUCTION**

**USE  
THIS  
COUPON**

To Messrs. VARLEY, Kingsway House,  
103, Kingsway, London, W.C. 2.

Please send me, free and post free, the "Square Peak" circuit booklet entitled MODERN "SQUARE PEAK" BAND-PASS CIRCUITS FOR EVERY REQUIREMENT.

DATE .....

NAME .....

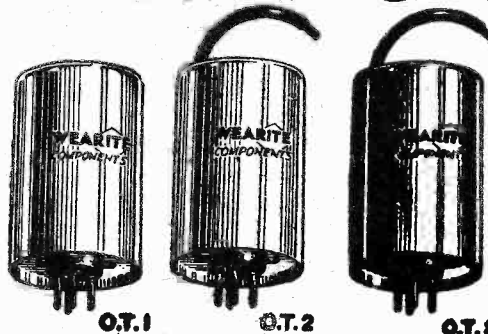
ADDRESS .....

P.W.2.

# Varley

# FOR YOUR "P.W. SINGLE DIAL SUPER" USE THESE **WEARITE** COMPONENTS

THE FIRST  
NAME IN RADIO  
COMPONENTS



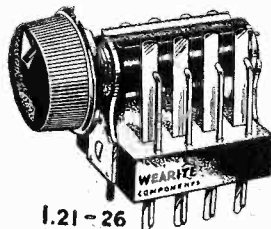
INTERMEDIATE  
FREQUENCY BAND  
FILTER COILS

Price **10/6** Each.

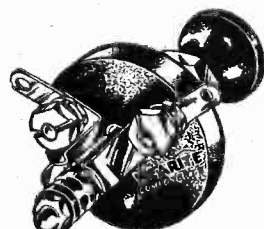
IF YOU HAVE  
ANY DIFFICULTY  
IN OBTAINING  
**WEARITE**  
COMPONENTS  
WRITE US DIRECT  
GIVING NAME OF  
LOCAL DEALER. WE  
WILL POST YOUR  
REQUIREMENTS BY  
RETURN C.O.D.

YOUR  
A.C. ST. 300!

For best results the  
**WEARITE H.T.5 CHOKE**  
must be fitted. This was  
used by Mr. Scott-Taggart  
in his original set and is  
specially recommended.



1.21-26  
1.31-36



## SPECIALLY ADAPTED WEARITE SWITCHES

Above are illustrated two standard Wearite Switches which have been adapted and specified for the "Single Dial Super."

On the left is the D.P. change-over switch. A 3-pole and 2-pole switch have been mounted on one spindle together with mounting brackets. The price of the complete unit is **9/3**.

On the right is the standard three-point switch. This has been mounted up with a 50,000-ohm Pot'meter as per designer's specification and is available at **6/-** complete.

WRIGHT & WEAIRE LTD., 740, High Road, Tottenham, N.17.

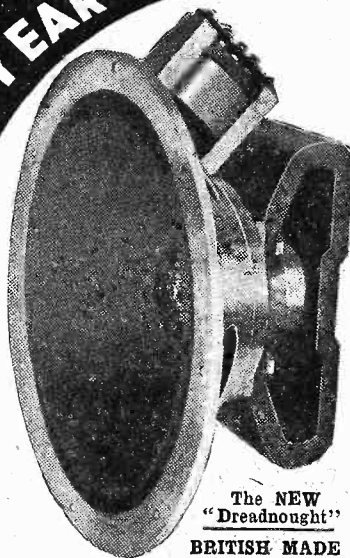
Telephone: Tottenham 3847/8/9.

259

## The MOVING COIL SPEAKER TRIUMPH OF THE YEAR

**39/6**

Including  
Multi-Ratio  
O.P.  
Transformer



Seven years scientific and experimental research culminates in Goodman's NEW "Dreadnought" permanent magnet Moving Coil Speaker.

Utmost sensitivity is ensured by the advanced design of the heavy super-efficient magnet exclusive to Goodman's, giving an intense magnetic flux across the accurately machined gap. Fullness and mellowness satisfying the most critical ear results from careful matching of the multi-ratio transformer, the scientifically designed cone and coil assembly and precision centering.

A Revelation awaits you in this unique Speaker: crisp, clear, mellow reproduction such as you have always longed for. Supplied complete with baffle board ready for fitting to your own cabinet or radio-gramophone. Fully guaranteed.

Get one to-day—if unable to obtain from your radio shop send 39/6 direct to makers—C.O.D. if desired (or write for full descriptive literature).

# GOODMAN'S

The NEW  
"Dreadnought"  
BRITISH MADE  
Dept. P.W.1.  
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Scientific

## "COSMIC" COILS

All components at moderate price.  
Send in your enquiries—quotation by return.

**5/6**  
EACH

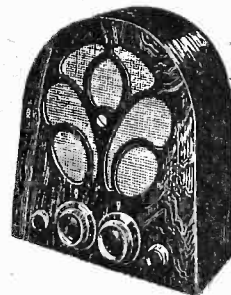
## ZONOPHONE HOME KIT

(As  
Illustrated)

**£6 : 6**

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PAYMENT at 2/6 per week

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# THE EPILOGUE MYSTERY

New facts concerning the B.B.C.'s 10.30 p.m. Sunday feature are given by  
A SPECIAL CORRESPONDENT.

**N**OBODY outside the B.B.C. knows very much about the Epilogue.

That only makes it all the more intriguing. For this reason I met with a "blank" in many directions when I tackled friends at the B.B.C. some time ago about the details of the Epilogue and how it is given.

## Enhancing the Effect.

"We find," said one of the programme men to me, "that a certain atmosphere of reticence and even of mystery seems to enhance the effect of the Epilogue, and that is why there is always a short gap

## STANFORD ROBINSON



Mr. Robinson conducts the Wireless Singers who contribute to the Epilogue.

between it and the end of the main Sunday programme at 10.30 p.m.

"That is why we do not announce the names of the singers who take part. The official attitude here," he said, meaning Broadcasting House, "is that we should keep the whole thing anonymous and we rather deprecate outside inquiries as to the whys and wherefores."

## How It Is Done.

Since then I have seen two Epilogues carried out and I really do think that there is no harm in explaining away some of the mystery. Most readers will agree that, as the Epilogue is one of the most acceptable items in the Sunday programme, and judging by the B.B.C. Post Bag, one of the most

popular items of the week, there is no harm in telling how it is done.

Listeners have made many wild guesses at the singers who take part in the hymns and chants. The Wireless Singers who do this comprises two sopranos, two contraltos, two tenors and two basses. The suggestion has frequently been made that the singers in the Epilogue consist of a boy soprano and male alto, tenor and bass, or lady soprano, alto, tenor and bass. Many have suggested that there must be at least a choir of a dozen to give the volume and depth of tone.

Therefore it comes as a surprise to know that there are seldom more than four. The Wireless Singers, from which selections are made for singing at the Epilogue, are conducted by Stanford Robinson, who frequently conducts last-minute rehearsals just before the Epilogue is due to be switched on. There are eight picked singers who, at one time or another, have taken part in everything from simple plantation songs to the "Dream of Gerontius."

## The Singers.

The group was started in February, 1927, and three of its members sing in the choir of St. Paul's Cathedral. At the beginning of the organisation the *personnel* included Dorothy Burton, Ethel Williams, Tom Purvis, John Collett, Doris Owens, Gladys Winnill, Stanley Riley and Samuel Dyson. It is generally Stanford Robinson who conducts, but he must not be blamed for the new pointing of the chants!

Some of the best Epilogues are given from the No. 10 studio, in the converted



wharf building, soon, alas, to be vacated. After the Sunday night orchestral broadcasts here, picked members of the B.B.C. orchestra stay behind and play during the Epilogue. The Wireless Singers sing unaccompanied, as a rule.

## Valuable Minutes.

Although the No. 10 studio has the largest floor area of all, there is a great deal of work involved in closing down after a big orchestral broadcast, and often there are only a few valuable minutes in which to clear instruments and the conductor's dais away from the front of the suspended microphone, and to get the singers grouped in their proper order.

In No. 10 studio the announcer has a separate little microphone by which he makes announcements during the orchestral broadcasts and it is through this that he reads the Bible passages and poetry. Whichever announcer is on duty at the time takes charge of this section of the Epilogue. Sometimes it is Mr. Hibberd, the chief announcer; sometimes Mr. Grisewood, or one of the other London announcers.

## Choosing the Hymns.

There is one official at London whose business it is to arrange the Epilogues for  
(Continued on next page.)

## THE WIRELESS MILITARY BAND IN "No. 10"



Number Ten studio, in which there is a separate microphone used by the announcer for reading the Bible passages and poetry.

## FOR THE CONSTRUCTOR

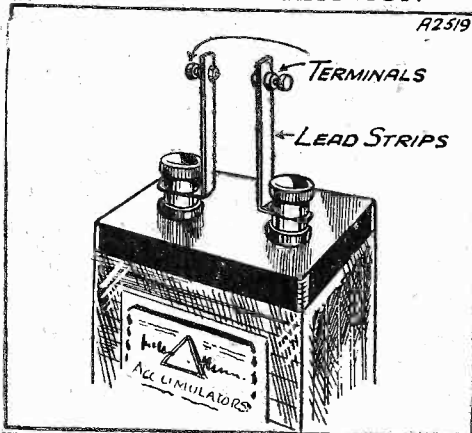
### SOME PRACTICAL POINTERS.

#### ACCUMULATOR CONNECTIONS.

**I**F neglected, the terminals of accumulators soon become a sorry mess, for if acid or vapour reaches the brass, corrosion takes place. This can, of course, be stopped by smearing the terminals liberally with grease or vaseline.

After this has been done it is always a most unpleasant job to make any connections to it. The plan I adopt is to fit extensions to the terminals consisting of heavy bars of lead bent L shape.

#### STOPPING CORROSION

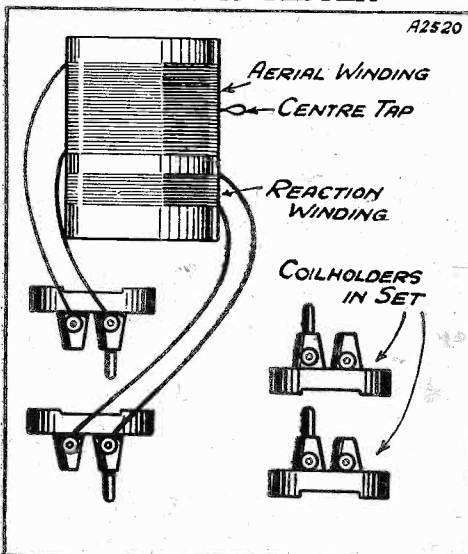


Besides making the accumulator more pleasant to handle, these terminal extensions tend to protect the leads from corrosion.

These are drilled to fit under the existing terminals and they are fitted with terminals at the upper end so that the wires to the set can be attached easily. If a piece of suitable lead is not to hand a short length of lead gaspipe flattened out will answer quite satisfactorily.

These extensions being of lead are not themselves affected by acid, so there is no need to protect them with messy grease at the upper end.

#### A TUNER TESTER



How you can test out various tuner arrangements on your set is clearly shown above.

#### COIL VARIATIONS.

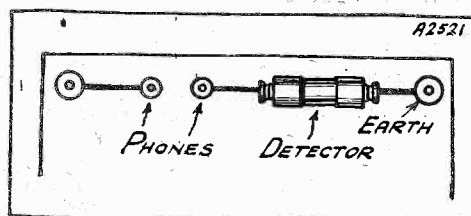
**I** THINK that many amateurs would be tempted to test out tuning variations but for the fact that they imagine that such variations necessitate the rebuilding of a set. This idea is quite erroneous for, if possessed of a common plug-in coil set, it is quite an easy matter to test out many of the solenoid coil variations.

Presuming that the coil holders are used with an aerial coil, plain or centre-tapped or X type, and the usual reaction coil, then all that is required is a couple of loose coil holders. Wires are now run from the new solenoid coil to these loose coil holders, so that these new wires couple up the set in the normal manner.

The idea is worked out in detail in the sketch. Any aperiodic or auto-transformer effect is made by the usual clip and flex attachment to the aerial terminal.

Even dual coils can be tried out in this manner by the insertion of a suitable switch. The system is so simple and easily adapted that various values and combinations to suit special requirements can be worked out and tested in a very short time.

#### ALWAYS READY



This simple device transforms a valve set into a crystal receiver.

#### THE STAND-BY CRYSTAL.

**M**ANY people have a complete crystal set, which can be used independently of the main receiver in an emergency; for instance, when the battery runs down and has to be sent for re-charging.

Others seem just to grin and bear it, and fail to realise how ridiculously easy it is to adapt the commonest type of valve set—say a detector, followed by low frequency amplifier—so that it can be used for the dual purpose.

The tuning part of the circuit is common to both sets, and all that is required is a crystal, preferably of the permanent type, and a pair of 'phones. To connect up, attach one end of the 'phones to the grid condenser (that side joined to tuning condenser) and the other end to one end of the crystal detector. The other end of the detector has now to be attached to the earth terminal. That is all.

If you have been convinced that it is a practical proposition, I would suggest that you incorporate the idea as a permanency on the panel in the manner illustrated in the accompanying sketch. Two telephone terminals are required, one being connected to the aerial terminal, and the other to one end of the crystal detector.

The other side of the crystal detector is wired up to the earth terminal. No switching of any kind is needed, and when the accumulator is sent away for charging, just connect up a pair of headphones. You can tune-in with the aerial tuning condenser, but, of course, the reaction tuning condenser is inoperative under these conditions.

## THE EPILOGUE MYSTERY

(Continued from previous page.)

all stations taking the London Epilogue. It must be remembered that certain Regional centres have their own Epilogue. When I asked him how he chooses the hymns and Bible passages, and in what order, he told me that the standard programme form on which he has to work is hymn, Bible reading, chant or hymn, all grouped round some central thought which is chosen as being appropriate to the season, no matter whether it is a Church season or a season of the year.

"When we have selected the Bible reading," he said, "the hymns very frequently choose themselves. We have to avoid clashing with hymns which have already been given in evening broadcast services, though, and as so many outside broadcasts are made from Churches now, it is not easy to prevent overlapping.

#### Last Minute Decisions.

"It may interest you to know that whereas ordinary programmes are made up two weeks in advance, the Epilogue is seldom prepared until two or three days before it is due. That is one reason why details are never given in print, because there would not be time to get them in the ordinary programme announcements."

"Bible readings are not always given, though, are they?" I asked.

"No," he explained. "Some passages of secular poetry are often more suitable, especially if there is any event of National importance on with which we want to link up the Epilogue. Milton, Shakespeare and George Herbert have formed subjects of the reading. We do not always have hymns, either. An aria from one of the well-known oratorios makes a change and this often strikes a more topical note.

"We know that a good many listeners to the Epilogue are anxious to come up and see how it is done. Almost every week we receive letters asking permission to visit the studios on a Sunday evening. We have a very rigid rule, though, that the Epilogue must be done 'in camera' and the few privileged people who are allowed in the studios to hear the Sunday evening orchestral broadcasts are hustled out before the Epilogue starts.

#### No Visitors.

"Apart from this question of policy, which we think it is wise to maintain, there is a little difficulty because studio audiences on Sunday are often members of the general public, not connected with the B.B.C. or with the orchestra.

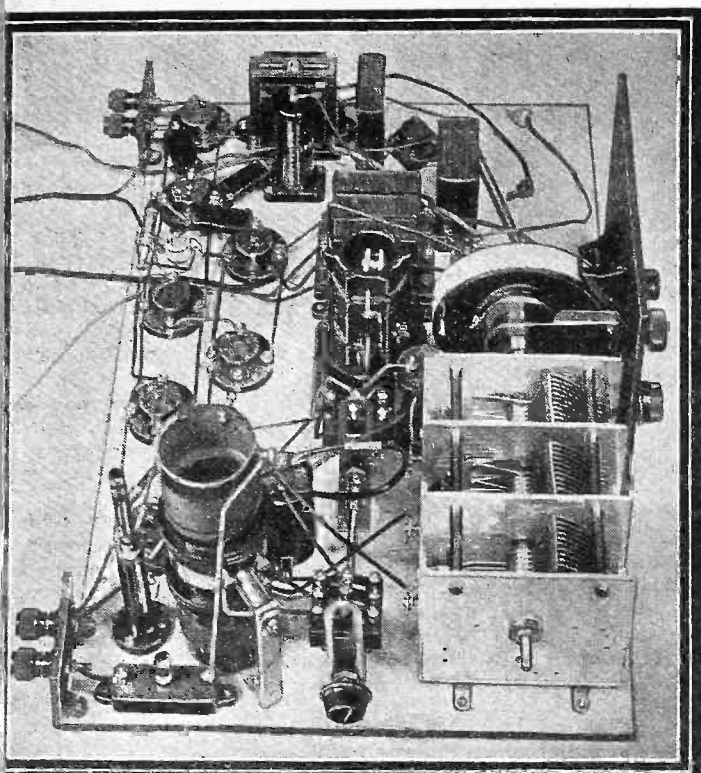
"It is very difficult for newcomers to the studios to keep quiet all the time, especially after they have sat through a two-hour orchestral programme. The slightest noise would spoil the silent background of the Epilogue and that is why we must maintain our rigid rule of 'no visitors.'"

BRITAIN'S LEADING RADIO MAGAZINE

IS

MODERN WIRELESS





# EXCLUSIVELY SPECIFIED FOR THE "SINGLE DIAL SUPER HET" "GOLSTONE" DUAL RANGE OSCILLATOR COUPLER

Single-Dial Tuning has been achieved in an extremely simple manner by the use of the new "GOLSTONE" OSCILLATOR UNIT.

50 to 100 Stations received at good Loud-speaker strength. Obtainable from all First-Class Radio Stores. If any difficulty write direct.

Radio Catalogue Sent on Request.

**Ward & Goldstone**  
PENDLETON MANCHESTER LTD

No. OC/106  
**10/6**  
EACH

## ★ ONE DIAL SUPER HET UTILITY TUNED

Again "Popular Wireless" designers have specified Utility condensers; this time for the Single Dial Super Het.

The wonderful selectivity of this set is greatly helped by the accurate ganging of the Utility triple-ganged condenser specified, and is controlled by the special Utility Drum Dial included. So to ensure the same results as the designers, insist on the following Utility components.

W 306/3 fully screened triple gang - - - **27'6** IV 296 Knob control Drum Dial - - - **10'6**

From your dealer or post free from the makers.

# Utility

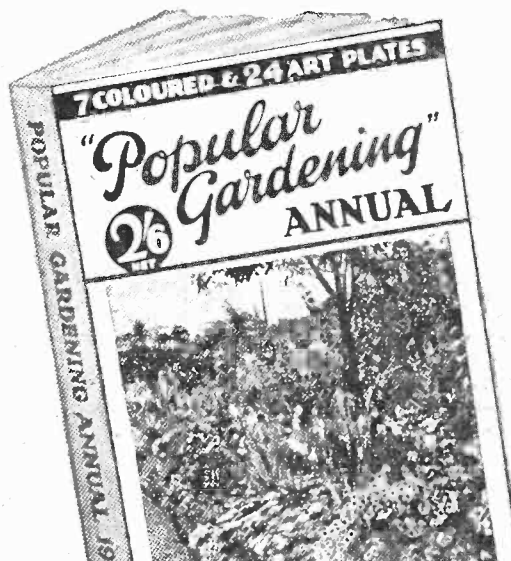
**WILKINS & WRIGHT LIMITED.**

Utility Works, Holyhead Road, Birmingham.

AGENTS.—London: E. R. Morton, Ltd., 22 Bartlett's Buildings, Holborn Circus, E.C.1. Scottish: E. B. Hammond, 113 Vincent Street, Glasgow. Lancashire and Cheshire: J. R. Lister, 83 Old Road, Blackley, Manchester. Westmorland, Cumberland, Durham, Northumberland, Yorkshire, and Derbyshire: H. C. Rawson, Ltd., 100 London Road, Sheffield. Lawrence Fraser, Chelsea House, Lansdown Road, Bath.

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## LONG-DIS-

TANCE reception on both high and medium wavebands continues to be very good indeed, not only after dark but also in broad daylight. Naturally, the long-wave stations provide, on the whole, the best reception during daylight, but there are many on the medium band which are usually quite excellent.

The complete absence of atmospherics, which still happily prevails, allows us to make full use of the sensitiveness of our sets, and to get out of them all of the high-frequency amplification of which they are capable. This accounts largely for the goodness of daylight reception.

## Long-Wave Listening.

When atmospherics are about one has to use reaction sparingly owing to the extent to which the tightening of the coupling brings up unwanted interference.

With the exception of Motala, who is rather below form, all of the long-wave stations are furnishing first-rate reception. Radio-Paris is still usually free from the heterodyne which was such a nuisance earlier in the year, whilst both Huizen and Warsaw come in with splendid volume and quality.

Zeesen is better now than I have known him for a long time. When, by the way,

# 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.

you are searching on the long waves, do not omit to try 1,237 metres—if your set is uncalibrated, the setting will be about midway between those required for Motala and Kalundborg. The station using this wave-length is Vienna Experimental.

So far as I know, he is not yet doing regular programmes, but you will find him quite frequently relaying items from the Vienna station's entertainment. The power that he is using has not yet been stated, but to judge by the strength with which he is received, it must be something considerable.

## Those Sputtering Sparks!

On the medium band there has been some recrudescence of the spark interference nuisance between about 220 and 280 metres. So broad is the tuning of the transmitters causing the interference that you cannot get rid of their Morse signals, no matter how selective your set may be over this very wide band of wave-lengths.

tion of channels, and all will probably be well until either several of the new high-power transmitters come into operation, or some of the smaller stations begin to indulge once more in wave-length wandering.

## Some Good Catches.

Readers may have noticed a recent return to form on the part of the 517-metre station which has been coming in night after night at fine loud-speaker strength. Budapest is also very good just now and though he has certain off nights, Brussels No. 1 is generally a station well worth trying for.

Florence is perhaps a little disappointing, but Prague, Langenberg, and Bero-munster all show excellent strength. Rome seems to be fairly reliable at times but he occasionally has a relapse. Stockholm is seldom anything like the transmission that he was a month or two ago, but both Berlin Witzleben and Belgrade are coming in at vastly improved strength.

JUDGING from the week's correspondence, conditions remain fairly good.

There are no new stations on the air, and no spectacular demonstrations from any of the usual places, but reception is just mildly interesting. So, at any rate, readers seem to think.

My old friend, W. H. G., of Settle, has a nice little tilt at me. He says: "What's happened to you lately? Your notes are full of this R.C. Club, and technical hints, etc., have retired to the background. Can it be that your 'Midget' One is perfect?"

## A Much Worked "Midget."

Well, W. H. G., I have been using the "Midget" for a longer period than I have managed to stick to any other set, and I have had to make no alterations at all up to the present. Sorry if you would sooner hear about my difficulties and snags—shall I go back to a super-het.?

To come to technicalities, however, for a little, W. H. G. asks me why I never mention "grid-stoppers," and what I think of them. I regard the grid-stopper as a cheap and convenient method of keeping unwanted H.F. out of the L.F. amplifier, but, in my opinion, it doesn't do it early enough. There should be no H.F. getting even as far as the grid of the first L.F. stage if the detector is efficient and well-planned.

As readers will know, I nearly always use throttle-controlled reaction in my sets, and by using a small reaction coil and a

## SHORT-WAVE NOTES



News and views regarding an exciting and fascinating wave-band.

By W. L. S.

correspondingly large reaction condenser I think one can clear all the H.F. off by that path.

A respectable H.F. choke in the plate circuit is, of course, necessary. But I don't think a grid-stopper could possibly help us in a case like this, because there shouldn't be anything for it to stop.

## How Many Volts?

Another query—from the same source—is this: Which is best, to use 50 volts of H.T. with the grid return going straight to positive, or 90 volts with a grid-return potentiometer to "tame" the reaction control? This, of course, is rather a poser. My answer would normally be: "Use 90 volts and still don't use a potentiometer—make the reaction control nice and smooth by some other method." But it is not too easy.

For a really efficient short-wave detector circuit I always insist on taking the grid return (or the grid leak) straight to positive. I am convinced that sensitivity goes up. When using a bad set and a "taming" potentiometer one often finds that reaction is not smooth until the slider is right round at the negative end, where sensitivity is definitely bad.

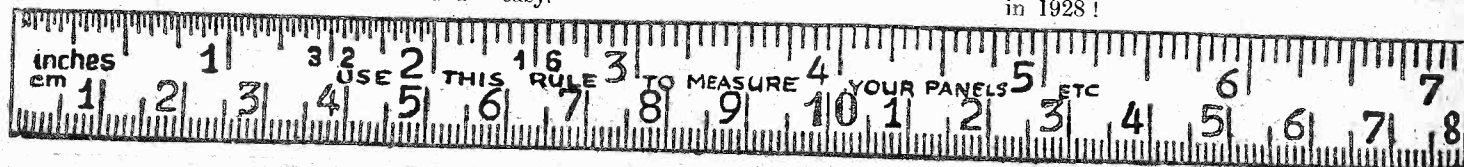
## Letters Received.

G. H. (Sheffield) inquires about a telephone communication heard, but it is impossible to place it, since there are about fifty different two-way channels in action nowadays. Likewise, he mentions a broadcasting station that announces in foreign languages, but signs off in English. Sorry, G. H., but unless you have some idea of the wave-lengths I can't help you at all.

E. K. (Yorks) writes to tell me that "the short-wave bug has claimed another victim. Symptoms—absent-mindedness, sleepy eyes, lordly air!"

Sorry about that, E. K. We shall have to see about your "Junior Competition."

Applications for "H. A. C." membership have been received and duly passed from K. C. (Totton), D. D. (Cardiff), P. A. V. (St. Leonards), and A. C. G. (North Walsham). Incidentally, I see that the International Short-Wave Club is suggesting that a "Heard All Continents Club" for its membership would be a novel idea. I fancy we started the "P.W." version of it in 1928!





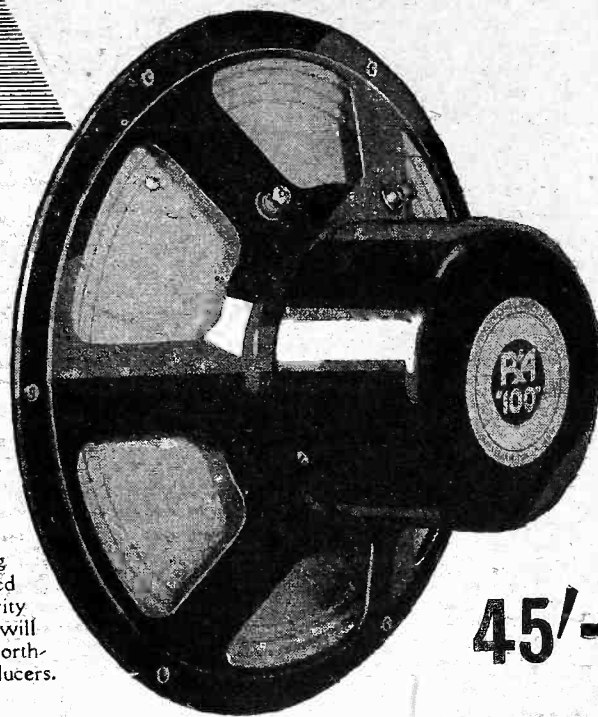
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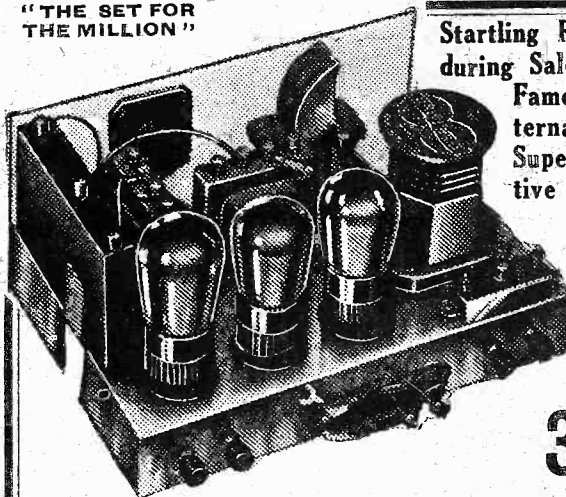
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"P.W." Single Dial Super is going to bring satisfaction to all who build it. It is a first-rate set, so of course SOVEREIGN Components are specified in it. There is nothing amateurish or "cheap" about anything by Sovereign. They are components made for experts and to do the expert's work. Therefore you can rely on and should use Sovereign wherever you can.



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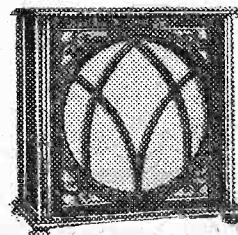
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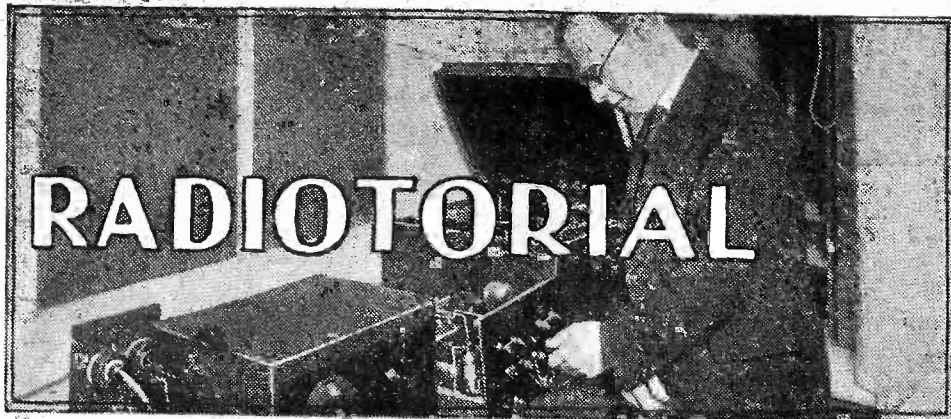
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# RADIOTORIAL

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, Tudgate 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

### A TEST FOR OSCILLATION.

T. L. (Newcastle).—"I seem to be working in the dark as regards medium waves, because I am not sure how to tell when the set is oscillating. Is there a simple way of knowing when this happens?"

The best way is to get to recognise the effect of reaction when no broadcasting is in progress. If you switch on early one morning when there are no stations working, and prop the loudspeaker up close

to your ear so that you can hear exactly what the effect of reaction is, you will soon discover for yourself how to recognise oscillation.

Put the tuning dial, say, half-way round, and concentrate on reaction, bringing this up very, very slowly.

You will notice as you do so that there is a distinct "liveliness" in the loudspeaker, even though no broadcasting is on. Little noises and whispering sounds appear, as reaction is increased, and the set becomes more sensitive.

If you move the reaction very, very slowly you will notice, too, that at a certain place there is a faint but unmistakable change of conditions, very often preceded by a "plop," as the set bursts into oscillation. Immediately this happens the character of the sounds you have been hearing changes slightly, and turns into a sort of rushing noise; not very easy to describe exactly, but very easily recognised if you will take the trouble to listen as we have described.

### How to Tell.

There is a good old simple oscillation test, too, and that is the test of the wet finger. To apply this, simply moisten the tip of your finger and tap the grid terminal of the detector valve, listening carefully to the kind of clicks you get as this is done.

Probably you will find that when the reaction is set at its minimum the click will be a well-defined "tap," and it is important to notice what happens when you put your finger on the terminal, and when you take it off.

Now increase reaction a little, and notice that the clicks begin to get louder. If you do the job slowly and thoroughly you will soon notice that when reaction is well advanced but before oscillation actually sets in—that is, before the little plop has taken place, and the rushing sound comes on—you get a sort of "single click" from the terminal when touched.

But as soon as the set is actually oscillating you get a "double click"—that is to say, there is a click when

(Continued on page 74.)

## HOW ARE YOUR RESULTS NOW?

Perhaps the 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.

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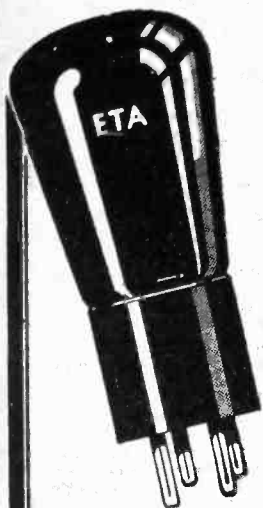
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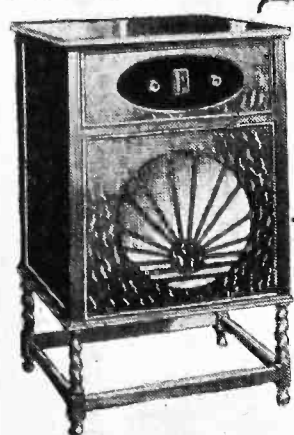
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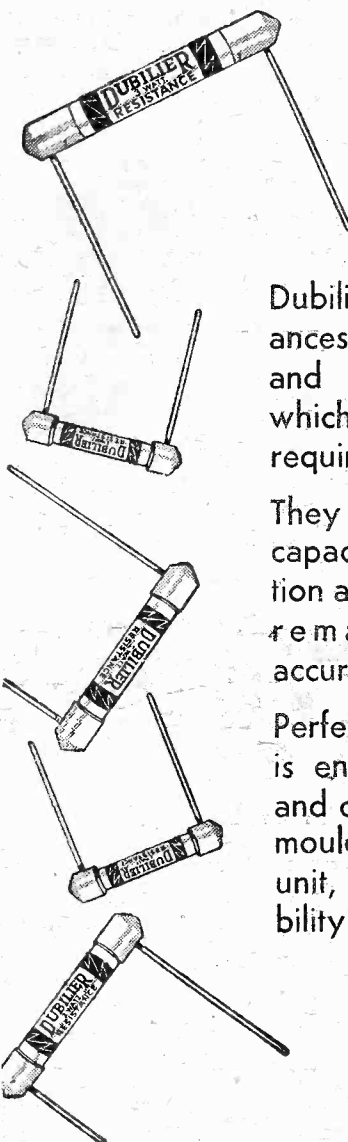
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DUBILIER CONDENSER CO. (1925) LTD.  
Ducon Works, Victoria Rd., N. Acton, London, W.3

## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 72.)

you put your finger on the terminal, and also when you take it off. This corresponds with stopping and starting oscillation.

Before the set will oscillate the effect is different and you will find the loud clicks only when you put your finger on, and not when you take it off.

You get maximum sensitivity from a set when reaction is well advanced, but not advanced enough to make the set oscillate; and if you practise a little in

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daylight when no loud station is about (and when you will be interfering with no one else), you will soon get into the habit of automatically adjusting reaction to suit tuning, and be able to tell from the sound of the set which is the best possible setting for the reaction control.

### PICTURE TRANSMISSIONS FROM THE VATICAN.

T. T. R. (London, S.E.).—"Could you tell me if the Pope's station at the Vatican now works a picture transmitter, like the British stations and Vienna used to work over a year ago? The reason I ask is that I heard a curious transmission coming apparently from this station, but was unable to hear the announce-

ment. Since then at the same settings I have heard no more of this, but only ordinary broadcasting."

Yes, the Vatican engineers have been experimenting with picture transmissions. It is stated that the apparatus employed is of the Bélin type, developed by the French inventor of that name.

### TRANSFORMER CONNECTIONS.

"PUZZLED" (Wavertree, Liverpool).—"I am putting up the 'P.W.' 'Cosmic,' most of the parts for which I have in hand. My transformer, however, is not marked like the one shown."

"The shape is similar, and it has four terminals, the lettering of these, however, is not as on the blue print. One is marked B + and next to that is G. At the other end the next terminal is C - and the last one is A."

"Can I use this kind for the 'Cosmic'?"

The markings are on the American system, and provided the instrument itself is of suitable ratio, etc., it should be quite O.K.

B + is the same as H.T. +, and should be joined to H.T. +2 and L.S. +. G is the same in both transformers. C - is the equivalent of G.B. -, and

### "P.W." PANEL, NO. 64. USING A LOUDSPEAKER.

All nuts, terminals and washers on a loudspeaker should be kept tightened, as if loose they may set up rattles.

"Boomy" results from moving-coil loudspeakers are sometimes due to cabinet resonance, which might be overcome by packing the cabinet's interior surfaces with sound-absorbing material.

For high quality results a large baffle-board is usually better than a cabinet, but it must be quite thick wood— $\frac{1}{2}$ -inch or so.

should be joined by a flex lead to grid bias 2 plug. The A terminal goes to the plate of the second valve holder.

### USING THE ECKERSLEY TUNER.

K. W. (Solihull, Birmingham).—"I do not seem to be able to get the results I should with the Eckersley Tuner. I am sure that the set is good, and I have heard a lot of stations with it, but I do not seem to be able to find them when I want them."

"My friend suggests I ought to draw up a chart, but I do not want to do this because I find that sometimes the dial readings seem to shift/about, and if I get Prague, for instance, on 95 one night, it may be only 90 the night after."

"It is certainly a very fine set, and I have never had such wonderful reception on the local, but even there I find the tuning quite 'shifty,' and a slight movement of the tuning puts the station right away."

"The letter from Mr. Austin which you published in 'P.W.' makes me very envious, as I feel sure the set has got far more in it than I can get out of it. Could you give me some hints on handling it properly, and explain why the dial readings shift, which seems to me the most puzzling thing."

"Also, should it be so selective that I can tune out a station by the very slightest movement of one dial, although my aerial is quite a good outdoor one, being about 38 ft. long and nearly 30 ft. high."

Apparently you did not pay much attention to the hints which were given at the time the tuner was

introduced, and when the various sets incorporating it were described. It is really quite easy to handle, but, like any set with a high degree of selectivity, it must be adjusted carefully when searching, or the selectivity becomes a fatal hindrance to picking up foreigners.

Your friend's suggestion re the tuning chart is a good one, and you should certainly make notes of all dial readings when you identify a station definitely. Only by this means will you be able to return with certainty to the wave-length adjustment when you desire it.

(Continued on page 76.)

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Rigid construction ensures this accuracy being permanently maintained.

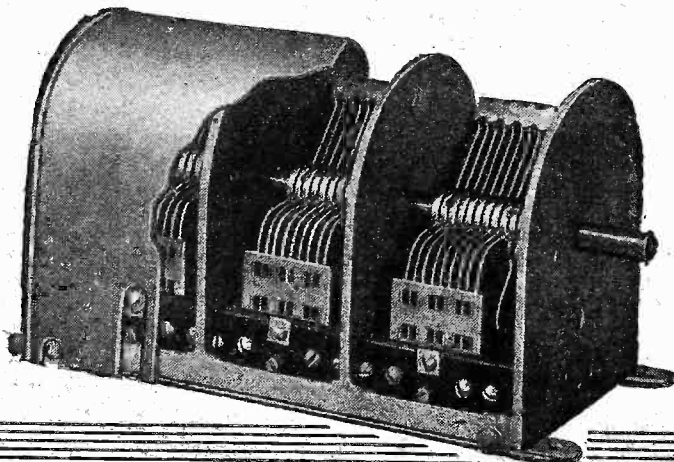
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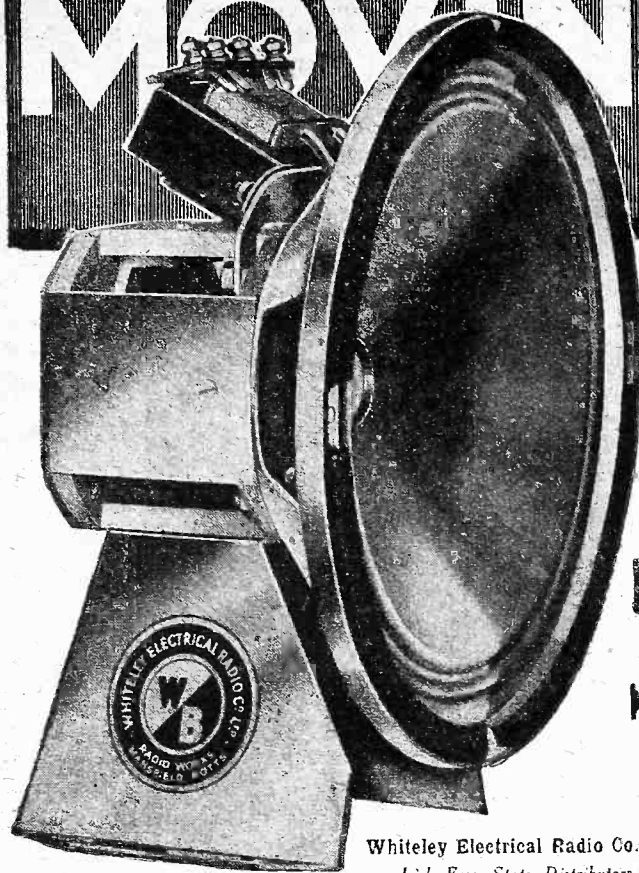
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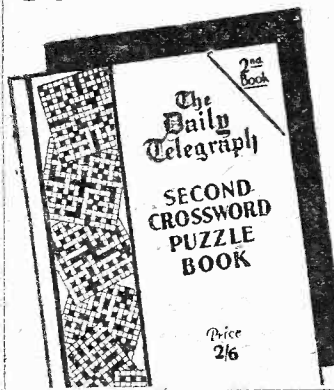
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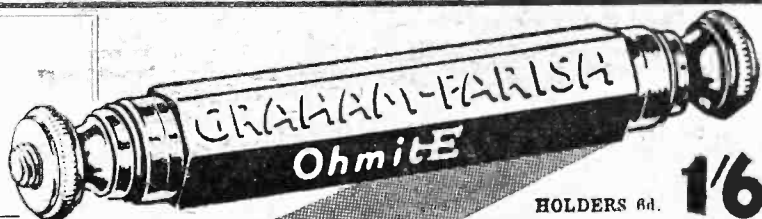
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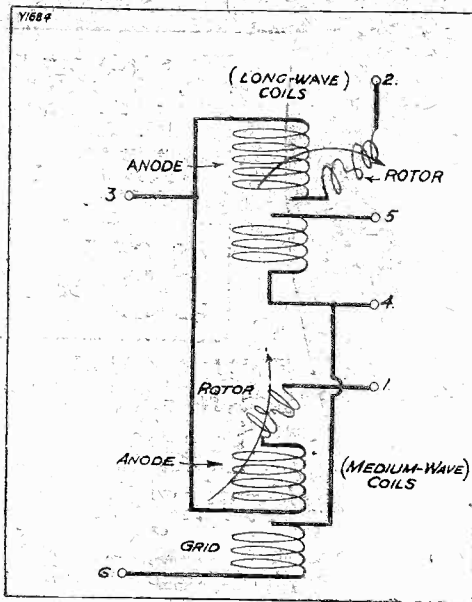
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## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 74.)

Particular note should be made of the fact that it is only on the *second* dial—that is to say, on the right-hand dial—that the readings will remain constant. The reason for this is that the left-hand tuning dial works in conjunction with the selectivity condenser

### THE CIRCUIT



Here you see the theoretical conception of the "Single-Dial Super" Oscillator Unit. Full constructional details are given in the other diagram on this page.

in the aerial, and to get varying degrees of selectivity you necessarily upset the reading already obtained on the condenser in question.

On the right-hand tuning dial the aerial selectivity condenser makes no difference, and therefore you should *always* use this right-hand dial for "logging" your stations, first setting it correctly and then bringing the other in tune with it. When slightly out of tune the station disappears.

### How to Search.

The best general recommendation is to search for foreigners with the selectivity condenser almost at maximum. Then move the right-hand dial very slowly, at the same time tuning the left-hand dial readings a little way each side of its fellow.

Thus, the right-hand dial might be set at 94 and be tuned slowly down to 90, while the left-hand dial should be swung slowly round between about 85 and 100 to see if anything can be picked up. When you hear a weak programme set your *right-hand* dial right first, then "bring up" the left-hand dial until the programme gets suddenly strong, and finally, if necessary, give a final touch to the selectivity condenser in the aerial circuit.

If two stations tend to overlap you will have to turn this latter condenser out a little, to increase selectivity, and immediately you do so you must compensate for that by re-adjusting the left-hand dial.

You will notice that when the selectivity condenser is increased in capacity, the first tuning condenser has to be slightly decreased to compensate; and vice versa, when you decrease the selectivity condenser the reading on the first tuning dial must be increased.

In both cases the second tuning dial (right-hand) remains unaffected. Thus the idea is to get the second

tuning adjusted as quickly as possible to the correct wavelength. Then leave it alone and juggle with the other two until the required degree of selectivity and strength is obtained.

Remember, too, that when the selectivity condenser is at maximum the strength is also at a maximum, but the selectivity and sharpness of tuning is at a minimum; while if you decrease the capacity of the selectivity condenser you will sharpen up the tuning to a great degree, and it will be quite difficult to pick up a foreign station so sharp is their tuning under these conditions.

### Keeping "In Step."

Once you have got the hang of the thing you will soon be able to tell without thinking about it when all the tunings are "in step" with one another; and thus when the set is in its most sensitive condition. It might be a good plan for you to practise when no local station is on until you get the hang of the tuning dials in this way.

What you do is to start with the second tuning dial set almost at its maximum reading, with reaction brought up so that the set is getting near the oscillation point, but not actually oscillating. Then listen carefully to the loudspeaker, not so much to hear any programmes that may be coming in from abroad, as to note the sort of hissing background that the loudspeaker gives when the set comes exactly into tune.

If you are careful you will recognise distinctly the little hissing, breathing sound that denotes that all the circuits are in tune. In this condition the set is amplifying the external noises to its maximum.

This "breathing" or hiss will only occur at the definite dial settings when the circuits are properly "in tune," so you can soon pick up foreigners by working down the dial from the top to the bottom with the second dial, keeping the other dial in this maximum sensitivity condition (what we call "in step" with it).

### The Reaction Control.

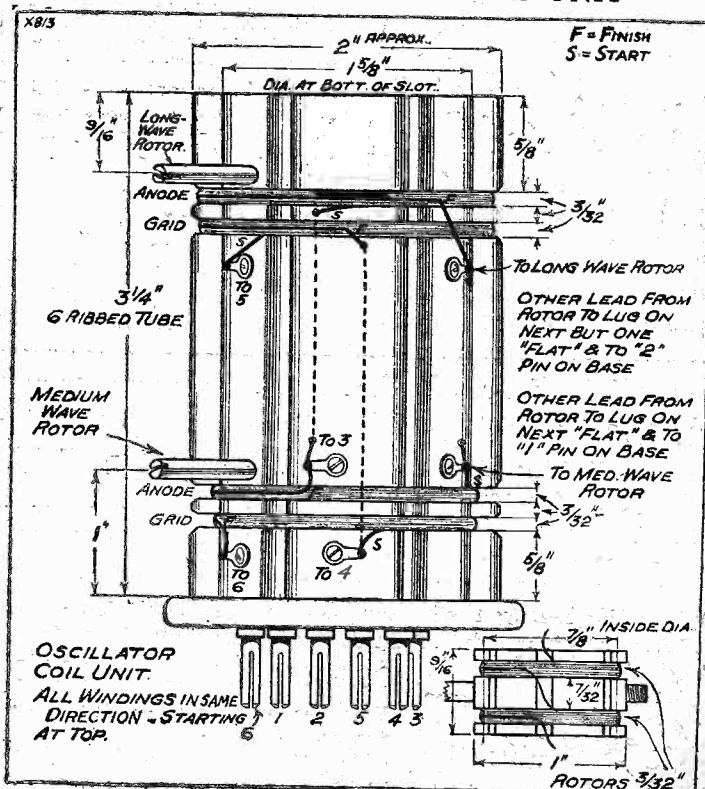
Once you have mastered this trick you have completely solved the problem of tuning in foreigners, for you will find that they fairly tumble in, especially if the reaction is handled judiciously. Too much reaction means whistles and poor reception; too little means that you are not getting all the sensitivity you might. To get correct reaction, turn the reaction dial *slowly* until the set begins to breathe rather more loudly than when it is in the "in tune" condition. But do not give it so much reaction as to make a little "plop" and soft rushing noise, which indicates that the receiver is actually oscillating.

And, finally, remember that the dial readings on the second dial are reliable, and can be logged for future use. Those on the first dial are dependent on the selectivity adjustment, so they vary a little according to the adjustment of the selectivity condenser.

If you use the second dial as the main tuning dial, moving it half a degree at a time, and keeping the other in step with it, you will find that dozens of

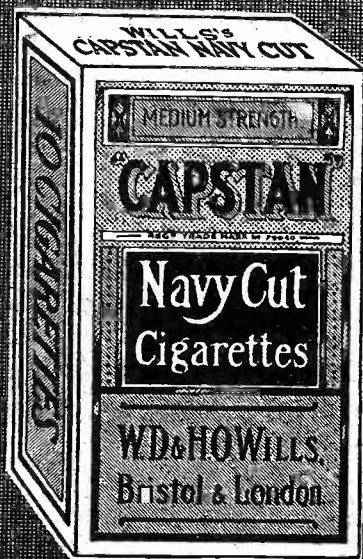
(Continued on next page.)

## MAKING THE OSCILLATOR UNIT



This comprehensive diagram gives full details for constructing the "Single-Dial Super" Oscillator Unit. It should be studied in conjunction with the article which appears elsewhere in this issue.

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## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

programmes which formerly eluded you can easily be tuned in.

### ABOUT VARIABLE CONDENSERS.

"EXPERIMENTER" (Ipswich).—"I like to try out different circuits, home-made coils, etc., and at the moment I am puzzled about variable condensers. You often see the maximum stated as .0005 mfd., but what is the minimum?"

"I have never seen this and I am anxious to know because of a little problem I am up against with regard to tuning. Perhaps, while you are about it, you can help me with that also."

"The problem is, what is the easiest way of using a coil which will tune down low on the medium waves (to stations below Radio-Normandie and Cork), and also at the same

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Last week's missing words (in order) were:

Watt. Amperes, Volts. Half a Watt. Half a Watt. One Thousand.

time cover stations above Budapest, right at the top of the scale over 500 metres? If you can give me some information about this I should be very pleased."

Condensers of the variable type differ a good deal in different makes, but as a general rule the minimum capacity is about one-tenth of the maximum and, therefore, in most makes it is somewhere about .00005 mfd.

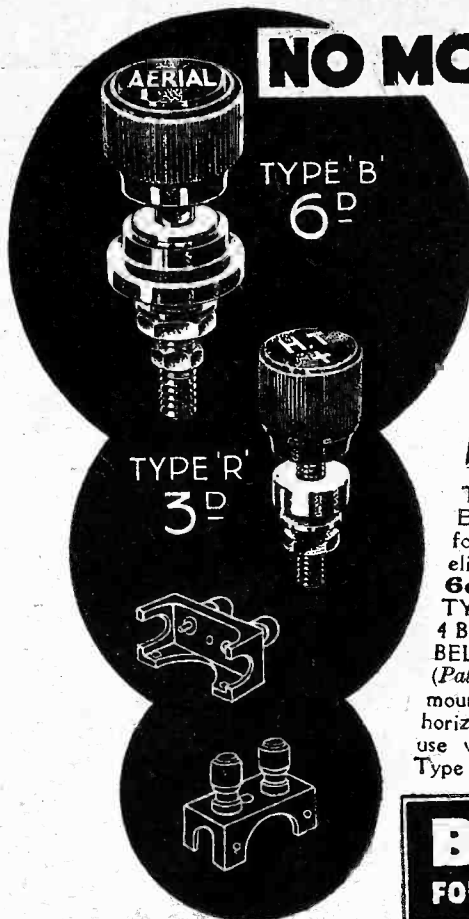
Probably the best way to cover the extended wave-band you are contemplating would be to wire up a little .0001 fixed condenser in the tuned circuit, and bring this into action when you wish to cover the stations above 500 metres. It should be wired in parallel with the present tuning condenser, with an on-off switch in one lead.

When you switch the extra condenser "off" you tune in from low-wave stations like Cork right up to, say, Budapest, or as far as you can go. Suppose it is Budapest and the reading for this is 96.

Switch in your extra condenser and re-tune for Budapest, which will now be 20° or so lower on the dial. Then you can use the higher readings to find other wavelengths above Budapest.

### "P.W." "MISSING LINKS."

Owing to space restrictions the usual "Missing Links" diagram is unavoidably held over this week.



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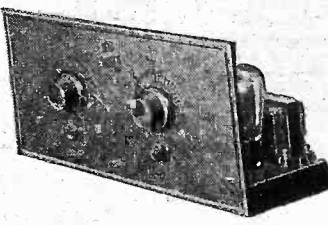
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## THE LISTENER'S NOTEBOOK

(Continued from page 48.)

per cent of listeners is certain, and after the way the paper was read one regretted that the idea of setting it to music had not entered the heads of the programme directors!

Ashley Sterne, on the occasion of his first effort as vaudeville critic, was seemingly more intent on being humorous than criticising the alleged humour of the artistes. Later, he admitted he was a poor judge, so perhaps not much heed was taken of his attempt to find fault with some of the turns.

In his criticism he hinted that crooning was not one of his favourite turns; but I agree with him that, if we are to be asked to put up with such, Eddie Collis is the best exponent of this expression of melancholy that could be selected. But please let us have some new songs.

Naturally enough, artistes jumped at the opportunity to poke fun at the new critic, and one must say that it was poor stuff. However, compensation came in the shape of a few topical puns, and even Claude Hulbert weighed in with two about riding in Rotten Row without a hat, and the selling of his stud for old gold.

### Some Outstanding Turns.

The new method of introducing the vaudeville turns was, after all, not by any means novel, and Leonard Henry as Silas P. Yapp produced little humour that one had not come across before; in fact, after a time the twang became not only monotonous but irritating. One of the earliest turns happened to be Eric Ross and Ida Williams, cross talkers, who did their best to outdo the announcer's alleged wit. Then a little later came Johnson Clark, the ventriloquist. He was well worth his selection. I fancy we shall hear more of him.

Nancy Lovat was content with some old songs that I have certainly heard better sung.

If Nosmo King and his partner are to hold on to their rather high reputations they must avoid repeating their patter. The partner recites with marked effect, and he might with advantage play a more prominent part in the turn.

### Jack's Get-Away.

Did you notice how smartly Jack Payne got away on the occasion of his good-bye performance? It looked as though he was not anxious to give the announcer a chance of being sentimental. He appeared to be as short of breath as usual, but his "boys" played with all their old fire and dash. They should take America by storm.

As a rule there is a stereotyped sound about the hand-clapping that follows a vaudeville turn, but it was evident that the fine baritone voice of Ashmoor Burch made as big an impression in the studio as it did among fireside groups. Mamie Soutter, with her partner, Blake Adams, also hit the popular taste with their patter: but singing is not one of their strong points.

If Sir William Beveridge is keen on increasing the interest in his pet scheme re Family Life and Marriage in particular, he will have to give us brighter discussions than the one he had with Professor Ginsberg. Perhaps the latter's voice handicapped the turn somewhat, but in addition Sir William should become a little less touchy about the way his idea was criticised.

## TECHNICAL NOTES

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

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

### Band-pass Tuning.

I SAID something about band-pass tuning in these Notes a little time back, and as a number of readers have asked me various points about this, I think perhaps it might be useful to refer to it more fully. Some of these questions relate particularly to the actual method of arranging the coupling for the band-pass tuning.

As you know, the object of band-pass tuning is to gain selectivity without losing quality, and also, as far as possible, without losing volume. In highly selective arrangements, as a rule, there is a great tendency to introduce distortion, owing to the cutting-off of the higher frequencies.

### Two Separate Circuits.

It has been known for a very long time that selectivity can be increased by the use of two or more tuned circuits, and a well-known method is to use a tuned aerial circuit followed by an H.F. amplifying valve, this in turn followed by another tuned circuit. This arrangement has merits, but owing to the presence of the amplifying valve following the first tuned circuit, any imperfections in the selectivity provided by the first circuit are emphasised by the valve.

In the arrangement just mentioned, if the two circuits are made sufficiently selective, so as to get fine tuning, it will generally be found that a "peak" will be produced in the resonance curve, so that there will be a great likelihood of distortion being set up.

### Preceding the Valve.

Now, band-pass tuning is really a pair of loosely-coupled tuned circuits, but instead of these having a valve amplifier interposed between them, the two circuits are put together and precede the valve. Instead, therefore, of having tuning circuit, valve and tuning circuit, we have the arrangement first, tuning circuit, second tuning circuit, and third the valve, the valve being taken away from the intermediate position, and put after the second tuning circuit. This apparently simple re-arrangement has important effects, however.

The basis of band-pass tuning is to pick out the desired signal from the unwanted ones before valve amplification. When we have the ordinary arrangement of two tuning circuits, with valve amplifier in between, we get, as I say, a peaked resonance curve.

When, however, we have the band-pass arrangement and the two loosely-coupled tuned circuits followed by the high-frequency amplifier, we get a resonance curve which, although only covering, perhaps, the same amount of dial space, has two peaks side by side and close together, these two peaks corresponding to the separate resonance-points of the two tuned circuits. For practical purposes the two peaks may be regarded as merging or coalescing into one.

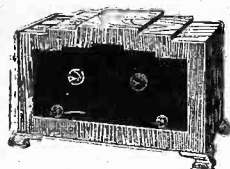
(Continued on next page.)



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## TECHNICAL NOTES

(Continued from previous page.)

which, although it has a slight dimple in the top, is virtually what is called a "flat-topped" curve.

### Flat-topped Resonance Curve.

You will see at once the great advantage of this new resonance curve which, as I say, although being roughly of the same dimensions at the base, is much broader at the top. The effect of this broader-topped resonance curve is that the band-pass arrangement covers more of the high frequencies, as it responds more on each side of the fundamental frequency.

The band-pass arrangement, therefore, whilst giving you the necessary selectivity, at the same time retains, owing to the broadness of the top of its resonance curve, those sidebands which are essential for the avoidance of distortion.

As regards the actual arrangement of the two loose-coupled tuned circuits for the band-pass arrangement, one of the simplest methods is to connect the two coils together, each, of course, having its own variable condenser, and to connect a coupling coil between the common point of the two tuning coils and the common point of the two tuning condensers. A variation of this method is to substitute a coupling condenser for the coupling coil.

### Mixed Coupling.

These two methods, however, although useful to us in studying the simplest arrangement of the band-pass tuning scheme, are not in practice all that might be desired, and they have now given place to another arrangement, which I will describe in a moment. One of the principal drawbacks of the simple coupling coil or simple coupling condenser for the two tuned circuits is that at different parts of the wave-length range the degree of selectivity will vary.

The band-pass arrangement which is now most popular utilises a mixture of both coupling coil and coupling condenser. We have the two tuned circuits, the two tuning coils, and the two tuning condensers being all in series and the common point of the two coils being connected by means of a coupling condenser to the common point of the two tuning condensers.

### Variation With Frequency.

So far, this arrangement is identical with the simple coupling condenser mentioned above. The difference, however, is that whereas there was no definite coupling between the two coils in the former case, in the "mixed coupler" the two coils are arranged so that there is a variable coupling between them.

This arrangement has the advantage that the degree of selectivity, or if you like, the band width of the resonance curve, does not vary very much at different wave-length frequencies over the ordinary scale, and furthermore the selectivity which is obtained does not involve any serious loss of signal strength.

You will see, of course, that two tuning condensers are necessary in the aerial circuit, one of these belonging to each of the two tuned circuits, and although, if desired, these condensers may be operated separately, the actual operation of the

(Continued on next page.)

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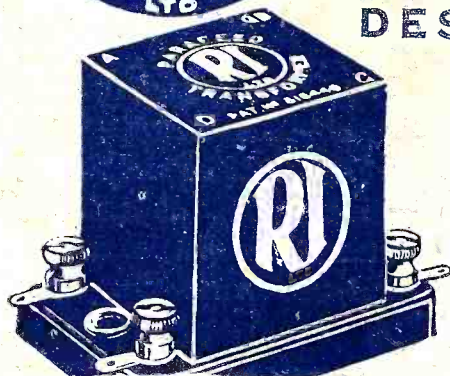
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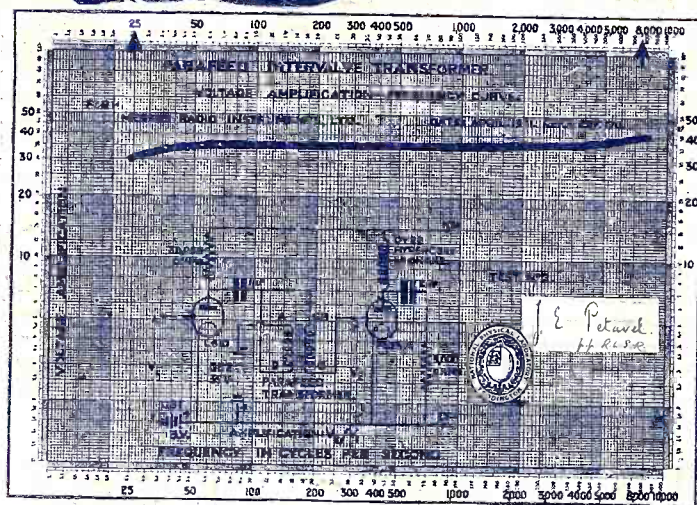


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8/6

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