

**NEW TELEVISION SERIES BEGINS THIS WEEK**

# Popular Wireless

No. 645.  
Vol. XXVI.  
October 13th,  
1934.

**AND TELEVISION TIMES**

IMPROVING  
THE HIGH  
NOTES  
ON  
THE SHORT  
WAVES  
PRACTICAL  
TIPS FOR ALL  
Etc., etc.

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*John Scott-Taggart,  
F.Inst.P., A.M.I.E.E.*

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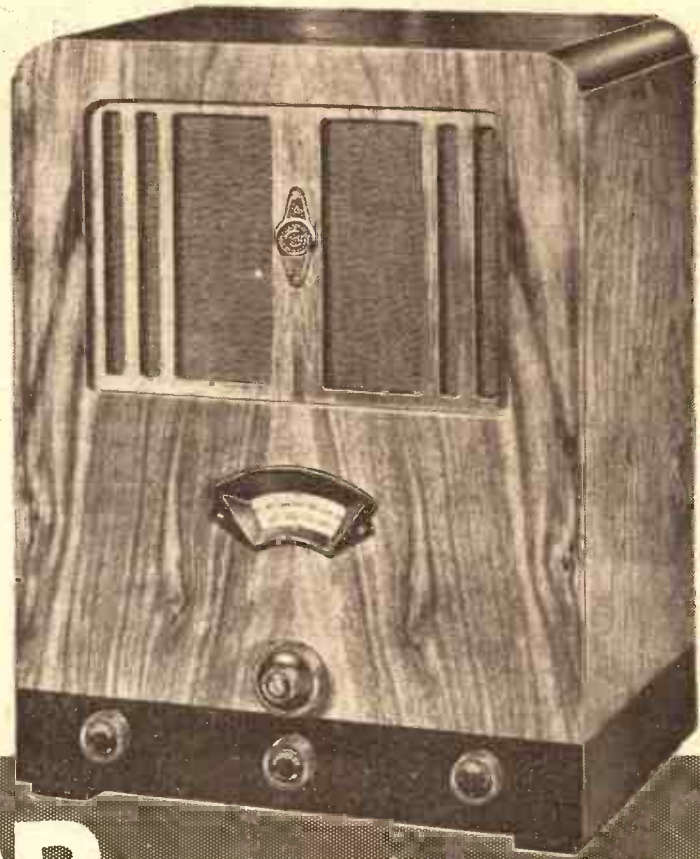
# WAIT FOR IT!



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Radio Value



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SCREENED GRID  
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●  
SUPER-SELECTIVE  
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MOVING COIL  
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Model.....

P.W. 15/10/34.

# POPULAR WIRELESS AND TELEVISION TIMES

MANAGING EDITOR: N. EDWARDS.

TECHNICAL EDITOR: G.V. DOWDING ASSOC., I.E.E.

THOSE "HOWLERS"!  
TALKS BY THE HOUR  
INTERFERENCE WAR  
RADIO HISTORY

## RADIO NOTES & NEWS

RADIO'S ROBOTS  
PHONE-WIRE HUM  
"PEDAL-  
TRANSMITTERS"  
BROADCAST LIGHT

### Ready for Relays.

**A**MBITIOUS plans for the reproduction of European and other distant programmes have now taken shape in New York, where premises in Broad Street have been enlarged as a programme-transmission centre.

The extensions will allow two incoming and two outgoing programmes to be exchanged simultaneously if the need arises. A battery of receivers at Riverhead, and another at Point Reyes, on the Pacific Coast, are ready to swoop on any required programme, and thus the Old World is now as an entertainment reservoir for the New.

### Howling.

**T**HE schoolboy howlers which I have given from time to time have met with such appreciation that I produce the following, which may be unknown to you. The first is a technical definition:

"Horse-power is the distance one horse can carry a pound of water in an hour!"

The second is a bit of history that may have escaped notice: "The Romans made their roads straight so that the Britons could not hide round the corners."

### Those Electrified Layers.

**T**HE scientists who have been pooling their knowledge about experience gained from the "Polar Year" of 1932-3 have discovered much about the world's radio roof. And one fact which emerged was that something in the nature of a sunspot, which electrically bombards the earth every twenty-seven days, was responsible for the failure of General Nobile's short-wave wireless during his ill-fated polar expedition.

The final report of the scientists should prove full of interest to John Listener.

### Words, Words, Words!

**H**AVE you ever wondered what it is that some of those foreign stations talk about so interminably?

I happened to see the full programme of one of them the other day—I mention no names advisedly—and this was the sort of thing they suffer:

News. Outlook for Farmers. Talk on Music. Exchange

Prices. Report for Housewives. News, Time and Weather. Market Report and Farmers' Programme. Talk for Children. Reading and (at long last) Gramophone. How lovely the scratch of the needle must sound after all that information!

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### On Tour.

**L**ISTENERS and also railway companies have been glad to hear that the B.B.C. Symphony Orchestra is to get about a bit and give concerts outside London. (The railways rejoice because there are about 120 players to be transported!)

I expect you saw the dates for the Manchester, Bristol, Birmingham and Dundee visits (Dec. 5th, Feb. 13th, Feb. 27th and April 2nd respectively), but you may like to note that the itinerary now includes Brussels on March 12th.

### Tantalising Television.

**E**VENTS may contradict it, but there is a widespread belief that the Television Committee is not going to tell us what it thinks before the end of the year.

### A SELF-CONTAINED BATTERY THREE.



The H.M.V. "Long Three" to which reference was made in "P.W.'s" Listeners' Service last week. This set sells at £7 19s. 6d., complete with valves, batteries and moving-coil loudspeaker.

In the absence of its report, rumour is rife. And if we have to wait till January or February before we know the official view, television will have missed the boat again for another year.

There is none of this uncertainty in America—they are quite sure there that television is inevitable soon. But they are looking very hard into the financial aspect.

Their view is that to see would be wonderful, but to see a profit would be essential.

### The War on Interference.

**T**HE countries of Europe are one by one finding themselves compelled to concentrate their forces for war—on interference.

In the campaign in Belgium, newspaper and microphone propaganda have been highly successful.

Sweden has been weeding out electrical apparatus which spits and splutters in neighbouring wireless sets, and France issued an ultimatum compelling the owners of interfering motors, etc., to stop it by October 1st or take the consequences. The fight continues.

### Sofia's Sympathy.

**S**OFIA works on 352.9 metres, and has to share this wavelength with four other stations. But when a fifth suddenly appeared, and its broadcasts interfered with Sofia's own, Sofia was annoyed and called in the aid of the public to locate the offender.

He came forward at once, confessing himself as an amateur who, although very poor, was so interested in wireless that he had made a transmitter out of bits and pieces. And the station authorities, admiring his enterprise and frankness, promptly forgave him and found him a job on the staff.

### He Was First.

**I**N his recent presidential address to the International Scientific Radio Union, Dr. W. H. Eccles paid a remarkable tribute to Sir Oliver Lodge.

"Forty years ago this week," he said, "Oliver Lodge demonstrated the transmission of Morse wireless signals across a

(Continued on next page.)



# THE FIRE THAT HAPPENED THE NIGHT BEFORE

few hundred yards in an Oxford quadrangle.

"That was the first wireless communication system, for it had all the same essential functions, including tuning and detection, of the receiver of to-day."

Weighty words, and handsomely put.

## Free Communication.

**H**OLLYWOOD is about three thousand miles from the fair city of New York, so phone calls between the two places are apt to be expensive luxuries. But a Hollywood sweetie has just disclosed an ingenious method of free communication.



Her gallant is a New York broadcaster who goes "on chain" once a week, and they have worked out a message code on

certain words, which he weaves into his programme.

She listens in like everyone else, but wrapped up in the back-chat are unsuspected little earfuls—for her benefit alone!

## Croydon Calling.

"**M**ANY happy returns" to the Croydon Radio Society, which has just celebrated its tenth birthday with great éclat.

The forthcoming session is full of attractions, including Loudspeaker and Pick-up Nights, and the meetings are held at St. Peter's Hall, Ledbury Rd., South Croydon, close to S. Croydon Station and the Swan and Sugarloaf bus stop.

All particulars from the Hon. Sec., 14, Campden Rd., S. Croydon.

## Nautical Note.

**A**N Eastbourne reader wants me to tell him how he can use *searweed* to improve his results.

I gather that he has read about the B.B.C.'s use of this material for preventing resonance, and that the only result of his own experiments is that the landlady is being very outspoken about the mess it makes in his room!



No, sir. My sympathy is with the lady. I suggest that you chuck the beastly stuff back into the sea and then look for a more promising line to investigate.

## Thank You.

**W**AY back in February a Blackburn reader, A. B., wrote to C. H. C., of Leigh-on-Sea (whose address he saw in "P.W."), about the "Cosmic 3." And to help a fellow-reader C. H. C. went to lots of trouble, drew out the layout, sent a small parcel of papers—and then looked in vain for a "Thank'ee!"

So about a month after he sent a p.c.

asking if the parcel arrived. But still he has not heard a word from Blackburn.

If this meets the eye of A. B. I hope it sends a blush to his cheek and causes him to thank the stranger who went to so much trouble on his account.

## The Dot Merchant.

**A**S the engineers find out more and more uses for radio, the variety of stations gets greater and greater.

Not so long ago we learned with surprise that complete transmitters went aloft in little balloons, registering barometric pressures, etc., at regular intervals, until the balloons burst and so closed down the tiny stations.

## ON THE AIR NEXT WEEK

**Reginald Foort** (North Regional, Wednesday, October 17th.)

Reginald Foort, the well-known cinema organist who is giving his first Northern broadcast next week (relayed from the Regal Cinema, Ferensway, Hull), was born in Daventry and played the piano at the age of seven. Studied the organ at Rugby, and later went to the Royal College of Music, where he studied under Sir Walter Parratt. Obtained appointment as organist and choirmaster at St. Mary's, Bryanston Square, at the age of seventeen.

In 1913 joined the R.N.V.R., and during the first two years of the war served as an A.B. in the Grand Fleet. After Jutland applied for a commission, and served as second gunnery officer in a monitor.

Has broadcast from many cinemas, and the B.B.C. has paid him the compliment of following his different appointments with the microphone. His first organ broadcast was in 1926, but he had previously played the piano from Marconi House in the very early broadcasting days.

Now the radio research people at Slough have an automatic "dot merchant" who switches himself on every half-hour, transmits for one minute and then lies doggo again until the next twenty-nine minutes are up. A similar automatic receiver checks results, and so enables an eye to be kept on the varying heights of the Appleton and Heaviside Layers.

## "Why Do Telegraph Wires Hum?"

**L**ONG ago, light heartedly, I raised this question. Now I lay it down in reverence. For it is indeed a Noble Topic.

Hosts of practical men, G.P.O. engineers, roadmen and so on have said what they think makes the wires hum; men of science have sent me sketches and figures about it, proving how wind vortices do this, that or t'other; and distinguished scholars have furnished formulae that Euclid would like to have talked over with Einstein.

To give the result of all this in a short paragraph is beyond mortal power. But I send thanks to all my correspondents for the extraordinary amount of trouble they have taken to get to the bottom of this phenomenon.

## Emergency Measures.

**A**BOUT twenty "pedal-transmitter" wireless sets have been placed at strategic points in North Australia by the Inland Mission.

Here is a true instance of their uses: A woman at an isolated cattle station was suddenly taken ill. A neighbour motored 70 miles to an outlying station where a pedal transmitter is installed, and spelt out a message for help on the keyboard, which is like a typewriter's.

The "flying doctor" employed by the Mission answered immediately by wireless, giving instructions and arranging to call in a plane, fitted with a stretcher cot, on which the patient was placed.

Thus in a few hours the vital operation was performed in hospital, though the cattle station is hundreds of miles from the town!

## Dangers of Zeal.

**D**RAMATISED news, with sound effects, etc., may provide excellent broadcasts, BUT—

An American newspaper reports: "A penchant for special scoop news led station W I P into an embarrassing situation last week. A fire at the Anchorage Café was publicised as a great conflagration and dramatically aired by W I P, with the clanging of sirens, fire-alarms and excited announcers, right from the spot.

"P.S.—The 'fire' happened the night before!"



## Belgium's Twin Station.

**C**OMMENTING on the fact that he always receives Brussels No. 1 (483.9 metres) much more strongly than Brussels No. 2 (321.9 metres), a Kentish reader says: "As the power used is the same at both stations I suppose one is much nearer my aerial than the other." No. As a matter of fact, the Brussels Brothers constitute a twin station on a single site at Velthem. The aerials are adjacent, but, being at right angles, one may radiate better towards Kent than the other.

The wavelength also affects radiation, so the discrepancy in results is less surprising than if the two programmes were received at equal strength.

## Lightens his Darkness.

**M**EET George Driscoll, an enterprising engineer who determined that, instead of sleeping on the station premises, he would camp out in the woods a few miles away. So he erected an aerial there, to keep in touch, and then found it picked up so much power that he could attach electric lights!

George's only trouble is that, as soon as the station signs off for the night, his free illumination vanishes!



ARIEL.



# TELEVISION

## A SPECIAL NEW SERIES FOR ALL READERS

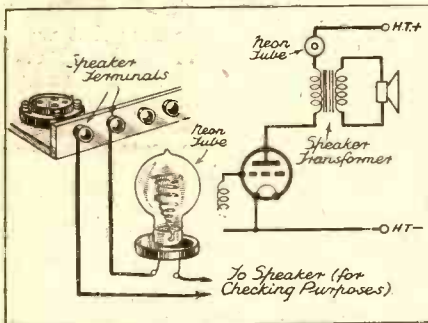
By L. H. THOMAS

In introducing this new series of articles, the author explains the requirements in a set to be used for television, and shows how the working of a televiewer may be checked before the broadcasting has started.

SOME little time ago the Editor of "P.W." told me that he wanted me to make myself responsible for a Television Series, to be run on essentially practical lines: written in language understandable by the home constructor; shorn of all "ballyhoo" and childish enthusiasm about something new.

My immediate reply was: "But I haven't had the least experience of Television myself! I know as much about the theory of it as a good many people, but I've never touched the practical side at all."

### DIRECT CONNECTIONS



The simplest method of connection. The neon tube is in series in the anode circuit just like an extra loudspeaker would be.

Quoth the Editor: "Precisely! That's just why we have chosen you for the job. You've got to start on the constructional side of it, right from the beginning, and take readers along with you. Don't go so fast that they are left behind, and don't dawdle about so that they get impatient!"

So with that little introductory bow I proceed to business. Now, why is it that so many people who are intensely interested in television have never attempted to put their enthusiasm into practice? In my own case there are two very good reasons.

First, my existing radio work has hitherto taken up most of my time. Secondly, to be candid, I've been "sitting on the fence." We're all expecting something revolutionary to come along. Apparently it never does, but it probably will some day. And with characteristic English apathy I have been content to watch things go by instead of joining in the procession.

### A Simple Kit of Parts.

Well, now it's good-bye to all that sort of thing, and television becomes an intensely interesting part of my radio work from now on.

I don't propose to say much about the theoretical considerations at the present stage. "P.W." readers have been well served during the last year with articles on those lines. I have assembled a disc-type

viewer from a kit, and have constructed, in great haste, what I hope will be a suitable receiver for it.

I can't say anything about results till next week, because this has to go to press before the next B.B.C. television half-hour comes round. In a way, that is an advantage.

The question that everybody asks right away is: "Will my present receiver be good enough for television reception?" That, of course, is an impossible question to answer without knowing quite a lot about it. If it gives an undistorted output of 1½ watts or more, and if its selectivity is reasonably good, there should be no difficulty.

I wonder, though, how many home constructors really have an undistorted output of 1½ watts (or more!).

The ear is a treacherous organ, and will put up with the beastliest type of beastly quality once it has become used to it. So there's straight tip No. 1. Make certain that the reproduction from your receiver is really good.

### The Amplifier in Use.

Use as large a valve as you can in the output stage, and don't allow anything to overload. Furthermore, use L.F. transformers (if you are using any) that are of good reputation.

How I wish readers could see my hurriedly built receiver as it sits on the bench awaiting its first try-out! The amplifier and power pack from my radiogramophone have been pressed into service, and a power-grid detector has been rushed through, "all hay-wire," and sits on the top of the pile. It looks like a bad dream, but the reproduction I am getting from London National at the moment doesn't offend my ear, which, thanks be, is pretty critical.

The output stage uses two valves of the PX4 type, running at 220 volts 36 m. a. each, and should, I imagine, give me about 4 watts with luck.

These are preceded by an ordinary indirectly-heated power valve (ML4, AC/P1, etc.), and this is preceded by the detector, which is the first valve in the set.

Living about twenty-five miles from Brookmans Park and possessing a reasonably good aerial, I am having a shot at getting good results without an H.F. stage—just for the present.

One can get a very good idea of whether the output from one's set is sufficient for television purposes by running a neon tube

on ordinary speech and music, particularly if one "scans" it by means of the usual disc equipment.

The two sketches on this page show two simple methods of connecting up the tube to an existing receiver. I have not shown any synchronising gear, neither am I using any on the first test, because I want to form an opinion on the results that one can get with the simplest possible viewer. ("Probably I shall get the shock of my life," says a pessimistic colleague!)

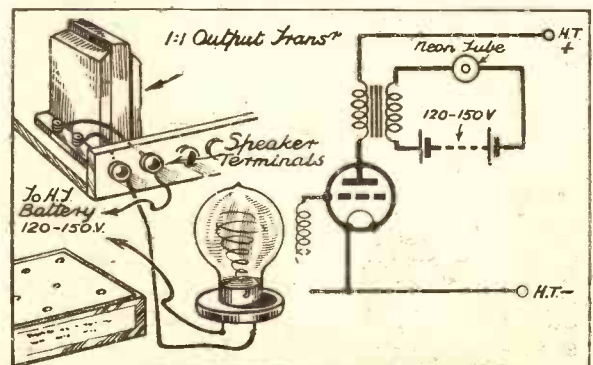
### Fascinating Patterns in Test.

At all events, using the receiver I have just described, and connecting the neon tube (one of the new "Telex" type, by the way), as shown in Fig. 2, I can receive fascinating patterns from music and a stationary and well-marked design from the tuning note. So I hope to be able to say next week that I have received television for the first time on my own apparatus.

I am not too optimistic about the constancy of my mains voltage. After running the motor for a quarter of an hour the disc appears to be subject to considerable changes in speed. These are of an abrupt type, and certainly cannot be accounted for by the control resistance heating up.

When we are all on the same mains and

### USING A "STRIKING" VOLTAGE



In this case the neon tube is isolated from the anode high tension, a separate battery being used to cause it to glow.

can use synchronous motors, one of the biggest bugbears of amateur television—manual synchronising—will vanish. One can always use a 6-volt motor and run it from a good-sized accumulator: the gaps between the television programmes give one ample time to keep it well charged! But one shouldn't have to do this.

I doubt if even the synchronising signal that forms an integral part of the television transmission will be enough to deal with mains that fluctuate as badly as mine.



# TELEVISION JOTTINGS

A Useful Book—The Cathode-Ray Tube in Germany—  
Notes About Television Clubs—A Short-wave Record.

The Anglo-American Radio and Television Society.

**T**HE President of the above society writes to me as follows:

"This society has as its aim the furtherance of international goodwill and the helping of radio and television enthusiasts with their problems. There are no charges and members are under no obligations. However, a stamped, addressed envelope must be sent when a reply is required.

"Members wishing to correspond with fellow-members may do so, and have merely to send their request to the headquarters of the society at 11, Hawthorn Drive, Willowbank, Uxbridge.

"To bring its members into personal contact, branches have been formed in this country and abroad. They are run under their own government, and in some cases a small subscription is charged to enable club rooms to be obtained.

"The West Middlesex and East Bucks Branch, however, does not charge for admittance. Meetings are held on the first Wednesday in the month, and are rendered attractive by television demonstrations and other novelties."

I understand, too, that the installation of a headquarters transmitter is being considered at present. Full particulars may be obtained from the President, Mr. Leslie W. Orton, "Kingsthorpe," Willowbank, Uxbridge.

## "Television for the Amateur Constructor."

I have received for review a copy of "Television for the Amateur Constructor" (Second Edition), by H. J. Barton Chapple, Wh.Sch., A.C.G.I., D.I.C., etc. (Sir Isaac Pitman & Sons, Ltd. 12s. 6d.)

This comprehensive book sets out in plain language, with a wealth of circuit diagrams, practical sketches and layouts, photographs, etc., practically all the information that the average television enthusiast is qualified to make use of.

Commencing with a simple explanation of the principles involved, Mr. Barton Chapple proceeds to deal with the types of receivers that are most suitable for television reception. The H.F. and detector are discussed at some length, after which amplifier circuits come under review. H.T. power is similarly dealt with.

After this the theory and practice of scanning and synchronising (chiefly in connection with the light-spot disc method) are outlined, and finally practical details for the home construction of a complete outfit are given.

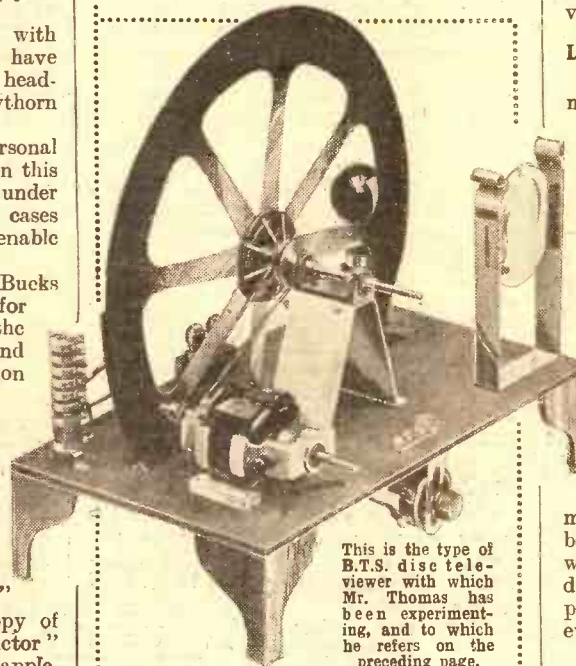
The latter part of the book is given over to descriptions of mirror-drum, mirror-screw and cathode-ray systems, with a final review of high-definition developments.

In a Foreword Mr. J. L. Baird appeals to all radio enthusiasts to "get down to television" and recapture the thrills that the old hands experienced in the early days

of radio telephony. Further, he says, one should "turn to it with a practical mind and use it as an outlet for those constructive capabilities which in many cases have been dormant for a long time."

## Progress in Germany.

One cannot help noticing, in a recent description of the Berlin Radio Exhibition, that an enormous amount of interest is



This is the type of B.T.S. disc televiewer with which Mr. Thomas has been experimenting, and to which he refers on the preceding page.

being taken in television in Germany. There were continuous demonstrations at the Show, and several firms were exhibiting complete receivers for sound and vision.

The authorities are completing plans for a regular National transmission, probably on the ultra-short waves, with a high-definition system and a network of relatively low-powered transmitters.

I hear from a correspondent in Germany that practically all systems have been superseded by the cathode-ray tube, and

## WHAT THEY ARE SAYING

"Someone, somewhere, is going to think of something so revolutionary that television will become as simple as a magic lantern."—Mr. G. V. Dowding in "The Wireless Constructor."

"The future has no earthly use for cumbersome mechanical devices as parts of a television receiver."—L. V. Barker in "An Engineer Looks for the Light."

"Hardly anyone seems to realise that really good results can be obtained with the simplest of gear on the present 30-line transmissions."—Mr. J. M. Coles in "Scientific Journal."

that it only needs a firm to produce such a tube at a low price for an enormous television "boom" to commence. He describes the latest demonstration, on a screen 11 inches by 9 inches, as "comparable in detail and illumination with the best home-projected moving pictures."

## With the Clubs.

I hope to make a regular feature of Club Notes and News, and extend an invitation to secretaries of all existing television societies to forward to me advance details of meetings, tests and other items of interest.

Further, I should be glad to hear from anyone who is keen on forming a local society or on extending a local radio society to embrace television; or from any interested readers who would like to be put into touch with others in their own localities with a view to discussing television matters.

## Long-distance "Ultra-Shorts."

I understand that a film has been transmitted from Berlin to a laboratory on the Brocken—a distance of about 125 miles—using an ultra-short wavelength. This is said to constitute a record for ultra-short-wave television.

## The B.B.C.'s New Times.

It is good news to hear that the bi-weekly transmissions from the B.B.C. are being extended by a quarter of an hour. Thirty minutes has always seemed too short for a television transmission; forty-five will give more time to get the gear working and "settle down." The times, 4.30 p.m. on Saturdays and 11 p.m. on Wednesdays, are also more convenient.

The real gain to most experimenters is more than the extra quarters of an hour, because the old Friday morning half-hour was pretty useless. Very few could get down to it at that time, but the new periods will be satisfactory to nearly everybody.

When the Midland Regional transmitter moves to Droitwich I understand the sound broadcasts for the television programmes will go there too. This will be all to the good, for the new station is to have greater power, and thus fading should be reduced.

## American Transmissions.

Over twenty American stations are transmitting television at present, and many of their signals can be received quite well in this country. They are of little interest to beginners and users of disc equipment, since practically all of them use 45, 60 or 120-line scanning.

When cathode-ray receivers become more popular (in other words, when the price is within reach of the average home constructor) we shall be able to make considerable use of some of these American transmissions.

## The Amateur Transmitter.

The full conditions of the new television transmission licence will be quoted next week. For the present, sufficient to say that the band to be used for vision is just below 10 metres. It is possible, however, that facilities for transmitting on longer wavelengths will be granted in special cases.

L. H. T.



# IMPROVING the HIGH NOTES

An interesting article describing some simple but illuminating tests carried out on a radio receiver to determine how the reproduction of the top register of the musical scale could be improved.

By A WELL-KNOWN RADIO ENGINEER.

THERE are certain parts of a radio receiver for which it is obviously very important to choose correct values. If one were to slip in an extra nought when specifying a 0.0005-mfd. variable condenser the result would be the loss of about five-sixths of the wavebands; and that would be just too bad.

But there are other parts where almost any value in the remote neighbourhood of that specified seems to do equally well, and for which there is not even any general agreement as to which is the correct value.

The grid leak and condenser, for example. All sorts of different values are seen marked on circuit diagrams; and constructors with an inquiring turn of mind may ask for a long time without getting a clear idea as to the intentions underlying these diverse figures.

### Very Perplexing.

The theory of the thing is very perplexing to anybody who is not an unusually bright mathematician, and, in any case, it leaves most people stone cold; so here are some practical results that show at a glance what is what.

Although there is an almost infinite number of combinations of leak and condenser values, there are, in the main, two schools of thought and practice, which may be distinguished as the Traditional and the Modernist. The former specifies a leak of 1, 2 or even 3 megohms and a condenser of about 0.0003 mfd. The latter prefers 0.25

turn in a receiver. That is a sound enough method when a really large and unmistakable difference is to be expected.

But this is one of the finer points which together make all the difference between a good set and an indifferent one, but which separately are difficult to assess. Anybody who has done much of this listening-test business will agree that it is most exasperating and indecisive.

You listen to some broadcasting with system A. Then you alter the circuit to system B, and

DULL  
OR  
CRISP?

neous change-over (if it can be arranged) is seldom conclusive.

The other method is to measure the difference in cold figures. In the present problem this is not possible without elaborate and costly apparatus; which probably accounts for the hazy ideas on the subject.

Fig. 1 shows how the tests to be described were carried out. L and H together form a miniature transmitter with meters for measuring everything about it, H being the high-frequency oscillator (representing Brookmans Park on a somewhat reduced scale) and L the low-frequency oscillator (as a substitute for Broadcasting House) for modulating the signal at any audible frequency. The result is a signal that is under complete control, instead of what happens to be "on the air" at the moment.

C and R are the condenser and leak in question, and the valve, an AC/HL, is fairly typical of the ordinary triode detector. The conclusions apply fairly well to other sorts of valve. By-pass condensers and an H.F. choke cut out all the H.F. signal that finds its way through the valve, and the L.F. output is resistance-coupled to a valve voltmeter for measuring it.

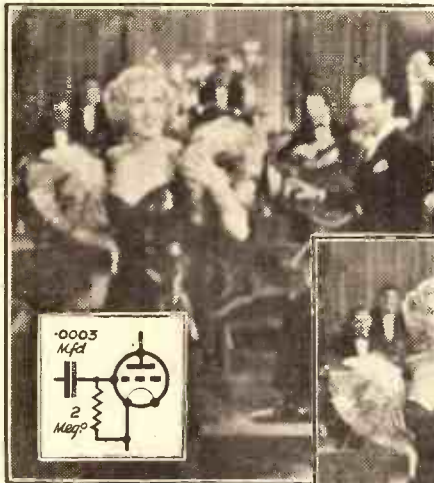
### The Coupling Resistance.

Generally, one will use a rather higher coupling resistance than 10,000 ohms—here the object was to avoid complicating effects—and the by-pass condensers should then be rather smaller, to avoid high-note loss.

Sometimes, of course, the by-pass condenser is taken in the form of a differential reaction condenser.

A signal of 0.75 volt, at a wavelength of 500 metres modulated 20 per cent, was used; and the Traditional R and C were represented by 2 megohms and 0.00025 mfd, and the Modernist by 0.25 megohm

(Continued on page 152.)



Two illustrations depicting a photographic parallel of the effects of reducing and retaining the full high-note response in a radio receiver. Lack of top, as produced by the high grid leak and condenser valves, gives a "picture" like that on the left, while full-top reproduction provides crispness and full detail in the musical picture. The photograph, by the way, is of Jane Carr and Roy Fox and his band in the film "On the Air."

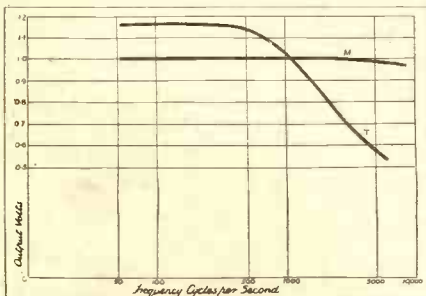


Fig. 2. T represents the results of the high leak and condenser values, while M shows how the low values assist high-note reproduction.

megohm (sometimes even as low as 0.1 megohm) and 0.0001 mfd.

The most obvious way of deciding between these two is to try them both in

switch on again. In the meantime, the station has gone over to another type of programme, or closed down, or faded; and there is no true basis of comparison. Even if it is still carrying steadily on with the fat-stock prices, it is difficult to take one's mind back to the previous results and decide whether there is any real difference.

The speaker may have cleared his throat while the change-over was being made. And he gives no clue as to what happens when a bass drum or a tambourine is being played. Even an instant-

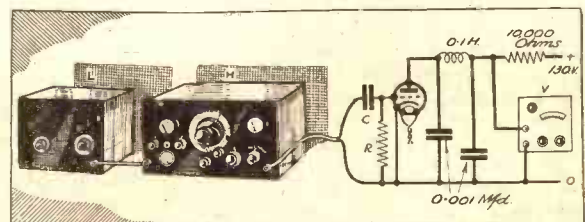


Fig. 1. The arrangement used for the tests.



# THE PROBLEM

Here is Mr. John Scott-Taggart, M.C., F.Inst.P., A.M.I.E.E., Britain's leading designer, in a characteristic attitude. He has faced the problem which faces most listeners in this country—the overwhelming power of the B.B.C.

great as that of even the S.T.400, gives the B.B.C. its death-knell as a "jammer." Swamp areas will cease to exist after Oct. 24

—for those who "Act in Oct."

The most sensational claims ever made will be set forth and proved up to the hilt in the

# S.T. 600

Droitwich is the new menace, but the Regionals blot out many foreign stations. The S.T.600, with a selectivity many times as

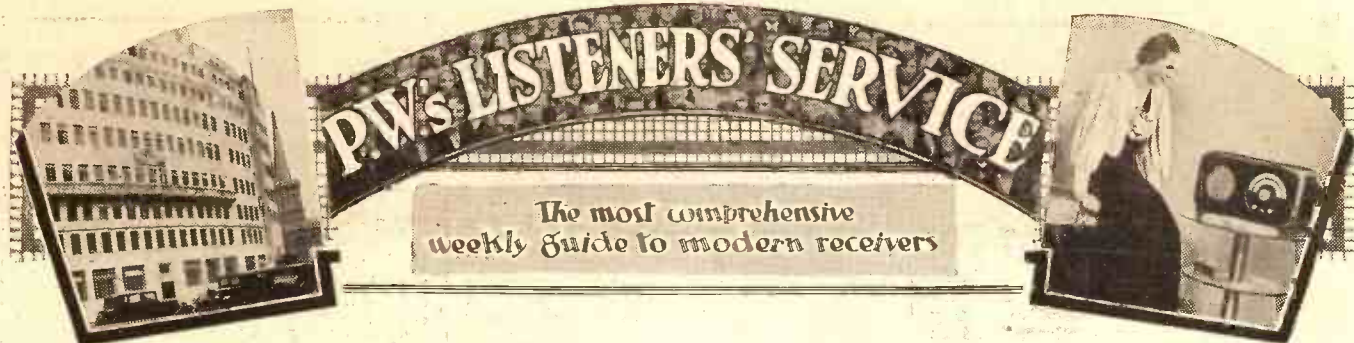
POPULAR WIRELESS Great Autumn Number, out on Wednesday, Oct. 24—only a fortnight off.

# 3 GREAT GIFTS

and an astounding new book offer will appear in this issue—the greatest bargain ever offered, and at 3d. only ! But above all : the greatest problem of nearly every listener will be

# SOLVED OCT. 24 !





**"FULL STEAM AHEAD"  
AT COSSOR'S  
LATEST FACTORY**

IT seems barely more than a few weeks ago since Messrs. A. C. Cossor, Ltd., announced their plans for the construction of still another vast factory at Highbury. And yet to-day that factory is not only completed, but equipped and taxed

**ALL THOROUGHLY TESTED**



One of the main reasons for the tremendous popularity of Cossor products is their extreme reliability, a factor due in no small measure to the searching tests to which they are subjected prior to dispatch.

to capacity so far as its manufacturing facilities are concerned!

We feel that we may be forgiven for observing that "this is progress, that was," for when we reveal that it is a five-storey building, with 60,000 square feet of floor space for manufacturing plant, the extraordinarily rapid growth of this enormous edifice will be better appreciated.

Factory number five completed and working! What a glowing testimony to the esteem in which Cossor products are held! And what a tribute to the enterprise behind this vast organisation! Think of the tidal wave of industrial prosperity that would be created if every radio firm in this country bought 2,500 tons of concrete, 10,700 square feet of glass, 10,000 feet

of steel conduit, 500 tons of steel girder, 28,000 feet of electric cable and 42,000 hollow blocks for flooring, as Cossors have done in order to build their latest factory!

The demand for Cossor products is ever increasing. There is nothing that succeeds like success. Here's to Cossor factory number six, a not unlikely eventuality in the future!

**SUCCESS OF G.E.C.  
SUPERHET A.V.C.5**

Our plans for a detailed test report next week.

NEWS comes from the G.E.C. this week that their Superhet A.V.C.5—one of the highlights of their 1934-5 range—is achieving tremendous popularity. That was rather to be expected, for consistent with the value offered the price of 14 guineas strikes one as being remarkably low.

The Superhet A.V.C.5 is a table-model instrument capable of the reception of an almost unlimited number of stations. It will provide an undistorted output of 3 watts from the large-size moving-coil speaker incorporated, and the quality of reproduction is exceptionally brilliant.

**Incorporating the Latest Refinements.**

It incorporates all the latest refinements, such as luminous station-name indicator, delayed and amplified A.V.C., sensitivity and tone control, etc., and the set is housed in an inlaid walnut cabinet of attractively modern design.

We are glad to be able to announce that arrangements have been made for this particular set to be subjected to a "P.W." Triple Test, and a detailed report will appear in our next issue.

**"P.W.'s"**

**TRIPLE TEST THIS WEEK.**

"Spectrum Tuning" is a 1934 innovation for which H. Clarke & Co., Ltd., of Manchester, are responsible, and it is one of the many salient features of their Model "7-5-8" receiver—the instrument which is the subject of our Triple Test this week. Read what both "P.W." and the Man-in-the-Street think about it on pages 133 and 134



**A BATTERY  
SUPERHET PORTABLE  
OF NOTE**

THE detailed specification of the new Ferranti Battery Portable, coupled with the prestige of the firm which is behind it, can leave no possible doubt that this attractive instrument is one of the most outstanding "take-it-where-you-will" sets of the season.

**MUSIC WHEREVER YOU GO**



The Ferranti Battery Portable, which costs 16 guineas, is completely self-contained, and although it is surprisingly economical in operation, it is capable of providing an undistorted output of 2 watts.

It is completely self-contained, and the price of 16 guineas includes a large, long-life H.T. battery and a non-spillable accumulator. The circuit incorporated is that of a six-valve superhet arrangement with every modern refinement.

There are, for instance, such features as automatic volume control, illuminated station name and wavelength scale, optically magnified dial (for easy reading), etc., and the set provides a maximum undistorted output of 2 watts through the Ferranti permanent-magnet moving-coil speaker incorporated.

If you are interested, Ferranti's will be delighted to supply you with further details without any obligation to purchase.





The new "Reflecto-Light" scale incorporated in the H.M.V. four-valve battery superhet, which has just been released, creates the illusion that it is illuminated from behind, whereas, in actual fact, and to save current, it is not illuminated at all.

Although this remarkable design is capable of providing an undistorted output of approximately  $1\frac{1}{2}$  watts, the average H.T. consumption on both local and distant stations is rarely in excess of 8 milliamperes.

Between 11 o'clock and five minutes past on the opening morning of the recent Manchester Radio Show, Ferranti's booked an order for over £4,000 worth of their new range of superhet receivers, representing something like 300 sets.

In consequence of this and other orders received during exhibition time, it has been necessary for them to take on 400 extra employees, bringing the total of their staff up to nearly 7,000, the highest it has ever been.

The Philips Full-Vision Micro-Index dial, which is incorporated in their Model 472, is provided with alternative interchangeable station-dial plates, one indicating practically every receivable station, the other showing just the ones that come in best.

The grid scheme for the electrification of the country is progressing so rapidly that during the last twelve months the percentage of homes wired has risen from 43.4 to 47.8, and that at this rate every home in the country will be on the mains by 1945 or 1946.

The price of the new Marconiphone Model Q286 has been incorrectly quoted in several quarters (not in "P.W.") as 21 guineas, whereas the correct price of this instrument is 22 guineas.

## HOME OF MARCONIPHONE



Some idea of the vast organisation which is behind the manufacture of Marconiphone products will be gained from this special aerial picture of their Hayes factory.

Longer and more convenient transmission hours for television are scheduled to commence almost immediately from B.B.C. stations, and that although the 30-line system is to continue for the time being, the increased broadcasting facilities are likely to do much to stimulate interest.

## THE ATLAS "7-5-8" CIRCUIT EXPLAINED

The Chief Engineer of H. Clarke & Co., Ltd., gives below a detailed description of the circuit employed in our Triple-Test set this week.

THE Atlas "7-5-8" receiver is a superhet and operates on alternating current mains only of 200/250 volts and 50/120 cycles. The receiver is coded "7-5-8," since 7 stands for the number of tuned circuits in the receiver, 5 for the number of valves and 8 for the number of functions these valves perform.

The seven tuned circuits are as follows:

1. Aerial coil.
2. Band-pass coil.

## A POPULAR TRIO



Burns and Allen, who are stated to be amongst the highest-paid American microphone artists, are here seen with the Atlas Model "7-5-8," which they used almost continuously during their visit to this country.

3. Oscillator coil.
4. Primary of first I.F. transformer.
5. Secondary of first I.F. transformer.
6. Primary of second I.F. transformer.
7. Secondary of second I.F. transformer.

The five valves are as follows:

### VALVE No. 1.

(Mullard F.C.4 Octode.) Performs two functions. This valve combines a triode and a variable- $\mu$  H.F. pentode in the one envelope, both these valves having a common cathode system, but separately screened from each other. The triode section functions as an oscillator, and the H.F. pentode section functions as a first detector, the "mixing" being done internally.

### VALVE No. 2.

(Mullard V.P.4.) A variable- $\mu$  H.F. pentode. This valve performs one function only—namely, amplification at intermediate frequency.

### VALVE No. 3.

(Mullard T.D.D.4.) A double-diode triode; performs three functions—namely, signal rectification, first L.F. amplification, and diode rectification for automatic volume control on the first two valves.

### VALVE No. 4.

(Mullard A.C.O.4.) A directly-heated triode and provides the power-output amplification. This valve is resistance-capacity coupled to the preceding valve.

### VALVE No. 5.

(Mullard I.W.3.) An indirectly-heated full-wave rectifier.

### The Coupling Arrangements.

The band-pass coupling is inductive and separate windings are employed for medium and long-wave bands in order that the correct peak separation of 9 kilocycles may be obtained on both wavebands. The intermediate-frequency transformers have both primary and secondary windings tuned to the intermediate frequency, which is  $117\frac{1}{2}$  kc.

These windings are critically coupled for maximum gain. With critical coupling the resonance curve is double humped, and by connecting the delay diode to the primary winding of the second I.F. transformer the sideband shriek is partially eliminated when a powerful station is not correctly tuned in.

An electrostatic winding is included on the mains transformer, and this winding also functions as the dial-lighting winding.

## "... BASS RESPONSE UNUSUALLY GOOD"

says "P.W.'s" Music Critic in his observations concerning the quality merits of the Atlas "7-5-8."

As a non-technical listener and a musician, the reproduction that a wireless receiver will give is of far greater interest to me than the powers the set may possess to bring a large number of stations to the fireside of its owner.

Thus, when I am invited each week to listen to the various receivers that POPULAR WIRELESS is testing, I am constantly on the look-out during the tests for any faults in the quality of the reproduction.

The latest set to which I have listened is the Atlas "7-5-8," and elsewhere you will be reading of its technical prowess and the ease with which it receives programme after programme. I can but give my opinion on the manner with which it dealt with the various items I heard from the two London stations and the records I listened to by means of a pick-up.

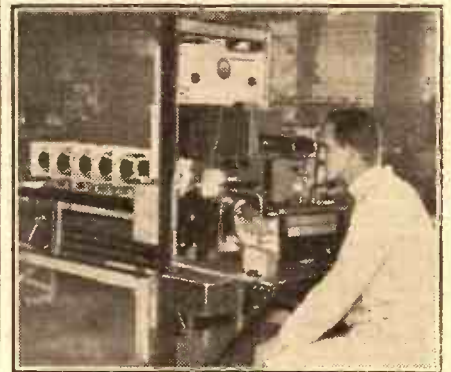
I may say here that during these tests I am using the same pick-up so as to give each set the same start, while largely the same records are tried so that I may compare and contrast the results.

The Atlas "7-5-8" has a general tone that I find extremely satisfying. The high notes are sufficiently brilliant and clear cut, yet they are not hard. This I am given to understand is due to the output valve used. Bass is unusually good and, too, is clean cut.

The result is a very well-balanced response, and music and speech are most enjoyable. I tried some very "heavy" records, such as the Philadelphia Symphony Orchestra recording of Liszt's Hungarian Rhapsody No. 2, and the way the set dealt with them was most gratifying. As a musical instrument I place the set very high.

One more word: I particularly liked the middle musical register as reproduced by the

## TELL-TALE TESTING



The chassis of all H.M.V. receivers and radio-gramophones have to undergo amazingly intricate testing on this cathode-ray oscillograph apparatus, one of many such devices in the factories of "His Master's Voice" for ensuring absolutely trouble-free radio.

"7-5-8," a remark that I cannot always make even regarding some more elaborate receivers.

And, talking about that middle register, I must say that I think many of the manufacturers will do well to consider that part of the musical scale a little more when designing their sets.



# TECHNICAL TESTS

## NUMBER THREE

### THE CLARKE'S ATLAS MODEL "7-5-8" RECEIVER

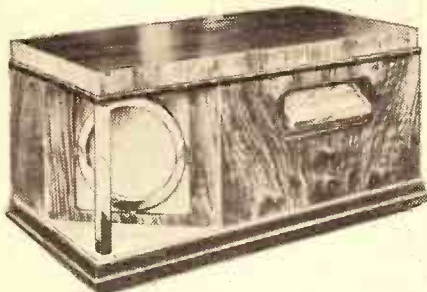
IT is not always circuit originality which makes the best commercial receivers.

From many points of view there is a lot to be said in favour of the adoption of time-tested arrangements which have proved their merits in so far as efficiency and reliability are concerned.

That is because, where receivers are being made by mass-production methods, the possibility of any sort of "teething troubles" cannot be entertained for one moment. "Bulk reliability," to use a somewhat clumsy term, counts for everything, and the reputation of any commercially-made receiver depends not upon the originality of the circuit it uses, but upon the way in which it serves the listeners who buy it.

#### Designed to Give Lasting Satisfaction.

That is one of the reasons why the Clarke's Atlas Model "7-5-8" receiver is proving so very popular. When you rob it of all its refinements it is a more or less orthodox superhet circuit of known performance; but it can at least be relied upon to give lasting satisfaction under the widely differing conditions in which it is likely to be used.



The general arrangement and finished appearance of the Atlas "7-5-8" represent a complete breakaway from convention—an achievement upon which the makers are deserving of congratulation.

But do not misunderstand us. The fact that we have referred to the "7-5-8" circuit as being an orthodox arrangement should not be taken to imply that it is in any sense an old-fashioned arrangement, for that would be very far from the truth. Despite the fact that there is nothing strikingly original about it, it is definitely a modern circuit, and one that is capable in every way of meeting present-day requirements.

The same basic circuit is employed in well over half of the modern commercial superhets, and one does not have to stop and think about it to realise that there must be a very good reason for this widespread popularity. There is. It is simply because it provides that essential combination of reliability and efficiency which is so necessary for the mass-produced instrument.

#### The Circuit Employed.

Considered from the point of view of number of valves and not stages (a very different thing), the "Atlas 7-5-8" employs four, excluding rectifier. There is an Octode frequency changer (or "mixer"), which combines the functions of oscillator and first detector, a variable- $\mu$  H.F. pentode for intermediate-frequency amplification, a double-diode triode which fulfils three important functions, and a directly-heated triode output.

The Octode consists of an ordinary triode section (oscillator) and an H.F. pentode section (first detector) in the one envelope. An inductively coupled band-pass filter precedes this frequency-changing valve and ensures a high degree of selectivity.

The double-diode triode has three separate sections in the one envelope, and it carries out the functions of second detector, first L.F. amplifier and diode rectifier for the automatic control of volume on the first two stages.

#### TECHNICAL SPECIFICATION

**GENERAL DESCRIPTION.**—Five-valve (including rectifier) superhet table model for operation on A.C. mains, 200-250 volts, 40-120 cycles.

**CIRCUIT ARRANGEMENT.**—Fundamentally the circuit follows the orthodox arrangement for four-valve mains superhets. There is an Octode "mixer" combining the functions of first detector and oscillator, a variable- $\mu$  H.F. pentode for intermediate-frequency amplification, a double-diode triode which carries out the three functions of signal rectification (2nd detector), first L.F. amplification and rectification for automatic volume control of first two valves, and finally a directly-heated triode output. The rectifier is of the indirectly-heated full-wave type.

**CONTROLS.**—Four in number, consisting of (1) main tuning (bottom centre knob); (2) tone control (top centre); combined volume control and on-off switch (left-hand knob) and wavechange switch.

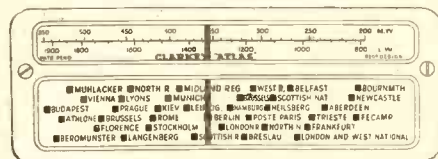
**SPECIAL FEATURES.**—(1) Tilting dial and "Spectrum" tuning. Note.—This feature enables the dial to be tilted to any angle to suit the position of the operator, while the "Spectrum" scheme provides illuminated colour differentiation between medium and long-wave scales. (2) Unconventional cabinet appearance. (3) Generous hire-purchase terms.

**MAKERS.**—H. Clarke & Co. (M.C.) Ltd., Atlas Works, George Street, Patricroft, Manchester.

**CASH PRICE AND HIRE-PURCHASE TERMS.**—14 guineas, or 32s. 6d. deposit and 12 monthly payments of 25s.

There is a series-stopper resistance in the grid lead to the output triode, and unwanted H.F. is filtered through a single condenser which by-passes it across the diode resistor.

In the first of our practical tests of this instrument, the test which is conducted without synthetic transmitter, the "7-5-8" gave a very good account of itself.



Some idea of the ease with which distant stations can be identified on the "7-5-8" will be gathered from this drawing of the "Spectrum" dial as it appears on the medium waveband. As the tuning dial is rotated the indicating line moves sideways over both station names and wavelength.

In the most exacting test of all, where we adjust the wavelength of our modulated oscillator to the channel adjacent to that of the London Regional station and arrange for it to

provide a received field strength of slightly under 1½ volts (the strength of the London Regional station without particular aerial arrangements), it was not found possible to separate the two transmissions.

But, frankly, we did not expect to. Our standards for the particular type of set require complete separation when the synthetic transmitter on the adjacent channel is adjusted to provide a received field strength slightly in excess of that of Strasbourg under conditions of darkness. Even that is a more exacting test than would ever be encountered under average reception conditions, and it speaks well of the "7-5-8" that it was equal to the task. It was actually possible to obtain complete separation.

#### Exceptionally Good Selectivity.

The overall gain from the set appears to be slightly above the average, if anything, and thus, in our aerial tests which followed, it was not surprising to find that a representative selection of real "programme-value" stations could be received when using an aerial of small dimensions. Selectivity, of course, under these conditions, was exceptionally good.

In our later tests with a much larger aerial, an aerial the characteristics of which are definitely above the average, there seemed to be



This "behind-the-scenes" view shows how, by the skilful introduction of screening, the manufacturers have succeeded in combining compactness with efficiency.

no limit to the number of distant stations that could be received, and all of them at excellent strength. The 36 which are actually marked by name on the medium waveband represent a very modest indication of the capabilities of the set, for we found it easily possible to receive not far short of twice this number.

Selectivity with the larger aerial was still very good, and there were few stations that had to be missed through "side splash" from adjacent ones. That, of course, is not taking into account heterodyned stations, of which there are still quite a few.

On long waves the performance was up to expectations. Sensitivity was excellent; and although there was just a slight trace of interference on Deutschlandsender from Droitwich and Radio Paris, the interference was not so pronounced as on similar sets that we have tried.

#### Excellent Quality.

Dealing with the quality aspect of the "7-5-8," it is a welcome relief from what has come to be almost standard practice these days to find the use of a super-power triode in the output stage. Everybody these days seems to favour a pentode in the output stage, and in many cases it certainly has its advantages. But so, for that matter, has the good old triode.

The trained ear can detect in the reproduction of the "7-5-8" slightly more natural  
(Continued on next page.)



## THE MAN-IN-THE-STREET TEST No. 3.

## AN "OLD HAND" TESTS THE "7-5-8"

This week "P.W.'s" chance-chosen critic of modern radio proves to be an expert who handled Britain's radio service to America during the war.

**A** FORTNIGHT ago we had a cinema commissionaire's opinion; last week, a postman's. Who, I wondered, would be "P.W.'s" visitor *this* week.

The set chosen for test was the new Atlas A.C. receiver, Model "7-5-8," and, as before, our chance-chosen critic was to have freedom to say precisely what he thought about it.

Punctually to time a Morris Minor drew up outside, and we heard a strange voice laughingly describing the joys of wet-night driving on strange roads.

The introductions took only one minute, and the visitor proved to be Mr. E. J. Elphick, of 12, Hawkhurst Way, West Wickham. "I ought to make a pretty severe wireless critic," he told me, "because during the war I was operating on the transatlantic wireless service from Ireland to Newfoundland. And when you've been in charge of a high-power war-time wireless link across the Atlantic you naturally never lose interest in radio."

## Checking the Tone.

Mr. Elphick explained that after leaving the R.N.V.R. he had joined a City bank and was not now connected professionally with wireless in any way. And then, without further preliminary, we got down to business.

His explanation had prepared us for expert handling of the receiver, and, sure enough, he put the set through its paces with the experienced touch that only years of wireless training can give. Quite obviously, if there were a weak spot to be discovered he would find it!

From my point of view—that of the interviewer—he was almost too expert, for, being completely master of his subject, he said very, very little. I can explain this best, perhaps, by describing his interest in the volume control.

He took hold of it and jerked the control knob from "High" to "Low," from "Low" to "Medium," and from "Medium" to "High," time after time, without comment, listening keenly to the London Regional announcer's speech.

Then, starting at "Low," he very slowly rotated it up to "High," still attending very critically to the speech characteristics.

Then he readjusted tuning by the tiniest fraction, and repeated the whole process, listening very, very carefully. But he said never a word!

"All right?" I queried.

"Oh, quite!" he replied. "You know, I simply cannot bear a set that makes its 's's' sound like 'f's,' and slurs or omits its final consonants. But this is clear enough, isn't it?"

## Very Good Value for Money.

The words "His father" and "At once" happened to be coming over, and Mr. Elphick pointed out how the adjoining "s" (of "his") and "f" (of "father") were clearly distinguishable, and how the "t" and "c" sounds of "at once" were easily differentiated.

This question of tone control was typical of the thoroughness and expertness of his criticism. He went all over the set meticulously, and summed up his impressions in a few words:

"Fourteen guineas, eh? And you've got to remember it's in a fine walnut cabinet, and that obliquely placed loudspeaker gives it a distinctive touch. Moreover, it's got power in hand—I do like a set capable of more punch than you normally use for domestic listening.

"Then there's that Spectrum-tuning idea—

extremely clever and effective. Dead accurate, too.

"And then there's this differential dial lighting—red for long waves and green for medium (I suppose it's colour filtering, but it's darned ingenious). By taking all the sting out of tuning, that's a feature of remarkable—*Whatever's that?*"

He broke off, looking at the set accusingly, though I had not noticed anything amiss! Holding up his hand, he enjoined a long silence till "that" occurred again—it proved to be a faint "zzzzzzzzee" on a very loud passage of music.

## Nothing Was Overlooked.

"Oh! It's nothing wrong," he finally pronounced, "except perhaps a nut working loose on the back or inside. But for a moment I thought she was distorting."

This little incident will show again the exacting nature of the test which the Atlas receiver was undergoing. And it speaks volumes for it that this trivial incident of the loose nut was the only blot on its performance.

"I've enjoyed looking it over immensely," our visitor said on leaving. "I specially con-

## OUR CHANCE-CHOSEN CRITIC



Mr. E. J. Elphick, of West Wickham, who was chosen at random to conduct our "Man-in-the-Street" test this week, turned out to be a war-time expert on radio matters. He was particularly impressed with the "Spectrum" tuning idea, which he is here seen examining minutely.

## WHAT IS VISION TUNING?

VISION tuning is one of the leading features of modern radio sets. On some a needle moves to a certain position to indicate that the set is exactly in tune to the station, and in others there is a column of light which provides the indication.

Many listeners may wonder whether such schemes have any real usefulness, or whether, on the other hand, they are merely in the nature of spectacular refinements having little else but an appeal to the novelty complexes of purchasers.

Actually there are sound technical merits in these vision-tuning indicators, particularly where certain types of sets are concerned. For instance, superheterodynes—which are so popular this year—and especially all those fitted with automatic volume control.

Automatic volume control levels the volume of all programmes—at least, all those which, without this control, would be heard loudly when tuned in correctly.

This makes it impossible to tune by the ear alone exactly to the point where a station comes in with greatest strength.

It is difficult, if not impossible, to do this in the ordinary way, let alone when A.V.C. is there to standardise maximum volume levels. And yet, if

gratulate them on that easy tuning—it's great for a set that has so many programmes up its sleeve.

"I think that feature, the nice tone control, and the general convenience of the whole set (that tilting dial and so on) make it a thoroughly interesting receiver.

"Although I am such an old hand at the radio game, it has certainly given me a really enjoyable evening's entertainment."

Which remark, coming whence it did, was a fine compliment for the "Atlas 7-5-8."

P. R. B.

## TECHNICAL TESTS.

## THE CLARKE'S ATLAS MODEL "7-5-8" RECEIVER

(Continued from previous page.)

bass than is usual for the type of set, and there is a welcome freedom from the pronounced "swishiness" which is so often common to superhets. The top is there, and with the tone control it can be accentuated if desired, but it is not overdone. These are facts which are due, in some measure, to the use of the triode output valve, and they are facts which, like the other attractive features of the "7-5-8," will influence the discriminating purchaser.

There are two other contributory factors to the excellent quality of reproduction which this set is capable of giving. In the first case the designers, by connecting the delay diode to the primary winding of the second I.F. transformer, have partially overcome the sideband "shriek" which often results when a powerful station is not tuned in correctly.

## The L.F. Coupling.

The other—and in our opinion, important—point is that resistance-capacity low-frequency coupling has been employed instead of the more orthodox transformer; and if the quality of reproduction given by this set may be taken as a criterion, the use of R.C.C. would certainly seem to have its advantages in a set of this particular type.

All told, the "Atlas 7-5-8" with its undistorted output maximum of 2½ watts, is a worthy contribution to the outstanding sets of the season.

such a set is not tuned in with dead accuracy, there is bound to be distortion.

All those who have handled superheterodyne sets will know that there is a kind of trough at the point of dead tuning of any station, and that either side of this there is a rushing background noise where the programme is heard only in a somewhat mangled form.

The noise lying outside tuning points can be suppressed, but the distortion of a programme cannot be removed except by shifting the tuning dial until you lie right in the centre of the trough.

Perhaps you think that, although your ear might not be able to tell you when there is the greatest loudness, it ought at least to be able to detect the

distortion, and in that way enable you to find the best tuning position.

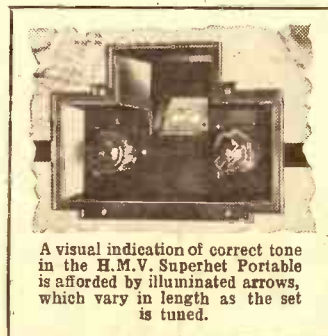
But this is not so, for the simple reason that the received speech or music is a varying quantity, changing in character and composition all the time.

Its strength changes, and more importantly, its tonal structure fluctuates unceasingly.

Without going into the deeper technicalities of the subject it is sufficient to say that your aural adjustment might prove suitable for everything that came through during the actual period of adjustment and yet be proved quite painfully noticeable by later

passages to be an inaccurate one.

Vision tuning prevents that. It ensures a correct initial tuning adjustment which will and must remain the one and only accurate setting for all types of programme material heard.



A visual indication of correct tone in the H.M.V. Superhet Portable is afforded by illuminated arrows, which vary in length as the set is tuned.



**THIS SEAL...AND WHAT IT MEANS**



**TO YOU!**



*T*HE production of Telsen Radio Components calls for an elaborate technique and a high degree of mechanical and electrical precision. Material is controlled at all stages for quality and accuracy of dimension. The inspection reference gauges themselves are correct to the hundred-thousandth part of an inch.

Some indication of the electrical accuracy required is shown by the fact that one type of instrument alone, which is used in actual Telsen workshop tests, records current changes of less than one hundredth of one millionth part of an ampere. It is only by the exercise of such exacting tests that Telsen components give such high efficiency and lasting performance.

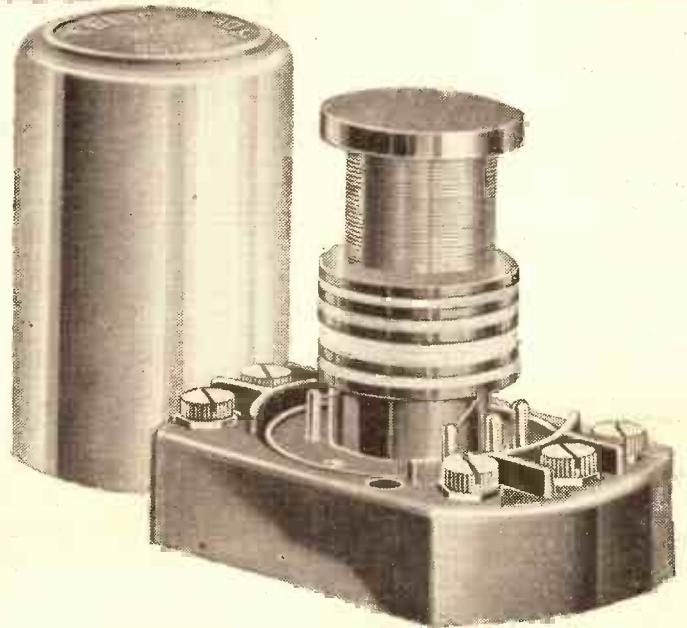
THEREFORE ALWAYS INSIST ON

**TELSEN**  
*Triple Tested*  
**GUARANTEED COMPONENTS**

*Permanent efficiency*

with Matched Performance is assured with all Telsen Components—for example, in the case of Dual Range Coils, these after winding are first tested for "Insulation" and "Continuity." The coils are then fitted with "Iron Cores, these having been previously tested for "Permeability"; the completed coils are then measured for "Inductance."

They are then graded into "Standard," "plus ½%" and minus ½%." Coils from these three grades are made up into twin or triple matched units providing "Inductances" which have been matched to within ½%, thus ensuring absolute accuracy for ganging purposes when Telsen coils are built into a modern receiver.



**TELSEN "349" IRON CORED SCREENED COILS**

The result of extensive research, these coils employ an iron dust core which has enabled their size to be greatly reduced without sacrifice of efficiency. Consequently they take the fullest advantage of all the benefits that the "Iron Cored" principle provides.

Single Screened Iron Cored Coil, 8/6. Twin Matched, 17/-. Triple Matched, 25/6.



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



EDITED BY JACK PAYNE

# POPULAR MUSIC AND DANCING WEEKLY

# 3<sup>d</sup>

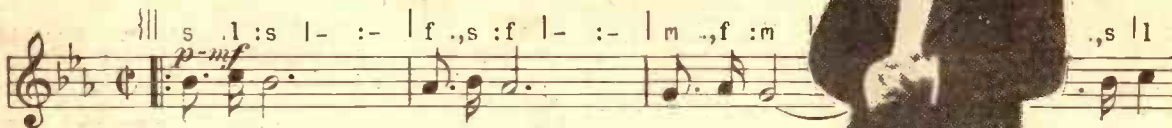
**No. 1** *On Sale*  
*Thursday, Oct. 11th*  
*Subsequent Issues Every Thursday*

All those famous radio hits you enjoy so much will appear in this great new weekly. No. 1 will contain all these popular numbers:

FULL MUSIC  
SIZE  
PRINTED ON  
GOOD PAPER

6 COMPLETE SONG & DANCE HITS in each issue

## EASY COME, EASY GO



## LADY OF MADRID



## THE SHOW IS OVER



## ALOHA BELOVED



## ICICLE JOE, THE ESKIMO,

and

## JOSEPHINE

All the most popular song and dance numbers of the day, selected for you by Britain's most popular band leader, will appear in this great new publication which, at 3d. a copy, represents the most amazing music value ever offered to the public.

The only SURE way to secure a copy each week is to give your newsagent or bookstall clerk a regular order: the demand will be enormous.

On sale at all Newsagents and Bookstalls in the United Kingdom and the Irish Free State.

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Other  
BIG HITS to appear  
in POPULAR MUSIC  
and Dancing Weekly

- UNLESS
- BELOVED
- MELODY IN SPRING
- YOU HAVE TAKEN MY HEART
- LOVE THY NEIGHBOUR
- MISTER MAGICIAN
- LOLLYPOP MAJOR
- COOM PRETTY ONE
- THE BEST O' MY HEART
- SILLY GIRL

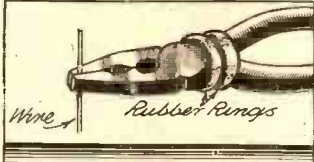


# RECOMMENDED WRINKLES



## SPRING PLIERS.

TWO rubber rings from mineral-water bottles will make a pair of pliers a very useful tool in many ways if the bands are placed as shown in drawing. The pliers will hold for themselves anything that may be required to be held without any further assistance in such jobs as soldering

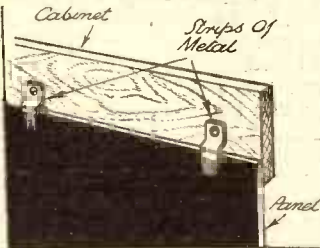


The rubber rings are taken from mineral-water bottles.

small tabs to wires, which in the ordinary way would be too small or would get too hot to hold, the idea principally being that it enables the pliers to act as a small vice, leaving the hands free for any other purpose. Additional pressure can be applied to the nose of the pliers if rubber bands are put higher up the handle.

## HOLDING PANELS FIRM.

OFTEN panels are loose and are liable to push inwards when operating stiff push-pull switches. In order to overcome this, fix small strips of metal to the cabinet above the panel, as in sketch. The strips are so bent as to hold the panel firmly.

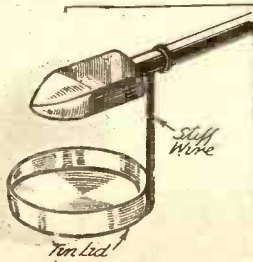


Small metal clips hold the top of the panel in place.

This idea is particularly useful when the whole set is loose in the cabinet, since it prevents the set from sliding about the cabinet, while the set can easily be taken out by just pushing the strips to one side.

## A SOLDERING HINT.

WHEN soldering is carried out in some difficult or dark part of the set, more often than not some molten solder will drop clear at the intended connection and probably ruin a component or short-circuit two



When soldering in awkward places the metal lid catches any solder that drops.

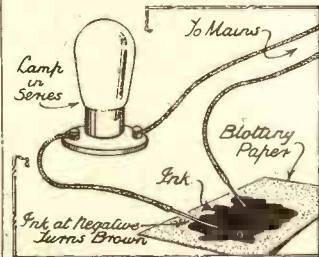
wires. To avoid this probable catastrophe, a small tin with stiff wires is attached to the soldering iron, or to some convenient spot, so that it hangs directly beneath the two wires to be soldered.

## POLARITY TESTS.

THIS simple indicator is very easily prepared at any time, and it shows unmistakably the polarity of wires, etc.

A piece of blotting paper is soaked in ordinary blue ink and the ends of the wires applied to it. The ink around the negative lead will turn light brown in colour.

The blotting paper should not be too damp, otherwise excessive current will flow. The leads should also be held 2 to 3 inches apart and gradually brought nearer until the change of colour is noticed.



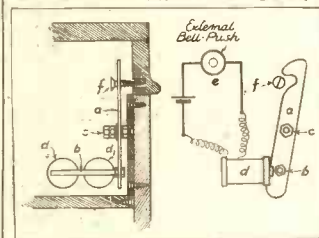
Blotting paper and fresh ink are all that are needed for this test.

It is, of course, essential when testing mains in this way to insert a lamp in one of the leads to avoid a short circuit. The distance apart of the leads should be varied in direct proportion to the voltage.

## THE SECRET LOCK.

HERE are details for the construction of a secretly operated electric lock for a radiogram type of wireless cabinet:

The "mechanism," which is mounted on a light bracket screwed inside the front of the cabinet, consists of a piece of strip brass (a) about 2 1/2 in. long (which acts as an automatic catch when the cabinet lid is closed), a pair of bell coils (d), a 6 B.A. steel bolt 1 1/2 in. long (b), a metal screw, nuts and spacing washers (e), and a bell push (c).



A detailed diagram showing how the catch works.

Holes are drilled in the brass strip to take the metal screw pivot and the 6 B.A. steel bolt. By experiment I found it best to drill the former about 1 1/2 in. from the hook end and the second hole about 3/8 in. from the other end. When the catch lever is assembled and mounted on its pivot, the weight

of the steel bolt (b) is sufficient to bring the catch into a vertical position.

The bell coils should be mounted near enough to attract the steel bolt (b) when the bell push is operated, but not so close that the poles attract it of their own accord, as it moves towards them when the lid is being closed.

An ordinary wood screw (f) is driven about half-way into the inner face of the cabinet lid directly over the pivot (e). As the lid is lowered the catch is moved across by the shaped end engaging the underside of the screw (f), until the latter passes under the "nose" of the hook and into the slot. The catch is then in an upright position and the lid cannot be opened from outside by the uninitiated, the bell push operating behind the magnet coils being concealed behind the cabinet or elsewhere.

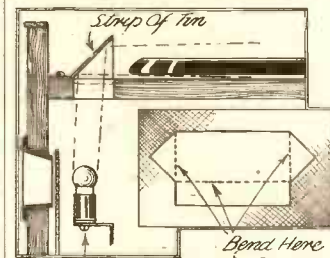
## ADJUSTING Q.P.P.

WHEN finding the best grid-bias voltage for Q.P.P. listen carefully to the "six pips" time signal.

If the note is clear-cut the system is correctly biased, but if it shows harmonic fringes the valves are over biased. This is an extremely sensitive test, and an amplifier which passes it is not likely to give trouble on normal reception.

## A DUAL-PURPOSE DIAL LIGHT.

BEING troubled by heavy current consumption caused by use of twin bulbs, one for radiogram table and the other for dial light, I eliminated



The tin reflects the light on to the turntable.

the sensitivity of one by means of the easily made reflector illustrated. One light does for both purposes, the piece of tin on motor-board reflecting the light from dial bulb through hole cut in motor-board.

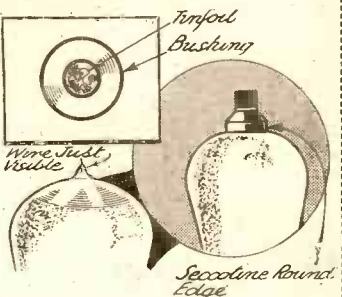
## REPAIRING VALVE CONNECTIONS.

SOME while ago I had the misfortune to have the busting of a screened-grid valve come off. Investigation showed that the wire connecting the busting terminal to the anode of the valve had broken close to the glass.

Soldering being out of the question, I repaired the valve in the following manner:

With a sharp-pointed instrument I picked away the glass around the wire, enough to leave it just visible above the surface of the glass. Then I filled the

bushing with tinfoil and pressed it in tightly round the wire.

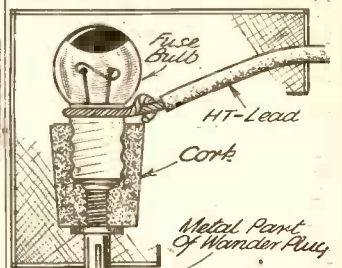


A simple but sound repair is easily made in this manner.

I then stuck the busting on the valve by means of Seecotine. The wire made a perfect electrical connection with the tinfoil.

## A HANDY WANDER-PLUG FUSE.

ALL that is required for this useful gadget is a cork bored at each end, a wander-plug and a fuse bulb.



Quite inexpensive to make.

bulb into the other end, so that the bottom contact on the bulb touches the wander-plug and a fuse bulb from the set is then soldered or twisted round the fuse bulb as shown.

## DRILLING ALUMINIUM.

DIFFICULTY is often experienced in drilling and cutting aluminium sheet, as used for baseboards, etc. Owing to the softness of the metal, it generally sticks to the drills and saws, which produces jagged edges. I find that this is prevented by placing the aluminium between two pieces of ply-



Rough edges are avoided in this way.

wood and using one side of one piece as a template. If the whole is clamped down to the bench it can be cut and drilled with ease, and the metal will not buckle or jag.

## ONE GUINEA FOR THE BEST WRINKLE!

Readers are invited to send a short description, with sketch, of any original and practical radio idea. Each week £1 is. will be paid for the best Wrinkle from a reader, and others published will be paid for at our usual rates.

Each hint must be on a separate piece of paper, written on one side of the page. Address your hints to the Technical Editor, "Popular Wireless," Tallis House, Tallis Street, E.C.4, marking the envelope "Recommended Wrinkles."

Will readers please note that the Editor cannot, in any circumstances, guarantee to return rejected Wrinkles, and that payment for published hints is not made until ten days after they appear?

The best Wrinkle in last week's issue was sent by Mr. W. M. Pannell, 245, Mill Road, Cambridge, to whom a guinea has been awarded.



# THAT QUALITY PROBLEM

By P. P. ECKERSLEY

Our famous contributor has recently been attempting to obtain perfect quality on the local station, and has some interesting remarks to make in consequence of his experiments.

I HAVE lately been working on an attempt to get the very best quality possible from local-station broadcasting. Several things have struck me.

First, the great variability in transmission level; second, the variability of actual quality; third, the extraordinarily good performance you can get out of an ordinary cheap moving-coil loudspeaker; fourth, the impossibility of getting a selective as well as a flat response using ordinary tuned-circuit technique; fifth, the futility of the wavelength plan; sixth, the trickiness and difficulty introduced on every cycle of "top" added to the reproduced spectrum.

## It is Insoluble.

The B.B.C., like all other broadcasting organisations, has a problem which is insoluble, and which lies at the root of proper musical broadcasting and reproduction. When an orchestra plays a tune it plays now loud, now soft, now medium. The contrast between the greatest fortissimo to the faintest pianissimo is one hundred million to one in power, i.e. ten thousand to one in pressure, or 80 db.

Now, if the B.B.C. were to transmit at medium modulations at 40 db. less than maximum and only modulated to the maximum during the fortissimos in an orchestral piece, and went down to 80 db. below that fortissimo during the softest passages, a whole lot of people would complain.

Because, if your set was sensitive enough to catch that pianissimo—80 db. down—it would, unless it were a few yards away from the sending station, pick up all the electrical noises we know so well. Moreover, if the modulation was so weak as that, the slightest land-line noises connecting transmitter and studio would become audible above the music.

## Tremendous Technical Difficulties.

Even suppose these difficulties were overcome by the use of super-power and silent valves and silent microphones and silent land lines, then, if your set was sensitive enough to hear this piano-pianissimo, it would have to be powerful enough to reproduce the fortissimo-fortissimo. That is to say, the loudspeaker coil would, if energised by one-thousandth of a volt for the pianissimo, have to receive ten volts on the fortissimo and take a power of forty or fifty watts in the output tubes to do it.

There is, furthermore, the point that if the transmitter was only modulated to the full during a fortissimo in the Queen's Hall once a week, all the other sounds would be interfered with by noises, because modulation on these feeble sounds (voices, etc.) would be relatively weak.

On the other hand, if you had this super-set to do justice to the fortissimo, and if the B.B.C. brought up voice modulation to the

same level as average fortissimo music, the announcer's voice would blow you out of the house.

It's all a question of compromise. Usually it happens that the voice is too loud and the music too thin. But my criticism of the B.B.C., listening as I have morning, noon and night for four days to one of the Regional stations, is that there is no sort of consistency.

It is largely due to the fact that there is

## RADIO AND BUDDHISM



The Panchen Lama, one of the two supreme pontiffs of the Buddhist faith, speaking into a Philips public-address microphone at Shanghai on the occasion of one of his rare visits.

still, I believe, some hesitation about policy in the matter of "balance and control." The too-long-haired people make

## A STRAIGHT-LINE DIAL

Details of an interesting constructor component.

THERE are several alternative dial principles from which the constructor can choose. There is first the ordinary circular dial, and this might have the readings running half-way round it or all round it.

In this simple conception the dial and its readings are rotated past a fixed indicating point.

There are even alternatives in the application of the circular-dial idea. For example, the dial and its scale can either be in full view or hidden, except for a few readings which are revealed through an aperture.

And then there is that type of dial in which the scale remains stationary and the indicator moves around or along it.

The tendency to-day is for this type of design to be more popular than others, and when it is combined with a "straight-line" layout, as in the Utility Straight-Line Dial, it must be admitted that it has very strong attractions.

There are obvious advantages in having the whole of the scale visible, and it is a logical arrangement which makes for easy readings to have a straight indicating needle moving along a straight scale.

These are not simple principles to apply in practice, and great credit is due to Messrs. Wilkins and Wright, Ltd., of Holyhead Road, Birmingham, for the ingenious and entirely satisfactory manner in which they have managed to achieve the movement in a construction free from mechanical complication.

The whole structure of their Utility Straight-Line

much of their crescendos; their "pianos" are, however, lost in hiss and atmospheric. The too-practical people keep the level up and miss all light and shade.

Testing quality, and having no interest in the daily grind of music, I prefer the people who just let it rip, and that's why jazz is so grand for all purposes—practical and aesthetic.

I heard a programme of a famous band (no, not Mr. Hall's band) from the local studio, and nothing could have been better in quality, presentation, light and shade, except that for ten minutes someone forgot, after fading in, to turn it up full again.

Outside broadcasts have terrible quality sometimes. There is a marked contrast, when your receiver is capable of judging it, between local-studio and distant-studio broadcasting. During the day the station I listened to always seemed to be relaying somewhere else. At night it did the same.

I did have a real receiver. It was dead flat up to 8,000 cycles. It had been measured and titivated and stroked and flattered, and it was a true judge. It told me a lot of things. It told me, incidentally, why so many people are not quite so keen on wireless listening as they might be. Those long, dreary tunes—perump, perump, pom-pom-pom—those sickly, namby-pamby voices, that so nice and gentle... But this is a technical article, and I... Perhaps you like "the programmes."

## The Output Valves.

But the receiver told me that we could all get excellent quality on perfectly reasonably priced sets if there could be found ways and means to reproduce the full spectrum. Oh, and there was another thing!—once you reproduce the full spectrum you must use triodes as the power-output tubes.

Very efficient pentodes—very harmonic pentodes—very powerful pentodes—and ever so commercial; they can hear all the mush when the B.B.C. is being artistic and "rich in overtones" (i.e. full of harmonics), when it's being all gay and fortissimo. If I were designing a commercial receiver I should certainly use pentodes.

Dial is very robust, and its action is positive and free from any looseness or wobble of any kind.

The needle is carried on a steel tape, and it moves steadily and gives precise readings. The action of the drive, with its convenient 12-1 ratio, is equally efficient. It is smooth and there can be no slip.

The dial costs only 6s. 6d., and it is supplied with either a two-colour scale marked in wavelengths and 0-100 degrees, or with a plain black scale marked only in 0-100 degrees. To utilise the wavelength markings it is, of course, necessary to employ certain Utility condensers and coils of 157 and 2,200 mhs. inductance.

The dial is fitted with an attractive escutcheon, and can be illuminated by means of a lamp fitting at the back.



A couple of Utility Straight-Line Dials, which are robust and are positive in action.

Utility are also making a Straight-Line Micro Dial which is designed on exactly the same lines as the other one, but it has the slow ratio of 150-1 in addition to the 12-1 ratio. This is an excellent dial for short-wave work, absolutely microscopic adjustments being possible with it.

The price of this one is 15s.



**“Yes, I’m fully charged  
Look at my indicator”**



I am the Exide “Indicator” Battery. When I say “Full” I *am* full—and that’s that. When my hand approaches “Empty” it is time to get me recharged—and that’s *that*. The point is that with me you always know where you stand. I put an end to uncertainty. I put an end to the risk of being let down by a run-down battery.

**PRICES WITH ‘INDICATORS’**

Type DTG-C 2 volt	20 a.h.	5/-
Type DFG-C 2 volt	45 a.h.	9/-
Type DXG-C 2 volt	58 a.h.	10/-
Type DMG-C 2 volt	70 a.h.	12/-
Type DHG-C 2 volt	100 a.h.	15/6

★ These prices do not apply to the Irish Free State.

**Exide**

**“INDICATOR” BATTERY**

For wireless H.T. get

**Drydex**

the Exide dry battery

Exide Batteries are obtainable in sizes to suit every set from Exide Service Stations and all reputable dealers. Exide Service Stations give service on every make of battery. ● EXIDE BATTERIES, Exide Works, Clifton Junction, near Manchester. Branches: London, Manchester, Birmingham, Bristol, Glasgow, Dublin, Belfast.

R. 70.

**‘STILL KEEPS GOING WHEN THE REST HAVE STOPPED’**



THE B.B.C. Empire short-wave service is now organised on twice the scale of a year ago and is costing proportionately more. I believe the salaries, artists, instrumentalists, engineering and other current charges amount to well over £70,000 a year, and will probably reach £100,000 in two years' time. It was thought, when the short-wave service was started, that the Dominions and Colonies would subscribe to it as soon as it was properly working. There is no sign of any such intention; nor is there likely to be in the new era of competition between the British and German short-wave services.

The B.B.C. simply must keep at the task of trying to maintain its place against the formidable rivalry of Berlin. The latter has one advantage which the B.B.C. could discount without expenditure. I mean the friendly personal touch in the programmes. The German announcers are real people to their listeners.

#### A New American Short-Waver.

Mr. William S. Paley, President of the Columbia Broadcasting System of America, permits me to make the first exclusive public announcement in Europe of his decision to erect forthwith a new high-power short-wave station to carry the Columbia transmissions right around the earth. The trouble with most American short-wave stations is their low power. This trouble Mr. Paley proposes to eliminate, his new transmitters carrying about 50 kw. in the aerials.

#### Dr. Boulton in America.

Dr. Adrian Boulton's acceptance of the invitation to conduct the Boston Symphony Orchestra for a fortnight in January is a tribute both to the B.B.C. Music Director and the B.B.C. I understand that this visit is likely to be followed by an offer to Dr. Boulton to go to America as guest conductor for two years.

While passing through New York on this visit Dr. Boulton will conduct specially for broadcasting, probably in one of the concert studios of Radio City. Whether he will accept the two years' visit offer will depend largely on the progress of the internal rearrangements of the B.B.C. designed to give music improved status.

#### A Problem Solved.

The B.B.C. has been having a lot of trouble in its efforts to build a passageway between the various adjoining buildings which have been added to its property in Portland Place. The first idea was to construct an underground tunnel. But this met with refusal from the L.C.C. The next idea was to bring a passageway across the roof to "B.H." This also proved impracticable.

Now permission has been secured to build a communicating way at the back, at about third-floor level, not interfering with the rights of other property owners or obscuring light where it is needed.

#### More Staff Wanted.

The completion of the staff of the Talks Branch by the appointment of about a

dozen new people has eased the situation at Broadcasting House. But more people are wanted. Unfortunately, the requirements are such as exclude nearly every eligible candidate. The B.B.C. expects "good family," public school, University, polish, brilliance, originality and experience all concentrated below the age of thirty, and then a starting salary of about £300. What hopes!



#### PERSONALITIES OF THE AIR (2).

Mr. S. P. B. Mais, whose talks have achieved such popularity with listeners. It will be remembered that he was sent out to America by the B.B.C. as "The Modern Columbus" to "rediscover" the country and tell listeners about it.

#### Sir Thomas on the Air.

Two broadcasts, under the conductorship of Sir Thomas Beecham, will be heard

"Rosiniana" (Rossini-Respighi). The concert on November 1st will include a performance by Jan Smeterlin, the famous Polish pianist.

#### Committee on Spoken English.

That most important adjunct of broadcasting, the Advisory Committee on Spoken English, has been reconstituted and enlarged from seven to twenty-three members.

Among the new members are:

Lady Cynthia Asquith.  
Hon. Maurice Baring  
Lord David Cecil.  
Dr. George Gordon.  
Professor H. C. K. Wyld.  
Messrs. Kenneth Clark.  
F. L. Lucas.  
P. H. B. Lyon.  
Edward Marsh.  
Harold Orton.  
S. K. Ratcliffe.  
I. A. Richards.

Representatives of literature will also be appointed. In the meantime, Dr. Gordon, who is president of Magdalen College, will represent the Royal Society of Literature.

Mr. Bernard Shaw will continue to act as chairman and Professor Lloyd James as honorary secretary.

Other members of the original committee are: Professor Lascelles Abercrombie, Sir Johnston Forbes-Robertson, Professor Daniel Jones and Mr. Logan Pearsall Smith.

#### Music in Scotland.

Eight concerts by the Reid and thirteen by the Scottish Orchestras are to be broadcast during the coming season. The first relay of the Reid Orchestra is fixed for Thursday, October 25th, when

Professor Donald Torey will be the solo pianist.

Ten of the Scottish Orchestra concerts will be taken from the St. Andrew's Hall, Glasgow, the remaining three coming from the Usher Hall, Edinburgh.

It is also hoped to relay concerts by the Scottish Orchestra from one or two provincial towns.

With an excellent supply of big concerts from London, Manchester, Birmingham and Belfast, in addition, music lovers (whoever they might be) are certainly "sitting pretty" for an absolute feast this winter.

#### "Owt Abaht Owt."

The officials responsible for the North Regional feature entitled "Owt Abaht Owt" are hoping to make some further microphone "discoveries" in the course of presenting the second volume of this broadcast magazine, commencing October 27th.

Miss Joan Littlewood, who won the B.B.C. prize for microphone technique, has recently found employment with the Manchester Repertory Company.

Despite her undoubted ability, Miss Littlewood, not so long ago found herself reduced to "tramping" for her living from London to Manchester.

She might still be doing so but for the opportunity to broadcast an account of her experiences in the last number. O.H.M.

## THE B.B.C. AND THE EMPIRE SERVICE

### NEWS AND VIEWS ABOUT BROADCASTING

by listeners on Thursdays, October 18th and November 1st respectively.

Both will be from concerts by the Royal Philharmonic Society at Queen's Hall, and the programme for the first will include the overture "Cockaigne" by Elgar, Incidental Music from "The Tempest" by Sibelius, Concerto No. 4 in G (Beethoven), played by Myra Hess and Orchestra, and Suite,

#### LISTEN TO THESE NEXT WEEK

PLAYS: "Measure for Measure," a Shakespearean play. The broadcast adaptation is by Barbara Burnham and the music has been composed by Herbert Menges. (National, Sunday, October 14th.)

"Wonder Bar," a musical play by André Charlot which proved very successful on the stage both in Berlin and London, and also as a cinema screen show. (National, Monday, October 15th.)

VARIETY: A relay from the Pavilion Theatre, Liverpool. The following artists will take part: Billy Merrin and his Commanders, David Poole, Jim Jessiman, Henri Hilton, and Con and Syd Creole. (North Regional, Wednesday, October 17th.)

ORCHESTRAL: A concert by the Western Studio Orchestra, with Gladys Courtland (mezzo-soprano) as the vocalist. (Western Regional, Thursday, October 18th.)





# MEGACYCLE METHODS

The fact that a fixed condenser also possesses a certain amount of resistance and inductance is of small consequence on the ordinary broadcast wavelengths; but on 5 metres the circumstance is often responsible for the complete failure of what looked on paper like the "perfect" circuit.

By M. G. SCROGGIE, B.Sc., A.M.I.E.E.

"AND things are not what they seem." The poet who wrote that was probably a complete duffer at ultra-short-wave work and spoke more wisely than he knew. Taken to heart and to head, these words are not a mere poetic vision, but are of great practical help in getting down to business on this 5-metre work. For it is most definitely no use going by the label on the carton or even by the circuit diagram if you really want to know what a component *does* when the current is

capacitance. (Shall we stick to that form? Thank you!) And a resistor provides resistance where it is needed.

But when a stated amount of one of these is prescribed we can never get the stuff quite pure. It is always mixed with some of the other two.

### A Good Example.

Sometimes it is what analysts call a "chemical trace." A 2-mfd. smoothing condenser has some resistance and inductance, but these are so small in comparison as to be well-nigh negligible. In other cases we get something like a kidney pie, in which the title-role is so small a part as almost to go unobserved beneath a mass of foreign matter.

This is particularly true at the very short wavelengths, or very high frequencies, if you prefer it that way. Only whereas everybody knows what to expect when ordering a kidney pie, it may not be generally known how seldom we get what we expect in short-wave components.

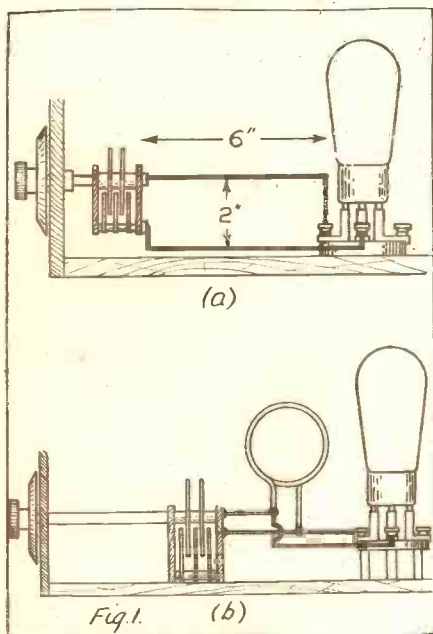
The result is that the complete set doesn't work according to plan, and all

sorts of effects take place which are so mysterious that the ordinary laws of electricity seem quite incapable of covering them.

The truth is that the laws are just the same; but our calculations may be upset through neglecting to take account of the fact that some of the condensers are really quite good inductances, but almost totally lacking in the attributes of capacitance.

Resistors often play the same trick. And the wiring, which is usually left out of

### SHORTENING LEADS



Because of the incidental inductance it possesses, an inch-long lead can, on 5 metres, behave like a resistance of 12 ohms, so every endeavour must be made to keep leads short.

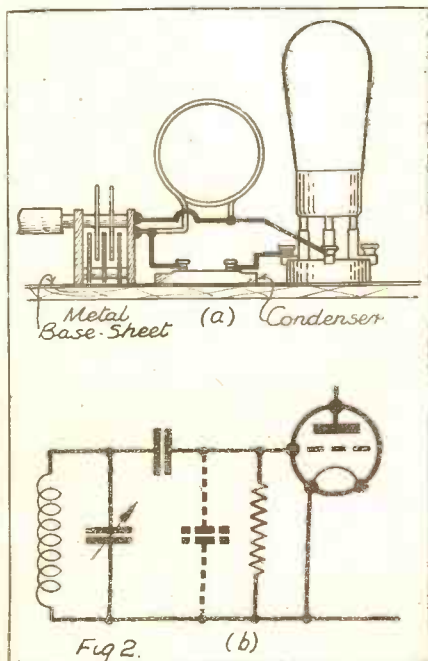
hustled to and fro in it 60,000,000 times every second.

Every receiver or transmitter is built up of a number of components, connected by wire to form circuits. Except for the valve, which is rather special, there are fundamentally three kinds of ways in which components can work—resistance, inductance and capacitance (that is the high-brow way of writing "capacity," to make it uniform with the others).

### Measured Doses.

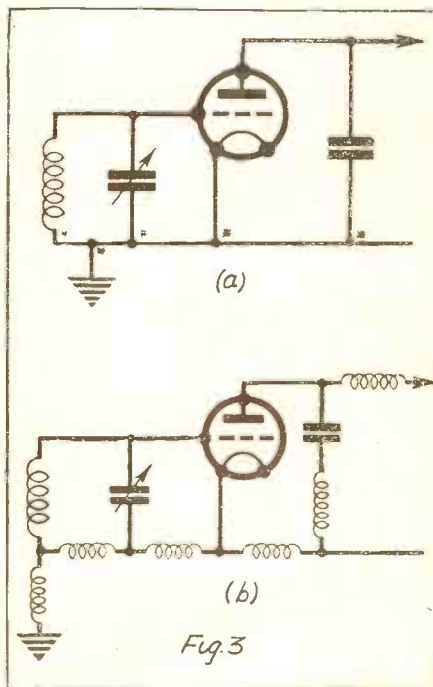
A coil is just a convenient way of putting a measured dose of inductance into the system. A condenser does the same for

### UNWANTED CAPACITY



By mounting a grid condenser flat on a metal base-board, the equivalent of connecting a fixed condenser across the tuning circuit is achieved, and the set may fail to "go down" to 5 metres.

### INTRODUCING INDUCTANCE



Connecting "earthing" points to a metal screen or long bus-bar with very high frequencies may make a circuit such as (a) really behave like the one shown at (b).

account when specifying microfarads and microhenries, is really the richest store of these properties, represented by the familiar symbols associated with components.

### Scattered Everywhere.

Our circuit, instead of being like a painter's colour store, with the three primary colours tidily located in little separate tubes or pots, becomes like the picture resulting therefrom; all three are everywhere and (Continued on next page.)



## MEGACYCLE METHODS

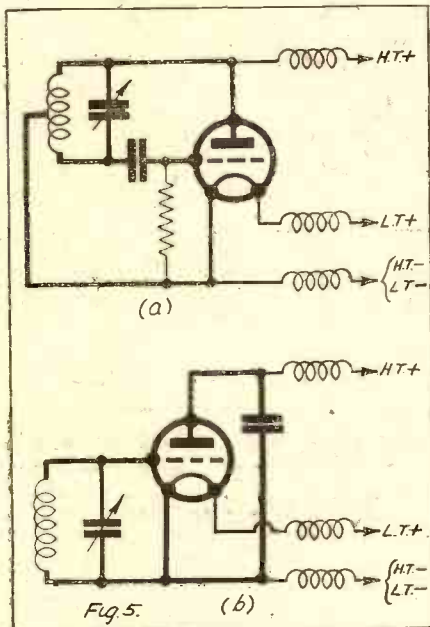
(Continued from previous page.)

a concentrated specimen of one of them nowhere.

It would give one a dizzy headache trying to draw a circuit diagram that really represented the effect of the set of components screwed down on the baseboard, and the wiring. But instead of being despondent about it, shall we try to sort them out a little?

After all, a clock that indicates noon when it strikes three, and the hands point to twenty-past seven may be confusing to the innocent stranger, but it is not wholly useless to the initiated. And if we know that when we want a certain amount of inductance we can get it by asking the

## CONFINING CURRENTS



The relatively lavish use of H.F. chokes is recommended in order to confine high-frequency currents to their proper circuits.

shopman for a certain size of condenser, then things will begin to become more understandable.

To make things more definite, where quantities are specified, they apply at .5 metres, or 60 megacycles per second. The same general rules hold, with slightly different figures, in all ultra-short-wave gear.

### Minimum Capacity

Let us consider first of all what is required to form a tuning circuit. The capacitance can be brought down to a minimum by using low-capacity valve holders (or none at all), very short leads and in other ways, but can hardly be less than about 20 m.mfd. with the tuning condenser at zero. Call it 28 to allow for a little tuning margin. The inductance must then be .25 m.h. If you indulge in a 6-inch lead, with the returns 2 inches away, you have used up all this allowance of inductance before ever starting to put in a coil!

You could reduce the inductance of the leads by bringing them closer together, it is true, but then the capacitance goes up and

frustrates you. The only thing to do is to avoid long leads (Fig. 1). Even an inch of wire represents a considerable proportion of the total inductance, and, quite apart from any resistance it may have, acts as an impedance of about 12 ohms.

### Save It for the Coil.

Some idea of the stray "uncouplable" inductance due to the wiring may be judged by noticing how much area is enclosed by the part of the tuning circuit that lies outside the coil. You can minimize it by arranging the leads to enclose the smallest possible area, so long as you don't go to extremes by putting the go-and-return too close together. About half an inch is quite a good distance.

By keeping the inductance of the leads down you can concentrate as much as possible of the .25 mh. allowance into the coil, and so get enough coupling to give oscillation when you want it. Then if you can bring down the stray capacitance, by carefully choosing condensers and valves and by avoiding too-close leads, you can use a greater inductance for tuning, and so get a higher voltage across the tuned circuit. One way in which a stray capacitance can unwittingly be inflated, to great disadvantage, is to have a grid condenser screwed down close to a screen (Fig. 2.)

One is very liable, ostrich-like, to bury one's head in the circuit diagram, and so to ignore this stray capacitance which may be the largest of the lot, though officially not present at all. (It has been shown dotted in Fig. 2 (b).)

### Very Misleading.

Another way in which a circuit diagram may be misleading is the matter of "earthing." By that is meant not the actual connection to earth, away from the set, but bringing the low-potential ends of components to the nearest "earthed" point, such as a screen. Fig. 3 (a) shows how a diagram may make one believe that, all the points marked with a star are brought to a common connection.

If, in wiring up, these components are connected to the nearest point on a metal screen, or on a long "bus-bar," the circuit diagram would have to be more like 3(b) to represent the facts of the case; and that is seen to be quite different from what is wanted. Almost anything might happen (and usually does!) in such a circuit.

Incidentally, pay special attention to the imaginary coil in the earth lead. It is hardly likely that you can manage to get all your components within an inch of a nice marshy piece of ground; and the operation of the set would be highly conducive to rheumatic fever or malaria, even if you could. In actual practice, therefore, the "earthed" parts of the set are only so in name, and not a bit so in reality.

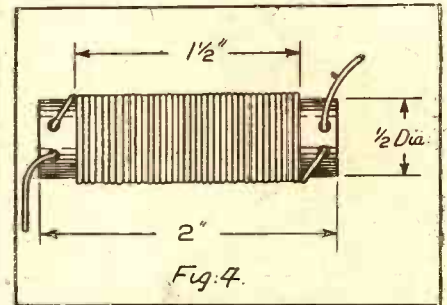
### Not Really Earthed.

Even what would ordinarily be a very satisfactory earth lead, only a few feet long, has more inductance than the rest of the H.F. circuits put together. How hopeless, then, is it to suppose that the set is earthed!

On the other hand, the L.F. parts—batteries, loudspeakers or 'phones, and their leads—form a large capacity earth, in the field of which you, dear reader, are moving uneasily about, trying to tune in.

What is to be done? The only thing is to give up all attempts to get a true earth anywhere in the set and to take great care

## TWO SORTS OF OHMS



Although the D.C. resistance of the choke is low, its "stopping value" on 5 metres is 3,000 ohms! It consists of 40 turns of 22 D.S.C. wire.

to confine the H.F. to those parts of the circuit strictly set apart for it. An excellent H.F.-tight bulkhead, and one that can be made low enough in resistance to interpose in filament circuits, is the choke depicted in Fig. 4. Purely as an inductance it has the very satisfactory stopping value of 3,000 ohms, but in conjunction with its small stray capacitance it tunes roughly to 5 metres and forms an almost perfect rejector.

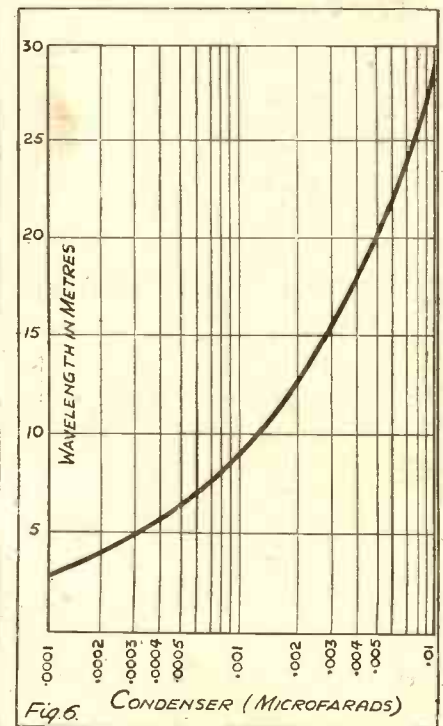
### Useful Stoppers.

Fig. 5 indicates how a few of these chokes can be used to restrict H.F. currents to the straight and narrow way. These precautions will prevent every irrelevant thing done anywhere near the set from affecting the tuning. Otherwise the signal is apt to fade out every time you touch a wander-plug. One only has to be careful that oscillation does not take place at the natural wavelength of the choke.

In Fig. 5(b) a by-pass condenser has been used to form an easy-path to earth from the anode. What value forms the easiest path? The answer is rather surprising. All fixed

(Continued on page 151.)

## CRITICAL CONDENSERS



By-pass condensers have to be very carefully chosen for ultra-short waves, and the correct values for various wavelengths are given here.





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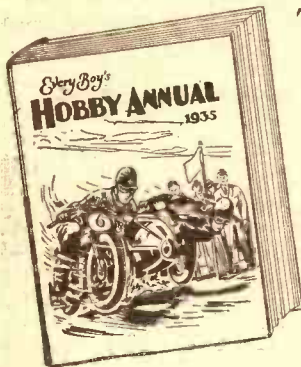
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I WONDER how many of you readers have managed to tune in WSUI—"Iowa's Own." Very few, I suppose, because the power of this little broadcaster is but half a kilowatt, although at times the engineers at WSUI do contrive, by permission, to exceed this power limit considerably.

Located at Iowa City in the State of Iowa, this American station is admirably situated for long distance transmissions. The State of Iowa, which, as you will be aware, is one of the Central American States, slopes gently down to the east. It is a State of fertile prairies which are almost wholly destitute of trees, but which are marked by their magnificent agricultural crops. Iowa has a dry, fine climate. It is, therefore, an area which exercises a minimum amount of absorption on radio waves going over it. If, indeed, radio station WSUI increased its power to anything approaching that of the giant American broadcasters it would be known throughout Europe.

#### Jolly, Human Programmes.

WSUI, however, despite its many-sided activities, is a very modest concern. It is in reality one of the American University stations, its ownership being vested in the State University of Iowa, and its technical command and running being entrusted to the Engineering and Electrical Departments of that University.

The foregoing reference to its academic ownership may result in your dubbing the station a dry-dust affair, disseminating high-flown "courses" and daily indulging in perfect orgies of highbrow theoreticisms.

You will be in error, however, in forming this opinion. I have weighed up a good many radio stations in my time, but I have yet to find a more comprehensive, a jollier, and, in all, a more human set of programmes than those which are put out daily by WSUI.

The station is usually on the air at 9 in the morning, and, with intervals, its programmes continue until 10 o'clock at night. On Sundays the programme times are from 6 p.m. until 9.30 or 10 p.m. Midnight or even "after-eleven" transmissions are at a discount in Iowa, the populace of which State, being mainly an agricultural one, goes to bed early.

#### An Excellent Mixture.

About the subject matter of these programmes? you ask. Well, imagine the sort of broadcast fare which the average plantation owner, farmer, agricultural worker, housewife and growing-up child would require. Imagine the type of programme which you would serve up as a regular thing if you were given the job of programme compiler—imagine all this, I say, season your result with a smattering of agricultural hard facts and technics, and you will have evolved pretty much the same type of programme as that which is served daily to the listeners of this Iowa station.

In a word, dance music (plenty of it), "concerts" (for the more conservative-minded Iowans), humorous items, plays, debates, orchestral music and special items for the kiddies make up the daily broadcast production of WSUI.

News items are given thrice daily—at 9 in the morning, and at 7 and 9 o'clock in the evening. They call this news feature

STATION WSUI

otherwise known as

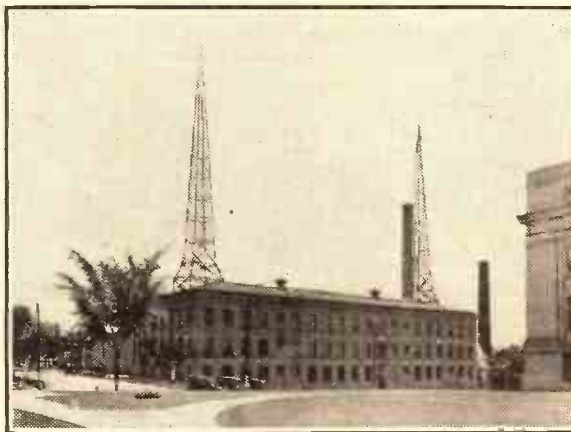
## "IOWA'S OWN"

The season has now arrived when the American stations begin to come over again on the "broadcast" waves. "Iowa's Own"—station WSUI—is admirably situated geographically for long-distance transmissions, and, when on increased power, can often be heard in this country. This graphic description by a Special Correspondent is therefore particularly interesting.

"The Daily Iowan." Quite an interesting feature of "Iowa's Own" station is its "Book-of-the-Air Club." It is a scheme whereby any book which is reviewed in the station's programmes may be borrowed by listeners. The WSUI people work the scheme on a non-profit coupon basis. You buy a book of twenty coupons for three dollars. Then, when you want to borrow a

WSUI's radio equipment is of Western Electric design and construction, the transmitter being split up into self-contained semi-portable, or, rather, transportable, units. It is rather interesting to note how the technical folk on the other side of the Atlantic love apparatus of Western Electric label. Indeed, fully two-thirds of the independent radio stations in America operate by means of apparatus and plant, if not fully, at least partly, of Western Electric construction.

### "IOWA STATE UNIVERSITY CALLING"



The American station WSUI, which is seen here, is owned and operated by the State University of Iowa.

book, you tear off a coupon and send it to the station along with your requisition for the book required. For each coupon one book may be borrowed and retained for a fortnight. Rather a novel notion, but hardly one which would function well over here.

WSUI, on the other hand, however, preserves its independence. It is a well-loved and a much-valued station. Could, indeed, any greater proof of its popularity be given than that which is conveyed by its now familiar appellation, "Iowa's Own"? J. F. S.

### PHOTO-ELECTRIC CELLS

THE Photo-electric Cell is one of the most fascinating as well as one of the most important developments of modern electricity. Its principles may not be new, strictly speaking, but it is only during recent years that its many potentialities have been realised.

The result is that there has been an absence of authoritative literature on the subject. In 1929 this omission was repaired by the publication by Pitmans of "Photo-electric Cells: Their Properties and Applications," a first-class work dealing with both the theory and practice, and written by Norman Robert Campbell and

Dorothy Ritchie, of the Research Dept. of the General Electric Co.

Television investigators in particular, and the world of electricity generally, found in this book a clear and comprehensive exposition of all aspects of the photo-electric cell, in which was included a considerable amount of new information derived from personal research and experiment.

There have been further advances in the subject since the date of publication of this book, and so now it has been entirely reconstructed in order to bring it right up to date.

This third edition comprises over two hundred pages and some sixty or so diagrams. The price is 12s. 6d., and it should receive a ready welcome both from radio engineers and interested amateurs.



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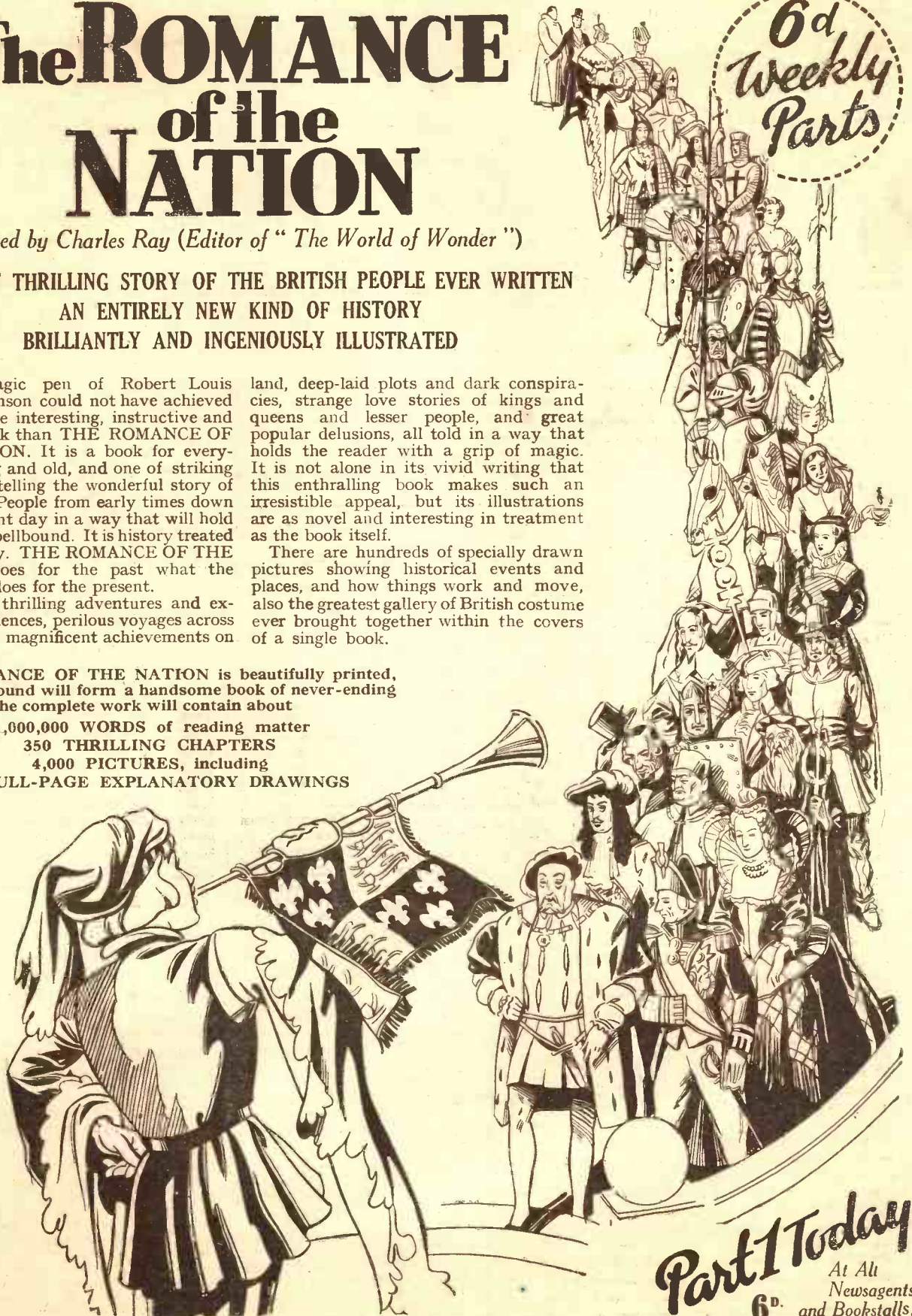
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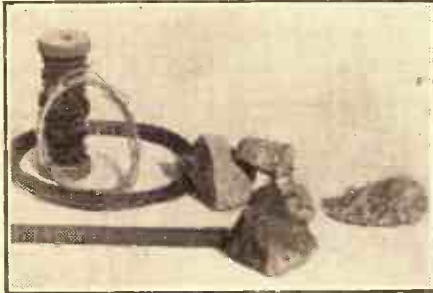


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## RADIO'S INDISPENSABLE ALLOYS

Designers in every sphere of broadcast transmission and reception would be faced with an almost insuperable difficulty were it not for the fact that certain metals, when alloyed together, increase in their electrical resistance. The way in which the resistance varies in accordance with the ingredients is the subject of this illuminating article.



German-silver wire—a useful electrical resistance material—is an alloy of copper, zinc and nickel.

It is undoubtedly a fact that if it were not for the remarkable property which some metals possess of increasing in electrical resistance when alloyed together, radio and electrical science generally would be very greatly handicapped as regards the details of its constructive working.

Metals, as you know, are usually good conductors of electricity. Silver is the best conductor of all. Then comes pure electrolytic copper, after which follow gold, aluminium, zinc and iron in succession. At the other end of this list you get metals such as bismuth and arsenic, which, in many respects, are only half-metals, as it were, and thus possess but poor electrical conductivities.

### Remarkable Properties.

Resistance wires are so very commonplace nowadays in wireless and electrical construction that few of us, I'm afraid, ever give a moment's thought to the really remarkable properties which they embody.

You have, for instance, copper, nickel and zinc—all of them good conductors in their pure state. As soon, however, as you alloy copper and zinc together you get a product whose resistance is much higher than the resistances of either of the two ingredients.

Add, now, a proportion of nickel to your copper-zinc alloy and the electrical resistance of the mixture will go up enormously. You will, in fact, have produced *German silver*, which, of course, is a much-valued electrical-resistance material.

There is a very definite law in all this business of preparing resistance alloys, and this law is to the effect that when you alloy good conductors with worse conductors the product which you obtain is a still poorer conductor than the worst conductor used in the alloy.

Perhaps this may seem a bit involved. To clear the matter, therefore, let me state a practical example.

### Some Specific Resistances.

The specific resistance of good-quality pure copper is about 1.647 microhms, and the specific resistances of zinc and nickel are 5.751 and 12.400 respectively. The S.R. of German or nickel silver, which is an alloy of all these three metals, is 21.170 microhms, which, as you see, is very considerably greater than the S.R. of the worst conductor of the three ingredients of the alloy—that is to say, nickel.

The above law, I might point out, is not, of course, an absolutely universal law, devoid of any exception. Nevertheless, it is applicable to all resistance alloys which are of any practical use.

There is another very convenient property of most resistance metals. They have a very low "temperature coefficient." That is to say, they do not vary much in resistance with increase or decrease in temperature as pure metals do.

This is really an extraordinarily convenient property, and it becomes more apparent the more you think about it. A resistance, large or small, would never do if it altered very greatly in value as soon as the current began to heat it up.

Most of the commercial resistance wires used in good-class radio and electrical

### COMING SHORTLY

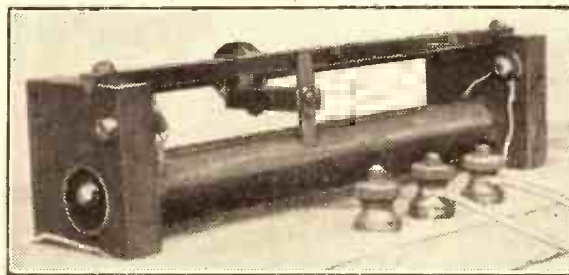
## S.T.600

will be fully described by John Scott-Taggart in Popular Wireless.

On Sale October 24th

construction employ either nickel or manganese as their "resistance component."

There are many different kinds of German silver or nickel silver, as it is alternatively called. *Argentan* is also another name for German-silver alloys. Alloys of this class contain from 5 to 35 per cent of nickel, from 10 to 25 per cent of zinc and from 40 to 65 per cent of copper. Usually, also, German silvers contain a small proportion of lead in order to render them more easily



"Argentan"—another name for German-silver wire—is extensively used for winding low-value resistance coils such as the one shown here.

workable and fusible. The fact to note, however, is that the resistance of the material is governed mainly by the amount of nickel which it contains. The higher the nickel content, within certain limits, the greater the resistance.

*Platinoid* is a resistance alloy which finds many uses. It has rather a handsome name. Many people think that they are getting a little platinum when they buy

platinoid wire, but, of course, this is not the case. Actually, platinoid is merely nickel silver with 1 or 2 per cent of tungsten added. The tungsten increases the resistance of the wire by more than one and a half times that of plain German or nickel silver.

*Constantan* is a simple alloy containing usually 60 per cent of copper and 40 per cent of nickel. You don't hear very much about it in these days on account of its being superseded by more efficient materials.

Manganese alloys have come into great prominence lately as resistance metals. Perhaps *manganin* and *resista* are the alloys of this class which are most used in radio components, measuring instruments, shunts and the like.

### Varies with the Source.

Manganin, like German silver, varies in composition according to its source of manufacture and the exact purpose for which it is required. A good approximate analysis of this material, however, is copper 84 per cent, nickel 4 per cent, manganese 12 per cent.

*Resista* is really a special form of manganese steel containing the inevitable nickel. Usually it has the composition: iron 80 per cent, nickel 15 per cent, manganese 5 per cent. It is good stuff, its resistance being at least four times that of the best German silver.

Then there is the well-known proprietary "Eureka" wire, also an iron alloy, whose resistance, although less than that of *resista*, is considerably higher than that of plain German silver.

*Rheostan* is a manganese alloy. It contains copper, manganese, nickel, zinc and cobalt in varying proportions, and it has a resistance which is some fifty or sixty times greater than that of an equal length and thickness of copper wire.

### For Heavy-Current Working.

*Rheostene* (not to be confused with *rheostan*) is a nickel-steel alloy. It is used for heavy-current working.

Quite a different class of resistance wire is *nichrome*, a new alloy apparently nowadays well beloved of the component manufacturer. It contains nickel and chromium in varying proportions, and, capable of being drawn into fairly fine wire of high resistance and low-temperature coefficient, it is used increasingly in the manufacture of shunts and other instruments in which compactness of design is essential.

It is, of course, quite impossible to tell the composition of a resistance wire by its physical appearance. Most of these wires are bright, shining, springy-natured articles, but to get at their exact composition you have to submit them to chemical analysis.

There is, as I think you will now appreciate, a good deal more in the subject of resistance wires than meets the eye at first sight. Resistance wires are improving. It is becoming possible to produce resistance alloys of extremely low temperature coefficients and of extremely high resistances. Merely a very short length of these wires will suffice to give the resistance which, formerly, demanded feet, or even yards, of some of the older wires. C.L.



# ON THE SHORT WAVES

*Conducted by W.L.S.*

I have enlarged in a previous article on the pros and cons of "hotting up," and I hope I made it quite clear that you mustn't expect something for nothing. If your previous receiver was as good as it could be, then obviously you can't say "Hey, presto" and get a little more out of it without expending a little more.

In the particular case of the two-valver described last week, however, it wasn't as good as it was possible to be; it was simply a two-valver in its most straightforward and primitive state—comparatively speaking, that is!

### Several Simple Improvements.

This week we are doing the following to it: (1) Adding choke-filter output. (2) Adding a band-spreading condenser to make for ease of tuning. (3) Improving selectivity by making use of an aerial tap.

The rest of the "hotting-up" process consists of increasing the H.T. somewhat, using a mains valve as detector (if possible) and generally adjusting things so as to get the last ounce out of the set.

Let me deal with these points in order. First, the choke-filter output circuit. It is always worth while, but surprisingly few people use it. For one thing, it is an almost certain cure for "live" phone leads, which are most annoying and ought not to be tolerated for one minute.

Secondly, it saves the headphones; if they are good—and they ought to be—they are worth saving in this way. There's no sense in pumping milliamps of D.C. through them; all you want is the signal.

Choke-filter output also tends to do away with little instabilities in the L.F. side, and often works as far back as the detector, in that it cures hand-capacity effects, which are linked up with the L.F. side when we deal with short waves.

### Making Tuning Easier.

Now for the "band spreader." All you require is a very small variable condenser, which is connected in parallel with the main tuning condenser, and a slow-motion dial. If you really want to economise, take the slow-motion dial off your '0001 and put it on the baby condenser, equipping the '0001 with a plain dial.

The broadcast bands and the amateur bands are all fairly narrow, and can be covered with a '000015 condenser, which makes tuning really easy to handle. You will soon get into the habit of setting the main condenser at, say, 65 degrees, and

## "HOTTING UP" THE TWO-VALVER

Some hints by W.L.S. on improving the two-valve short-wave receiver described last week.

knowing then that the "little 'un" will cover the 31-metre band for you.

Regarding the aerial tap, this is a very desirable improvement if one has a longish aerial. Personally, I have a liking for tight aperiodic coupling by means of a third coil, but I think the capacity method of coupling, in conjunction with a tap about half-way down the coil, is practically as good, as it has the advantage of being flexible.

Always use as loose a degree of coupling as is consistent with reasonable signal strength. Likewise use as tight a degree as is consistent with good selectivity—which is only another method of saying the same thing! From this you will see that some form of adjustable coupling is a necessity.

If one relies solely on a coupling con-

The cathode should be connected to one of the heater pins, which may be done by twisting a short piece of bare wire round those two pins on the valve itself—if the valve holder is of the type which has a recess or a hole in the centre. Otherwise it is better to make a real job of it and install a five-pin valve holder, simply wiring the cathode terminal to the nearest heater terminal.

I have a feeling, however, that this particular part of the "hotting up" won't be very popular with readers, who mostly use 2-volt valves and small 2-volt accumulators.

As an alternative to the mains type of valve it is often worth while trying an ordinary battery L.F. pentode as a detector. This will take the same voltage as the triode on the anode, but requires only about 25 to 30 volts on the priming grid.

Don't forget, if you try a pentode, to connect a 1- or 2-mfd. fixed condenser between the priming grid and earth, or results will not be what you expect. The pentode can either be of the four-pin type with the extra side terminal, in which case the present valve holder can be retained; or you can fit a five-pin valve holder and use a five-pin pentode.

A further change can be made by using an S.G. valve as detector, and I shall have more to say about that type of valve next week.

### Using a Higher H.T. Voltage.

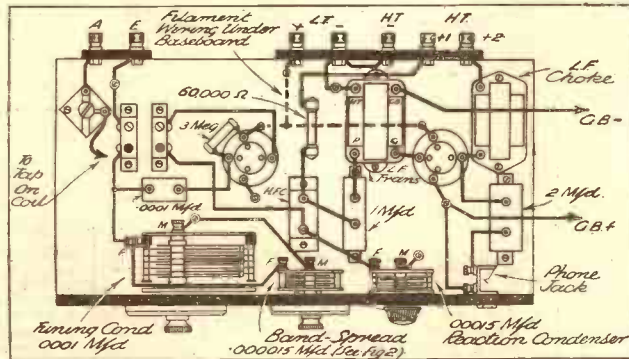
I said something about increasing the H.T. Don't carry this to extremes—there is no point in that. But you can often improve the performance of a short-waver by going up to 150 volts or so, taking care to increase the grid bias to the appropriate figure for the output valve. With resistance (or resistance-fed transformer) coupling the detector will probably still behave itself quite nicely on the increased voltage.

If an increase of H.T. causes "ploppy" reaction, look to your L.T. wiring and make sure that the detector valve really is getting the full voltage on its pins. You

may easily have 2 volts at the accumulator terminals, 1.9 at the set terminals and 1.7 at the valve holder terminals! Use good stout wire, don't put up with cheap and dirty filament switches, and use a good valve holder.

If you look to all these points your "hotting up" should be a success. By the way, a diagram suggesting an easy method of making a small "band-spread" condenser appears on the next page. It is quite a simple matter, as you will see, and will not take long.

## AFTER THE ALTERATIONS



Here is the two-valver diagram modified to include the aerial-series condenser and the tap, and to show the wiring of the "band-spread" condenser fitted on the panel. The filter output also is indicated, the phone jack being inserted between the 2-mid. condenser and the L.T. wiring.

denser tapped on the top of the grid coil, one has the flexibility all right, but adjustments upset tuning so badly, and it is impossible to calibrate the receiver. Hence the advantage of a tap down the coil, which does a lot to obviate this particular trouble.

### An Excellent Detector.

Now regarding the other points. First, the mains valve. If you have a biggish 4-volt accumulator it is well worth sparring one ampere to light a valve of the indirectly-heated "HL" type as detector.



ON THE SHORT WAVES—Page 2.

## NEWS AND VIEWS

Including interesting notes on letters received from readers

THE way some of these readers want to argue with each other, with me as professional arbitrator, is rather embarrassing. No sooner does X. Y. Z., of Wigan, complain about poor conditions than A. B. C., of Little Grumpling, wants to tell him that he has a rotten receiver. Still, it's good for trade.

And here's a letter from L. W. D. (Whitstable) asking me to describe an all-A.C. H.F. Pentode-Detector-Pentode set, or even a Single-Signal Superhet! There's nothing I'd sooner do, but for every approving letter I received I should have at least a hundred curses. But we're gradually working up to more ambitious receivers, so don't be downhearted, L. W. D.

### A Very Good Idea.

A gentleman from Westcliff-on-Sea—whose signature, unfortunately, I can't decipher, except for the "McK." part of it—wants help in identifying a station on about 16 metres that calls up using three musical notes descending the scale. Is he a South American, because he announces in something that sounds like Spanish?

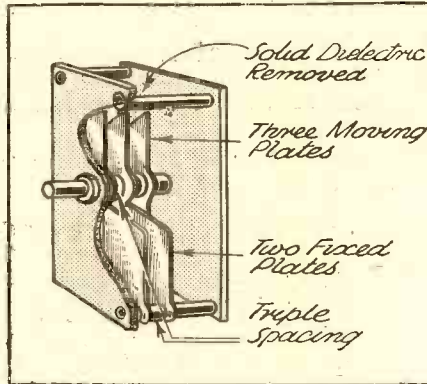
I want to quote from a letter from A. I. (Todmorden). He says: "I offer you herewith a suggestion on the same principle as you are offering your new short-wave sets—i.e. if you don't like it, don't use it."

"If you yourself intend to build and use each of these sets as they appear (I notice

you don't commit yourself!) it would be a distinct advantage if you published previously at what time of day and on what wavelength you intended to listen. Then we lesser lights would be able to compare results with something definite."

Excellent idea, A. I.—but, unfortunately, impossible. The "lag" between the time of writing an article and the time of its appearing in print is the reason. By the time you are reading about the one-valver it has been in bits for at least a week, so as to get the next one ready!

## FOR BAND SPREADING



Here are details of the small-capacity band-spreading condenser advocated by W. L. S. for use with the two-valver described on the preceding page.

But I'll try to think out some tests on those lines. The trouble is that if I receive much more than anybody else, people say: "Isn't that man, W. L. S., a crammer?"; and if I don't, they say:

"Call yourself a short-wave expert?—you didn't get any more than I did!"

### Never Had Hand Capacity.

Meet I. K., the perfect conductor! Readers probably remember his suggestion about using an S.G. valve in the L.F. stage. Now he's on the warpath about "all this nonsense that's talked about hand capacity." He says he has never encountered it, and if a set does suffer from it, it disappears as soon as he takes over control.

He explains all this by saying that he can put one finger in the mains socket (240 A.C.) and complete the circuit through a 40-watt lamp, which lights! And he doesn't feel anything! I. K., my lad, you ought to be employed as a tester on the grid system—perhaps 132,000 would produce a mild shudder from you!

But cheer up! Here's a letter from B. M. (Bangor), congratulating you on your S.G. note-mag. idea and confirming that there isn't a trace of background. It's not the only one I've had, either.

### Can Anyone Answer This?

F. W. (Saltash) wants to know why there are two separate "PHI's" in the 16-metre band sometimes. He gets one on 111 degrees and one on 119 degrees, same strength. Can it be his receiver, or is it a double transmission?

There's not much news this week, but I promise a good batch in the next issue. I hope it will include the names of one or two new short-wavers which we may expect to hear very soon. Make up your minds that this is going to be a proper "boom" winter for short waves, and you'll be approaching things in the right spirit.

W. L. S.

ONE of the most prolific of modern record makers is Bing Crosby, the idol of millions of flingcocks and radio listeners. He has just made another record—on Brunswick, of course—of numbers from the film "She Loves Me Not." The items are *Love in Bloom* and *Straight from the Shoulder, Right from the Heart* (01850).

They are typical Bing records, but I hope that his prolific recording will not satiate his admirers. And that reminds me that there is a special autographed art reproduction of Bing Crosby available, free to each purchaser of the set of three records containing his singing of six numbers from "We're Not Dressing." These numbers are on Brunswick 01785, 01786 and 01788.

But in spite of his colossal success and the fact that he is probably the second highest paid man in the world—so runs the official "dope"—I wonder who is the highest?—Bing Crosby remains unspoiled. He loathes any publicity, so typical of America, that drags in his home life, his wife or three children, and he prefers to keep home and business entirely separate.

Though he has great wealth, he lives his life as an ordinary business man: no ostentation, no night life; just golf (at which he is scratch) and his home.

Always welcomed by those interested in American vocalisation is Ruth Etting, another screen personality, who has this month given us *With My Eyes Wide Open*, *I'm Dreaming* and *Were Your Ears Burning?* These are from "Thank Your Stars" and are on Brunswick 01829.

Introduced to the radio in this country, I believe by Greta Keller, who sang it at her recent come-back to the British microphone, the *Iste of Capri* has spread like a fire throughout the dance bands and recording studios. Its words have been criticised—though I for one do not think they are at all bad; they do at least tell a story—but the tune is one of the most haunting and simplest we have had for some time.

This month we have Al Bowlly singing it on Decca F5188, together with *Judy*. Monia Litter again accompanies him at the piano. You should hear this, and if you do not already know the number—a remote possibility—and do not at once take to it, hear it again: it will grow on you, I'll warrant.

Have you seen the latest Gracie Fields' film, "Sing as We Go"? Whether you have or not, you

# ROUND the RECORDS

Selections and recommendations from the latest gramophone lists.



will relish Gracie's H.M.V. records of the songs she sings in it. *Love* (B8208) finds Gracie in sentimental mood, and she sings it with a feeling and voice that many an operatic star might envy. On the other side *A Catchy Little Tune* lives up to its name, with Gracie in lighter vein. Then there is the theme song of the film "Sing as We Go," with Gracie playing the Pied Piper of Blackpool (B8209).

The other side of this disc contains *In My Little Bottom Drawer*, and this is probably the funniest number the great comedienne has ever recorded. Gracie plays the part of a disappointed spinster going through the inventory of her curiously assorted "bottom drawer," and she does it with all the art at her command. Don't miss it!

As great a treat, though of a totally different kind, is provided by the album of four Mozart records made by Jascha Heifetz.

Just after the war a boy violinist came to London. He was preceded by a reputation so great that it seemed impossible that any player could justify it. The boy was Jascha Heifetz, and when he played at the Queen's Hall he proved that all the reports that had reached England of his technique and tone were true. Only emotional wariness was lacking.

Now he has made some new records, the first since his marriage to Florence Vidor, and this recording of Mozart's *Violin Concerto in A* with the London Philharmonic Orchestra (H.M.V. DB 2199-2202) shows that he has developed maturity and depth.

The concerto is a rarely played one, though it is one of Mozart's most easily appreciated works, in the opinion of many.

As we go to press I have received a record I should like to draw attention to—that of the massed bands of the Southern Command playing Ketelby's *In a*

*Monastery Garden* and a selection called *Fifty Years of Song*. This is on H.M.V. B8217.

The record was made during the Tidworth Tattoo, and is an exceedingly realistic capture of the atmosphere of the vast arena with the massed bands in full blast.

Another outstanding disc is that of Miliza Korjus, the 22-year-old soprano, singing *Una Voce Poca Fa* from the "Barber of Seville," and variations on Mozart's *Ah! Vous Dirai-je Maman* (H.M.V. C2688).

This record is all the more remarkable because Miliza Korjus declares she has never had a singing lesson in her life, her sole acquaintance with music and the technique of singing having been gained from playing gramophone records of celebrity artists.

From an exceedingly early age she has tried to imitate such stars as Pavarotti, Galli-Curci and Frieda Hempel, and if the promise this record shows

is fulfilled she should be regarded as a legitimate successor of the stars she has tried in her early years to imitate. Already in Germany her name is a household word, and her fame is rapidly spreading.

A real fill of organ music of the popular variety is supplied by four Octacros records. They are good recordings and will be of interest to many radiogramophone owners. Here they are: *The Jester and The Knave of Diamonds* (1059), *To a Flanders Poppy* and *The Storm* (1060), *For Love of You* and *The Hunting Horn* (1061), all these by Pattman on the Forum Cinema, Ealing, Compton organ. Finally we have Wyndham Lewis playing at the Theatre de Luxe, Gloucester, on a Wurliitzer organ, a selection of Irving Berlin's *Waltzes* (1071).

*The Storm* (1060), though a little lacking in bass, will give most radiogramophones a good toning. It is well modulated, and if your output can handle it without any blasting and with clear reproduction there is little wrong with the instrument.

Many enthusiasts have written to me in connection with the plea for demonstrations of good quality reproduction, and I shall be glad to hear of others who are willing to demonstrate their sets to readers wanting to hear the "best that can be obtained" with small apparatus.

I should like particularly to thank Mr. Leonard Luce, of "Lynwood," 60, Old Beulah Hill, S.E.19, who has offered to demonstrate his outfit to radio societies who are interested if they will get in touch with him. K. D. R.

### BING CROSBY AT HIS BEST

### NEW DISCS BY JASCHA HEIFETZ

### SOME POPULAR RECORDINGS



# RADIOTORIAL

The Editor will be pleased to consider articles and photographs dealing with all radio subjects, but cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped, addressed envelope must be sent with every article.

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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

### H.F. FILTER CONDENSERS ON A.C. MAINS.

T. S. T. (Glasgow).—"At the Radio Exhibition I was told how to join two condensers together, and earth the junction, in order to clear H.F. interference on A.C. mains.

"I understand the connections, and that only high-voltage-tested condensers will do. But unfortunately I lost the paper in which the size (capacity) of the condensers was given.

"What value do you suggest?"

For an H.F. filter circuit of the type you mention it is not necessary to use very large condensers. Often a maximum of .1 mfd. will be found enough, and in any case you should find that 1 mfd. will be ample.

### THE GRID CONDENSER'S EFFECT ON QUALITY.

D. B. K. (Paignton).—"Would there be any improvement in the reproduction of low notes if the grid condenser were made much larger than .0003 mfd., the grid leak being altered simultaneously, if necessary?"

No. There is no appreciable gain to low-note response when the detector's grid condenser is increased in capacity.

### EXTRA LOUDSPEAKER APPEARS TO ALTER TONE.

W. B. (Withy Grove).—"A 5-valve super-heterodyne circuit is employed, and the set runs from the electric light mains (A.C.).

"One of the many excellent fittings on it is a peg which goes into one of three holes, to alter the pitch of the reproduction.

"The holes are marked 'H', 'M' and 'L.' for high, medium and low respectively. And normally I have the peg in 'M'.

"I have noticed, however, that when I am working an extra loudspeaker it is a distinct advantage for the 'L' terminal to be used. (It makes music better.)

"Why should the extra loudspeaker affect the tone?"

Probably when you add the extra loudspeaker it is connected in parallel with the existing one. If so, this lowers the effective impedance in the output circuit.

By setting the tone control in the "Low" position you are then enabled to correct to some extent the effect of the lower impedance on tone.

The change in output impedance quite likely accounts for the noticeable change in the tone of the reproduction.

### HOW MANY OHMS?

D. O. (Birkenhead).—"The value of resistance recommended was 10,000 ohms. But after experiment I find I get far better results from two 25,000-ohm resistances, one connected across the other, in parallel.

"How many ohms do I get that way?"

When two equal resistances are wired in parallel their effective resistance is halved. So you are now using 12,500 ohms.

### PREVENTING HUM WITH AN A.C. SET.

G. W. (Kettering).—"I get very slight hum on the set since I altered it by running the last valve's filament from A.C. (through a transformer) instead of from accumulator.

"I now read this last trace of hum can often be cured by fitting a potentiometer 'to get the electrical centre instead of the tapped centre of the transformer winding.'

"Frankly, I don't understand what that means, but I would like to try the scheme.

"Please say what potentiometer to use and how to connect it to the set."

Small potentiometers of 30 ohms or so, with heavy windings, are made specially for the purpose, and can be obtained quite cheaply.

All you have to do is to undo the wire (or wires) connected to the centre terminal of the transformer and join it (or them) to the slider of the potentiometer instead, the centre terminal then being left without an external connection.

The outer ends of the potentiometer are connected to the respective outer terminals of the transformer winding which supplies the valve with its filament current, the effect thus being to use a centre tap on the resistance of the potentiometer rather than on the winding itself.

By adjusting the slider to the "no-hum" position you find the electrical centre for the return wiring from the grid, and this often gives better and cleaner reception than a centre obtained by means of a tapping.

### GRID BIAS AND INTERFERENCE.

E. N. (Reading).—"My old superhet is still going strong, but I seemed to be getting more than my share of interference until I renewed the grid bias recently—that cleaned up reception at once!

"I have been wondering ever since how this happened. What has grid bias got to do with the number of programmes or whistles heard?"

If you altered the bias of the oscillator you have a complete explanation of the effect observed.

Wrongly biased it will create harmonics, which will beat with other stations exactly like the main and wanted oscillation to which the condenser across the oscillator coil is adjusted.

New bias, by correctly setting the oscillator's working point and removing the harmonics, would thus remove the interference caused by them.

### "A SHORT GRID-BASE."

B. S. (Cape Town).—"The article says, 'It must be noted that the S.G. valve is one of the short-grid-base type, requiring only 9 volts bias for full control.'

"I have not met the term 'short grid-base' before. What does it mean?"

If you look at the characteristic curve of an S.G. you will find grid voltage is marked along the base of it.

The no-bias position is on the right, and the various negative bias voltages used are marked off at intervals across the page to the left.

In the earlier valves the required divisions extended

(Continued on next page.)

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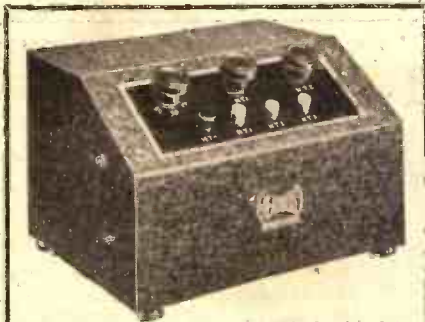
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## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

up to about 20 volts negative before anode current was reduced to minimum.

In later valves this condition occurs at perhaps half that voltage, or less.

Thus, instead of needing a large grid-bias battery, these newer types require only a 9-volt (or smaller) battery for full control.

The anode current is just as responsive, but instead of needing 20 volts or so (a long grid-base) to control it, this can be done on the comparatively short grid-base represented by the smaller maximum grid-voltage figure.

### "STOPPERS" IN CLASS B WORKING.

S. F. D. H. (London, S.W.9).—"Is the use of stoppers in Class B working absolutely necessary? And if so, what are the correct values?"

Class B and all similar "push-pull" arrangements have a greater liability to parasitic oscillation than simpler stages, so stoppers are often essential.

The arrangement and values are fixed by the designer for any given design, and they should not be departed from if quality is to be unimpaired.

### TINGLING L.S. TERMINALS.

W. E. P. (Bath).—"I find I can get quite a strong tingling shock from the loudspeaker terminals, notwithstanding that I am using a filter circuit.

"I tested this for leakage, but no steady current will flow through a milliammeter from the H.T. battery, so insulation must be in order.

"Can you explain why a shock is felt in such circumstances?"

It is usual and necessary for voltages to appear at the loudspeaker terminals when the instrument is in action—otherwise it could not work.

Probably it was these—the working voltages—that you felt. And if you wish to test the fact, try holding the terminals whilst a loud programme is coming through, and then get the tuning shifted to a no-programme position.

The voltages will disappear in such circumstances, and return again when the loud programme is tuned back again.

(The effect is often very marked where pentode output is employed.)

### ROTATING THE SET FOR SELECTIVITY.

D. E. (High Holborn).—"The old set was a portable and self-contained, but this one is a little larger, and has aerial and earth wires as well as the lead from the electric-light switch.

"It is infinitely superior, except in one respect: With the last set I could cut London almost out by swinging the set round on its base. But on this set there is no difference which way it faces.

"Can I have it altered to overcome this?"

No, it is not practicable, owing to the difference in the two designs.

Your old set had a frame aerial which possessed strongly directional properties. It was because you rotated its aerial that it could differentiate between one station and others.

The new set has a fixed aerial, and no matter how the set itself is rotated it will not exercise any directional effect.

### SHORTING THE SELECTIVITY CONDENSER.

D. L. (Kilmarnock).—"I am interested in wireless, but know nothing about it. So it was with some trepidation that I tried a hint I saw in your paper for improving selectivity.

"It was very easy to do—just put a .0001-mfd. condenser in the wire to the 'A' terminal, adjusting this as necessary when tuning.

"The difference it made was very pleasing. But I notice that it only seems effective in the 'busy' periods, after darkness has fallen. In daylight I have to keep it set full in.

"Is this to be expected?"

Yes, it is quite usual. It is seldom during daylight that there are sufficient stations on the air to call for the sharper tuning which results from using a small aerial condenser.

Also the distant stations are all weaker in daylight, so it is better to leave the condenser set to its maximum capacity then.

Some listeners prefer to "take it out" of the set (not literally, but electrically) for daylight and long-wave reception.

All that is necessary for this is a connecting wire, or link, or switch that will join one of the condenser's terminals to the other when it is not wanted in action.

An ordinary on-off switch will do. The operation is called shorting (or short-circuiting) the condenser.

### FOR VISUAL TUNING.

L. A. (Great Yarmouth).—"I tried a milliammeter in the diode detector lead to see if it would show the 'in-tune' position as it did with a grid-leak detector. But no luck.

"Is it possible to use it, as I should prefer to make the final tuning adjustment by eye rather than by ear?"

An ordinary milliammeter is unsuitable for your purpose, but perhaps there is no need to use it in the diode detector's circuit. If your set has A.V.C., which is likely with diode detection, the bias (and so the plate current) of the H.F. valves will be determined by the tuning.

Therefore the milliammeter should give the correct indications if placed in the plate lead of the controlled H.F. valve.

### CRACKLES WHEN THE AERIAL AND EARTH ARE OFF.

W. E. G. (Weybridge).—"In the last month a crackle has come on. It is not very harsh, but is enough to spoil enjoyment of the programme.

"As it seems to be getting worse I tried to track it. On the advice of a friend I took

## THIS WEEK'S HINT SELECTING A NEW LOUDSPEAKER

The quality of your reproduction depends to a large extent on the loudspeaker you employ. But it is only the last link of the receiving chain, and the output valve and L.S. transformer (or choke) are of equal importance to quality reception.

If incorrectly matched to the output valve a good loudspeaker will give bad quality. So be sure to consider this point, and use a choke or transformer that enables correct matching to be achieved. (The L.S. makers will give information as to correct ratios for use with the different output valves.)

Remember, too, that a loudspeaker may perform differently on your own set in your own home from the test in a shop, so a home test is more satisfactory. Also if two loudspeakers are to be used they will probably affect each other to some extent—another point in favour of a home test.

off aerial and earth wires and listened, but it was still there.

"He has offered to come round and test the components for me by 'clicking through' with a loudspeaker and battery; but he wants to know first if there is any special place to look in this kind of set (S.G., D. and Pentode) for a crackle of this sort."

It is likely to prove difficult to find, for a fault of this type can arise in many ways.

Bad contact at the switches, groggy wiring, faulty H.T. or grid-bias supply, defective valves or components can all cause it.

You will see that this covers virtually everything in the set; and as hidden connections (such as those under valve holders and coil units) are frequent offenders, it is better to test one stage at a time, to ascertain where the fault lies, than to proceed haphazardly.

If your friend's set is similar to your own, the valves could be tested for performance at his house, and so, probably, could the batteries, thus localising your investigations.

Similarly, if he has any spare parts, the substitution of these will be the quickest way of settling whether the corresponding parts in your own set are faulty



## MEGACYCLE METHODS

(Continued from page 142.)

condensers of ordinary "non-inductive" type above about .001 mfd. act as inductances of about .025 m.h. The old "inductive" types may be double this. It looks a very small figure, but at 5 metres it is 10 ohms.

It doesn't much matter what condenser you use, from .001 to 1 mfd.; all act just the same, as if a tiny coil had been put in circuit. You could short-circuit the condenser with a little over an inch of wire—the usual distance between the terminals—and, apart from the possibility of upsetting D.C. voltages, get almost exactly the same result.

If you are really keen to do better than this you can: even improving on a one-inch short-circuit!

### Choosing the Condenser.

By making the condenser .0003 mfd. its capacitance just neutralises the inductance of the usual type of fixed condenser, and the bypass is brought down to a real short-circuit. This is not just theory; it works! Any condenser less than this value is not nearly so effective. So if the set is to be used on various wavelengths, choose the condenser to suit the highest wavelength. Fig. 6 enables you to do this.

We haven't said anything yet about resistance. Generally one has no desire to introduce intentional resistance into 5-metre H.F. circuits. There is only too great a tendency for it to arrive unbidden.

The famous "skin effect" is mainly responsible for this. The current crowds to the surface of a piece of wire, leaving the inner section alone. The result is that a 16-gauge wire has as much resistance to 5-metre current as a 34-gauge wire to D.C. It behaves, in fact, like a 34-gauge wire beaten out very thin and made into a tube of 16-gauge diameter, but, of course, containing much less copper.

So it is more economical in copper to make the conductors tubular rather than solid. Because of this a belief has grown up that a tube is better than solid rod of the same diameter. That is nonsense. The rod is bound to be lower in resistance, but the point is that it is so slightly lower that the inner metal can be left out without making much difference to the efficiency.

### It Must Be Rigid.

Tubing of comparatively large diameter is also very rigid, and is worth while for that alone. Unless all the parts of a 5-metre circuit are extraordinarily rigid the slightest vibration makes the note go all bubbly and horrid, or perhaps out of grasp entirely. There are thus two solid reasons for using tube—if that doesn't sound too Irish.

Still another reason is that the inductance is slightly reduced. It must be remembered that unless the wire is much thinner than a hair (and, therefore, unlikely to be used) the inductance contributes far more ohms than the resistance.

Resistors, like condensers, are actually inductances, in spite of what the circuit diagram may say. Composition grid leaks, of course, are exempted from this ruling; they are, in effect, true resistances shunted by capacitance. So far as H.F. is concerned they can never be made to exceed about 5,000 ohms impedance, however high the D.C. resistance may be.

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## NEWS FROM THE MANUFACTURERS

**C**ONCURRENT with several important price reductions to existing lines, T.C.C. announce the introduction of some entirely new types of condensers.

Cuts in price, ranging from 6d. to 10s., according to type and capacity, have been made to practically all of the T.C.C. dry electrolytic range, and there are one or two quite appreciable reductions in the prices of their tubular non-inductive paper condensers.

Among the new types which have just been introduced are tubular dry electrolytic condensers with soldering tags, aqueous electrolytic condensers for high-voltage working (8 mfd., 500 volts D.C. working and 16 mfd., 440 volts D.C. working, both at 7s.), and some new dry

electrolytic types in one-hole-fixing aluminium cans, also for high-voltage working.

A new type of interference-suppressor unit, incorporating double-capacity condensers of 4 mfd. each section and the usual safety fuse-box, is also announced. The price of this new unit is 18s. 6d.

### Where Space is Limited.

The "Trapeze" aerial is the latest addition to the range of products manufactured by Aerialite Ltd., and it warrants attention by all those who have a very limited space for the erection of an outdoor aerial.

It can be fitted to the side of a house or a chimney, and it consists of a number of horizontal metal bars mounted on a vertical metal strip, which is twisted, the horizontal metal bars following the twist.

A galvanised-iron angle bracket for mounting is fixed via an insulator to the bottom of the twisted vertical strip, and a 40-ft. length of Aerialite bitumen insulated wire is provided for leading in purposes. The price of the complete

outfit, which is supplied in an attractive carton, is 9s.

### Bulgin Activities.

Bulgin seem to have acquired the happy knack of keeping pace with the times. It has been a characteristic of theirs ever since the company was first founded ('way back in the good old days!). And, as sure as fate, if you read something about a new valve development or perhaps a new tuning scheme, you find on the very next page that Bulgins are supplying the necessary valve holder or whatever else it may be that is required!

Their latest activities are in the direction of resistors for use with the new universal valves. Ever since the 13-volt type valves were first introduced, Bulgins have been supplying resistors for use with them, but the latest ones to be introduced are for use with the .3-amp type valves.

Six types are available to cover any combination of valves from two to seven, and a tapping is provided on the resistors to cover 100-110-volt mains.

The prices are 3s. 6d. in skeletonised form, or 8s. 6d. enclosed. G. T. K.



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- 6.—0-100 m.a. { For testing current taken by total valves in set.
- 7.—0-250 m.a. {
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- 9.—Plug-in test for valves.

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- 4.—0-400 volts.
- 5.—0-10 milliamperes.
- 6.—0-50 milliamperes.
- 7.—0-250 milliamperes.
- 8.—Resist/valve test.
- C.—Plug-in test for valves.



**29/6**

# PIFCO ROTAMETERS

**PIFCO ON THE SPOT WILL TRACE YOUR TROUBLES LIKE A SHOT**

## IMPROVING THE HIGH NOTES

(Continued from page 129.)

and 0-0001 mfd. respectively. Coming now to the actual results, they are found in Fig. 2, where those relating to the high values of R and C are denoted by T and the others by M. The horizontal scale is the frequency to which oscillator L was adjusted and the vertical scale is the output voltage measured by V.

### The Outstanding Points.

Two things stand out from this comparison. One is that system T is rather more efficient to start with (at the lower frequencies); 16 per cent better, to be exact. The other is that it falls off very badly at the upper frequencies, whereas M remains practically steady all the way. So on the ground of mere efficiency it loses just about as much as it gains.

But that is really unimportant—a 16 per cent increase in strength can hardly be detected by the ear. What is important is that the precious high notes, that give clearness and character to the reproduction, are seriously whittled down. It does not matter how "straight-line" the amplification may be elsewhere; curve T is a sad blemish on the family escutcheon.

In these days there is bound to be a good deal of high-note loss in the receiver because of the sharp tuning circuits needed to separate station from station.

### Small Load Imposed.

Such sacrifice, however, is made in a good cause; one may look regretfully at the depleted "top," but feel consoled by the thought of the good selectivity thus earned. But it behoves one to take good care that no high-note reproduction is wilfully thrown away for nothing.

It may be argued that the low-leak resistance needed to get curve M constitutes a load on the tuned circuit that feeds it in an actual receiver, and this causes a further reduction in efficiency, not shown on the curves because the test signal was kept up to the mark by brute force. True; but this does not count for very much.

The load of the detector valve itself is likely to be considerably higher still, and even a quarter-megohm shunt is not low enough to make a really big difference.



## ANOTHER "SCRAPBOOK" SUCCESS

Candid Comments on Recent Programmes by our Broadcasting Critic.

ONE of the most satisfying items of recent programmes was "Scrapbook for 1910." It was universally praised. I heard it described by different people as clever, thrilling, delightfully entertaining, especially the musical-comedy portion of it for the pleasant memories it recalled. "What a fine play the Sherlock Holmes item would make!" was one comment I heard. And another: "Knowing nothing of the facts of the Grahame-White flight, I expected Grahame-White to win. I was terribly fed up when the little Frenchman popped up and pulled it off. I was thrilled to the marrow—"

I agree with all of this. "Scrapbook for 1910" was well up to the standard of former Scrapbooks. Congratulations to all concerned.

There's something quite original about Miss Lejeune's cinema talks. It is a good thing that these talks can be given from a different angle. I confess that in the past the preliminaries to a film—i.e. the lists of people responsible for the production—have sometimes bored me. Miss Lejeune points out that this information shouldn't bore. It should instruct. And an intelligent film-goer should find the instruction interesting. Miss Lejeune favours an intelligent interest in the films. She's right, of course.

The claims of "microphone technique" are not mythical. It was quite clear that the Berlin College of Music Choir were not very used to broadcasting. They certainly didn't do themselves justice when they broadcast their programme of German songs. Or ought we to say that the microphone didn't do them justice? Balance, for one thing, seemed all wrong.

I speak of them in this way because I have had a chance since of hearing them sing some sacred music in a chapel and some secular music in a concert hall. They are remarkably good. I can tell you. And I can tell you further that had their performance been televised you would have been very impressed with their conductor, Dr. Warner.

The launching of the new Cunarder—the Queen Mary—was another of those outside broadcasts about which I am inclined always to rave. As usual, the B.B.C.'s arrangements were perfect and worthy of the great occasion. The running commentary by George Blake must rank among the best yet done. He drew a very comprehensive picture of the scene, was rightly generous with his superlative, spoke clearly and readily with a fascinating Scottish accent. What more does one want?

Somehow I don't feel that the autumn drama has opened with a bang—and this in spite of "The Skin Game." The play that succeeded Galsworthy's play, like the one that preceded it, had too much of the empty box about it. I mean, there was nothing in it.

Although there was only a small cast—three males and two females—two of the males contrived to speak so much alike that it was almost impossible to distinguish between them. I thought it was a golden rule of the Plays Department that no two members of a cast ever spoke alike. Vassya and Abram were alike as two peas after Vassya dropped a characteristic stammer at the beginning of each remark. Till then the two men were easily distinguished.

But wasn't it strange for a character to lose a peculiarity as definite as a stammer within the short space of half an hour? Not that I liked the stammer, but, having started it, Vassya should have gone on with it to the bitter end.

To me, a lover of radio drama, the best bit of news we've heard lately is that Eden Phillpotts has been busy on a microphone play. I assume he is being adequately paid for his pains. It seems to me that this is at the root of the trouble. It is a fact that the best dramatists don't look favourably on broadcasting. At any rate, they don't seem to write for it. Quite obviously, then, the best isn't being done for radio drama, which is unfortunate if radio drama hopes to compete with the other branches of radio entertainment.

No one can say, I should think, that "Squaring the Circle" was worth seventy minutes. And it wasn't the fault of any of the artists or producer, either. The most perfect rendering of such a play wouldn't justify one's giving seventy minutes to it. Once or twice between the scenes a narrator spoke glibly of the "action." The use of the word "action" was really comic.

Everybody interested in the drama was wildly enthusiastic over "The Skin Game." Why? Because "The Skin Game" is a play. The best living

dramatists must be encouraged to write for broadcasting. Our radio actors and actresses are second to none. Our producers ditto. For goodness' sake, then, give them decent plays to do.

It is amazing how all our leading athletes seem to be such good broadcasters. Hamilton-Smythe provides another instance of this. I am left wondering whether it is because of their athletic prowess that they are asked to contribute to the Saturday evening Sports Talk. Or is it because they are known to be good broadcasters?

Julian Rose can still make us roar with laughter with his boxing story, although we have heard it several times before. It takes a good man to achieve this. But then Julian is a good man.

Bern Ecks is an acquisition to the Variety bills. I like his style of humour. The manner of speech he affects, however, puts a bit of a strain on listening, which might interfere with some listeners' enjoyment.

We shall all miss Christopher Stone, and those of us who listened to his farewell broadcast could hardly help feeling rather sad. It was obvious that Christopher Stone was deeply moved especially when he appointed a record to say what he dare not trust himself to do.

C. B.

## A RADIO SENSATION

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(Continued on next page.)

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**A RADIO SENSATION**

(Continued from previous page.)

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AMONG the several new and interesting Formo products that have been recently released is the Formo Steel-Framed Slow-Motion Condenser with Mystic Dial.

This retails at the attractive price of 6s. 6d., and is a very sound proposition which the constructor would be well advised to bear in mind.

The construction of the condenser embodies numerous features of interest which contribute both to its electrical and mechanical efficiencies.

The slow-motion mechanism is novel and excellent. It is all hidden in the spindle of the component, and there are no wheels or bands and pulleys to be seen. The action is velvety smooth, and there is not the slightest sign of backlash or harshness at any point.



This is the latest Formo Condenser which retails at 6/6. The dial is marked both in wavelengths and degrees and a knife-edge pointer enables very accurate readings to be obtained.

The control knob is of generous proportions, and is sharply milled so that it is a pleasure to handle it. The most microscopic adjustments can be easily made with it.

The vanes are solidly inset into a substantial brass supporting spindle, and their ends are locked by a small insulating member. This comprises practically all the solid dielectric lying within the field of the device.

The pigtail is straight and non-inductive, and is taken into the hollowed spindle.

The dial is marked in wavelengths, these applying when a Formo Sensity Iron-Cored Coil is used; but there are also straightforward degree markings, so that the scale is applicable whatever make or type of coil is employed.

The readings are given by a knife-edge pointer enabling close settings to be obtained.

The condenser can be mounted either by means of one panel hole or can be fixed to a chassis by the rigid base of the framework.

There is a lampholder for accommodating the scale-illuminating lamp, so that it will be seen that the design of the condenser is complete, there being in it everything to ensure a pleasant and efficient working.

**SENSITIVITY AND OUTPUT**

Jottings of Interest to all Constructors.

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

I HAVE often noticed from readers' letters that many talk about the set being "sensitive" as though it meant the same thing as giving a loud output. This is a misapprehension which seems to be quite common, and it is important to realise that although, on the face of things, sensitivity and power seem to be closely related, they may not be so.

If a set is sensitive it means that it can be made to operate on a very small incoming signal strength. You may say then that, by the same token, if the signal strength is increased so the output loudness will be increased correspondingly. But this is just where the mistake comes in. It does not follow that the output will increase in accordance with the signal input.

**H.F. & L.F. Amplifiers.**

For example, if you have a receiver with, say, a couple of high-frequency amplifiers and detector, without any low-frequency stages, this would pick up very weak signals, but it might not be able to give out any loud reproduction; it might, for instance, not be able to work a loudspeaker.

Again a set with, say, a couple of low-frequency amplifying stages after the detector and no H.F. stages might pick up the local station and reproduce it very powerfully. The first one you would call sensitive but not powerful, and the second one powerful but not sensitive.

Of course, the real point lies in the fact that if the two were combined, as it were, that is, if you had a set with a couple of H.F. stages and a couple of L.F. stages as well, this would be sensitive and powerful. It is obvious that the output of any set increases when the input increases, and that is where we are apt to get the idea of associating sensitivity with power but, according to ordinary parlance, a sensitive set is not necessarily a powerful one and vice versa.

**"Straight" or Superhet.**

We usually distinguish between "straight" high-frequency circuits and H.F. circuits of the superheterodyne type. The superheterodyne has increased very greatly in popularity during the last year or two; its outstanding characteristic is undoubtedly its extraordinary selectivity.

Added to this it is, of course, extremely

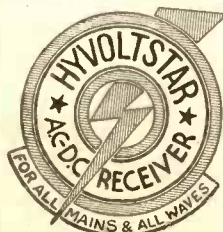
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## SENSITIVITY AND OUTPUT

(Continued from previous page.)

sensitive, which accounts for its great range. In passing you will note that range, especially in these days, is of little use without selectivity; the two really go hand in hand.

It is generally more difficult to make a "straight" set selective, or rather it has been until lately, but the advent of H.F. iron-core coils has greatly simplified the problem. With this new type of coil you can get very sharp tuning, provided you have good tuning circuits.

### Effect of the Iron-Core Coil.

The arrival of the iron-core coil, of which the "Ferrocart" is perhaps the best-known example, has rather changed things round in regard to the "straight" circuit, and many people think that we will be able to get superheterodyne results with the "straight" circuit more simply and at less cost.

The important point is that we can now get very great magnification with great selectivity and at the same time retain complete stability. Curious how things keep catching up, passing one another and falling back, like cars on a by-pass road.

### Grid Bias.

You know that the H.T. current consumption varies with the value of grid bias used, the higher the grid bias (in most

indefinitely without testing it to see if it is giving its proper voltage. It dries up, anyhow, even if it is not being used at all. I have often come across sets in which the G.B. battery was absolutely atrophied and about as much use as a piece of cheese. And yet the owner could scarcely be persuaded to buy a new one. It's like a good many other things in life—too cheap and therefore not appreciated.

By the way, if you are using variable-mu valves, remember that with these the G.B. battery *does* pass an appreciable current, due to the potentiometer volume control, and so it requires attention more frequently.

### Decoupling.

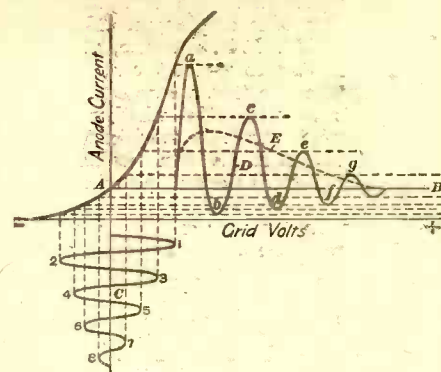
In these days of sensitive and super-sensitive sets, decoupling becomes more and more important. It is obvious that, with such sensitivity and such compactness as we have nowadays, decoupling and screening are essential if instability is to be avoided.

Any reaction or feed-back may ultimately find its way back to the aerial or aerial circuit, but, quite apart from this, there is a very important reason why the H.F. stages should be properly decoupled. The reason I refer to relates to the characteristic curve of the screened-grid valve and the effect of low-frequency energy upon the working of the valve.

### L.F. Surge.

Assuming that the H.F. stages are quite free from L.F. surge, you will see that, even allowing for large variations in the incoming signal energy, the S.G. valve still

## Do You Know What This Graph Means?



The man who can analyse these curves and understand what they indicate knows his job. But if they do not convey to him perfectly definite information, it would appear that he needs more training than he has had. He is not competent to fill a responsible position in wireless.

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cases) the lower the H.T. current. This is perhaps the simplest and most effective way of economising in H.T. consumption, and if it were carefully followed out a great deal less would be heard about H.T. batteries not lasting long enough. In an ordinary circuit you should always use as much grid bias as possible, consistent with getting good quality, and, incidentally, it is an excellent thing to have a milliammeter in the anode circuit whilst you are about it, as this will give you ocular and unmistakable proof of the economies effected. In passing, I wish every radio experimenter would provide himself with a milliammeter and use it freely. It comes in handy in no end of different ways and will pay for itself over and over again. And yet how few possess such an instrument! As instruments go, it is the most useful one the radio experimenter can possess.

### Variable-mu Valves.

The G.B. battery is called upon to supply only a very small amount of current, compared with the H.T. battery (some people will tell you that it does not supply any current at all, but that is not correct), and so it should normally last a good deal longer than the H.T. battery. But, at the same time, it is a great mistake to leave it there

works on a suitable part of its curve, and there is no distortion—at any rate, not from this cause. But if low-frequency energy gets back into the stage, then the H.F. oscillations will be pushed up—and down—the curve, as it were, to unsuitable positions, with the inevitable result that distortion will be produced.

### Working Position on Curve.

You may say that low-frequency energy cannot get into the H.F. side owing to the fact that the constants of the circuit are against it. But remember that the amplification of the H.F. depends upon the instantaneous working position on the curve, and if the influx of L.F. energy causes it to change its position on the curve, so the amplification will change accordingly. There is, in fact, a sort of modulation taking place, and the net result is as though the L.F. energy had actually got through.

So you see how important it is, not only to prevent feed-back from one L.F. stage to a previous one, but also from any L.F. stage to the H.F. stages. If this is not prevented it will almost certainly give rise to instability in one form or another, including motor-boating. And the way to prevent it is to use adequate decoupling.

(Continued on next page.)



## SENSITIVITY AND OUTPUT

(Continued from previous page.)

### Converting a Speaker.

A reader asks me whether it is possible to convert his horn-type loudspeaker to be used with a cone diaphragm. The answer is Yes and No. It is, of course, a relatively simple matter to convert some kinds of horn speakers so that a cone can be fitted, but it is very doubtful whether the job, when done, is worth the trouble. As a rule, the diaphragm of the horn speaker is quite plain—nothing at the centre to fix the cone on to. You can solder a small brass bolt to it by the head, or drill a small hole in the centre of the diaphragm and attach by means of bolt and nut. But the result will almost certainly be unsatisfactory, for various reasons. For one thing, you still have to use the original steel diaphragm, as well as the cone, and when you attach weights to this you alter its characteristics completely. For another thing, the movement or "works" of a horn-type speaker will most likely be quite out of date as compared with a modern speaker of the moving-coil or balanced-armature type. In view of the great improvements in speakers since the days of the horn I advise you not to attempt the conversion.

### Recording Television.

When television becomes a real broadcast service there is no doubt that there will be a market, so to speak, for potted television, by which I mean television of events which took place, say, earlier the same day. This would be merely the logical parallel to the broadcasting, in the evening, of events which have occurred during the day, as is often done at present.

The question then arises as to how such items shall be recorded or stored. It is evident that, since a television receiver is operated by signals, precisely like those which give rise to sounds, such signals can be recorded upon any ordinary record and thereafter reproduced and transmitted. Whether the "matter" would suffer so much in the process as to be useless is another question, but the principle is there.

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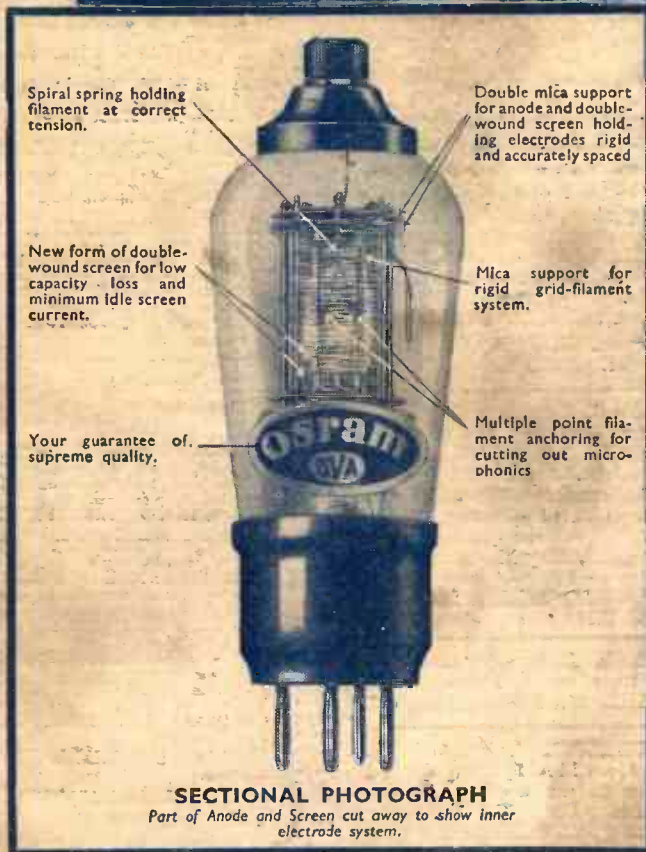
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