This week our cover picture shows a typical scene in one of those popular holiday camps where the radio set is always a good entertainment standby—wet or fine.

**Described Inside:**

- The "Decade" with SIMPLIFIED TUNING
- Radiogram
- A New Type
- Notes from
- Reminders
- Mains Set
- The Midlands
- Experiment

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A SEA SERPENT!
PUBLIC TASTE
ANTI-PIPS
PUNCTUALITY CRANKS

RADIO NOTES & NEWS

Don't Leave Your Licence at Home.

The portable radio—seems to be even more popular with the river lovers than with motorists and campers, though the last-mentioned brand are very keen. A London writer reports that during the Whitsun vacation about one in four of the pleasure boats on the Thames sported a portable receiver.

And by the way, let us remind ourselves that when the portable travels its licence must go with it, lest there be a P.O. inspector, a summons, and a fine.

The Sea Serpent of Radio.

It was bound to come, just like the first cuckoo, the largest strawberry, the giant gooseberry, and the sea serpent of the silly summer season. I refer to this “wireless causes rainy weather” letter.

This time a Bristol paper has got it first. Hark!

“Surely the tremendous amount of electricity emanating from hundreds of radio stations is bound to affect the weather. Since the advent of wireless we hardly had any decent or seasonal weather. Isn't that lovely—as the sweet young things say. A perfect specimen, true to type; not a spot or blemish of any kind.

A Few Questions.

What is a "tremendous amount" of electricity? Does a "tremendous amount" of it emanate, etc? How does the writer of the letter know what amount of electricity emanates, or even that it is "tremendous"? What is electricity, and does he really believe that it emanates from radio stations?

Why should electricity, even if it emanates copiously from radio stations, make rain? Why should it not make sour milk and dry weather? Oh yes! I have heard about the condensation of moisture by electrical means. Me and Millikan are like father and son! Haven't we had any decent weather since the "advent" of radio? When does he think radio "advent"?

Evidently not a reader of "P.W."

THE POPE AND THE 'PHONES

Television.

In a lecture delivered at University College, under the auspices of the Television Society, and entitled "Seven Years’ Experimental Research and Investigation of Television," Mr. R. W. Cocking, F.P.S., A.M.I.E.E. (Fellow), recently stated: . . . in spite of the vast amount of

SPEAKING at the Royal Institution last month Sir J. Reith brought up his heavy oratorical artillery in order to prove that the constitution of the B.B.C. is the best in this best of all possible worlds.

The association of elected representatives with the management of public utility services, he thundered, is fundamentally unsound. Government department methods are inapplicable to the conduct of public services.

I smile at the picture of Sir John pretending to pretend to believe that the B.B.C. is not run "like a Government department—and pass it over. What I want to know is, would he not be a fine Minister of Broadcasting and Television?

Here is a sentence from his speech which set me thinking. "If any will have it that the B.B.C. has been arbitrary, even cruel if they like, in declining to accept and be guided by a kind of lowest common denominator of public taste, then I reply that the great mass of listeners has approved and encouraged the Corporation."

He is right, certainly I verily do believe, and if only the film-exhibiting industry could be placed under his control England would be a cleaner place; slightly less arresting films would be shown, but the shuy suggestiveness which sickens the soul would be abated. I will say, however, that all the English-made films I have seen were clean.

My Anti-Pip Campaign.

Is there no artist at the B.B.C. to tear his hair and throw the Time Signal Controller down the ash-lift? Did you notice that organisation was carried so far that those petulant "peas" were allowed to wrench us back from the fairy world just in the tensest moment of "The Turn of the Screw"?

It was utterly inexusable! But list! I have a comrade in the fight—not less a (Continued on next page.)
person than Hilda Matheson, who was until recently, a B.B.C. "Talks" expert. 

**Punctuality Cranks.**

Describing her impressions of "The End of Savoy Hill," Miss Matheson imagined that she was listening in the company of an explorer who had been absent for ten years. "He winced, I am glad to say, at the six barbarous 'pips' superimposed on no matter what programme, even after I had explained that it was for the sake of the punctuality cranks for whom Big Ben was not precise enough."

I do beg of Sir John to see what can be done to remove this blot on some of his choicest items.

**Plain Words About the B.B.C.**

If the B.B.C. could hear what the fellows in the "93 up" say about them, they might — but certainly wouldn't — shiver up. I say but little; my job is to mark, learn, etc.

When I was tackled by the big man in the corner seat — smokes Burmah cheroots and has a son in the Indian Civil — as to why I never ecss the B.B.C., I replied that although I loathe some of the B.B.C.'s activities I consider that for ten bob they give me and I am willing to help them.

Apart from his hankering after "Unidyne," Mr. White is a "Cosmic" user, having replaced his Bechstein Baby Grand, and as its keys are not superimposed on the Indian Civil — as to why I never ecss the B.B.C., I replied that although I loathe some of the B.B.C.'s activities I consider that for ten bob they give me and I am willing to help them.

**Note for Resurrectionists.**

To "Gentle" (Huddersfield), and any other readers who are serious in their desire to resurrect the "Unidyne" circuit, be it known that Mr. F. W. White, 33, Lewis Flats, Hackney, London, E.8, is willing to help them. Ask Mr. White! And don't forget postage stamps!

As to his hankering after "Unidyne," Mr. White is a "Cosmic" user, having replaced his Bechstein Baby Grand, and as its keys are not superimposed on the Indian Civil — as to why I never ecss the B.B.C., I replied that although I loathe some of the B.B.C.'s activities I consider that for ten bob they give me and I am willing to help them.

**"The Tryer."**

This gentleman, of Ashton-under-Lyne, who has conceived the idea of writing his pseudonym from right to left, as it would come out on blotting paper — (made one blink for several minutes) — sends me his log for May 8th to 16th, though he omits to state details of his receiver.

He does, however, make a remark which interested us, for he says that he received a station called the "Colombia Broadcasting System," and adds that it is new to him. What a very receptive receiver he must possess, for that system is a great chain of American stations. A very nice log otherwise; U.S.A., Spain, Russia and Italy on L.S.; 5 S.W. on "phone!"

**The Complete Canned Concert-Quilt.**

I hear that at the Amsterdam International Exhibition there appeared a combined all-electric piano, radio receiver and radio-gramophone. Of course, a really complete job would have been made of it if the layout had included a miniature cocktail bar and a musical vacuum cleaner! However, the basis of the outfit is a Bechstein Baby Grand, and as its keys are struck the music is electrically reproduced through an amplifier and a moving-coil loudspeaker. There is included a microphone for making announcements. Is there enough free money in Europe to buy this?

**"SHORT WAVES."**

"I bought a three-valve set a week ago, and I am now a rigid wireless connoisseur."

**Provincial Paper.**

"His wife has gone back to her home, where she can hear herself speak." — "Humorist."

A.: "Will you come and spend the evening with us? We're trying out our new wireless."

B.: "Thanks, old man. I'll be there sharp at ten."

**FATHER'S PART.**

The very modern child was looking through his "at home" book of Great War photographs. "Dad," he said presently, "what were you in the war?"

Father smiled proudly. "Why, my son, your father was a battery sergeant-major," he replied.

"High or low tension, dad?" asked the boy. "Answers."

Cooksey expert (broadcasting for the last eight months): "And when all these instructions have been carefully followed, go into the toolshed and pull the old main, sledge-hammer and pick-axe; or, as a last resource, pour with dynamite!"

**CONTROVERSY!**

Just take this letter of Chris. Stone's gramophone recital. Who casts abroad his home-made verses (of course) on the air? Ask Mr. Jones.

And miss the hot stuff he rehearses; but that won't stop him moulding there into the vast, defended void of air.

Take, as I said, the case of Jones, who thinks (and means we all know it) that deep conviction marks his tones. What does he spout proclaims him poet. The private view of his own patter surely amounts to controversial matter?"

**BITTER.**

When we're freed from the day's toil... (Ha!)

**Answers.**

**Tired of Evolution.**

B. (near Halifax) writes an interesting letter, but nevertheless that of a fellow who is wearying of "that game." He feels that the "home constructor" is being pushed out of the picture and that he must bow before the "all-metal, all-mains, all-goodness-knows-what, one-dial." I advise him to wait till after his summer (Ha!) holiday and then to think the matter over.

"P.W." has a lively, keen, scientifically-directed technical department, whose efforts are directed solely to the achievement of some progress, some step, in the evolution of radio reception. Let him stagnate and turn into a mere listener if he chooses. But there are always fresh worlds to conquer and, if he be a genuine radio enthusiast, he will follow "P.W." like a bloodhound.

**Chris, and the Pips.**

Much gratified to notice that during Chris's gramophone recital the other night, which was most likely disturbed by those absurd Greenwich time "pips," he was moved to remark: "Hum! I thought that would happen!"

In a good-natured fellow, such as Stone must be, I am glad to hear his appraising of a caustic remark. Frankly, I think the B.B.C. is an easy to allow scientific chronology to obtrude its obscure horizons while music holds the stage.
A TRANSFORMER is a very pleasant help in trouble. It raises volts without consuming appreciable power. It is an important component and in certain cases its use is imperative.

For all that, I predict that in time no one will even use transformers unless absolutely forced to do so.

There are two ways in which to look at wireless— one as a hobby, the other as a means to extend one's powers of hearing. You may use wireless in both of these forms if you will.

Difference in Outlook.

The hobby of wireless is building new sets and circuits and pulling in more and more distant stations. The other side of wireless lies in the possession of a set which gives a truly clear sound picture of an event broadcast.

The hobby side may well take liberties with quality and go for sensitivity, selectivity, and a sufficient economy of material. The extended-hearing side discards anything which may even theoretically affect the "pleasingness" of the result.

Let us first discuss the transformer, then, in terms of its convenience as a means to eliminate perhaps a whole valve stage, as a means to "step down," to "match up impedance," and so on.

We do not use iron in H.F. circuits, and so the first time we meet the L.F. transformer is in the detector stage. Now, a detector of the "power" leaky-grid type is in the detector stage. Let us first discuss this transformer, then, in terms of its convenience as a means to eliminate perhaps a whole valve stage, as a means to "step down," to "match up impedance," and so on.

Saving the Volts.

If you use resistance in the anode of the detector you have to use a very high H.T. voltage, and that is expensive if you use the mains, or almost prohibitive if you use the dry battery. So a transformer is a very low D.C. resistance impedance and very useful. But so is a choke a low D.C. resistance impedance. But the transformer can actually step up the volts from (detector) primary to secondary, and so many people like to use it because of this gain.

Inter-valve transformer are excellent in that they economise H.T. and step up the volts between stages.

Output transformers allow either a very high-impedance valve—e.g. a Pentode to work into a relatively low-impedance (moving-iron) speaker, or an ordinary valve to work into a low-impedance speaker (moving-coil), etc., etc. In this last case you gain nothing in "bongs" you merely use the transformer as an efficient means to transfer power from one type of circuit to another.

What is there to look for in a transformer?

Firstly, the frequency characteristic must be reasonably good.

Secondly, the expense must not be absurd.

Now you cannot really talk about the frequency characteristic of a transformer without a more concise definition. It's the characteristic of the transformer plus valve and surrounding circuits which matters.

AS IT SHOULD BE SHOWN

Figure 1

What is known as the magnetic leakage of a transformer can be considered as an inductance in series with the secondary winding. Unless properly used, this inductance can completely spoil the response curve of a transformer.

L.F. TRANSFORMERS

Our Chief Radio Consultant continues his striking series this week, by throwing new light on a much misunderstood component, and on its claims when compared with R.C.C.

This means that the transformer ought to be drawn, as in Fig. 1, where Le is an inductance introduced outside the secondary in series with the load. Now, if this load is a valve, then it has an effect capacitance C, as shown. This capacity, in series with an inductance, may have an effect. Thus, when at a low frequency resonance occurs, and (relatively) large circulating currents are set up, and the voltage across C may rise above normal.

This effect is often usefully by those who know how to take it—it is terribly effective in producing bad humps in frequency characteristics to those who don't!

Plenty of Iron.

My advice to you, when choosing an inter-valve transformer, is to get one which has a decent amount of iron in it, which has a decent reputable name behind it, and I should try and be sure to ask the makers for frequency characteristics, stating the makes of valves with which such characteristics were obtained.

But now for the "quality" merchant. Why do I not like transformers? Now look at it like this. I have taken two loudspeakers—one we will call M.C., and the other M.I. M.C. had a really quite good frequency characteristic, M.I. had a worse frequency characteristic.

I played those two loudspeakers from a flat characteristic amplifier fed by broadcasting or by direct speech into a high-quality microphone or by First-class gramophone pick-up. And I found that I, and others with ears, and ordinary people with ears, and musicians, preferred M.I. So I said with justification. Frequency characteristic is not everything.

Resistance-Capacity Coupling.

I then produced the very finest result I could by using a resistance-capacity push-pull technique throughout my chain, using no iron anywhere except in the speaker M.I. mentioned above. I then began to introduce transformers, having, to all intents and purposes, perfectly straight frequency characteristics between 30 and 19,000 cycles. You could remark the introduction of transformers, each time the introduction of transformers made the result worse.

(Continued on page 466.)
THE crashes and bangs with which atmospheres are still providing us are cramping a little the long-distance set's style, since only the most powerful of the foreign stations are really worth listening to on evenings when these natural nuisances are in evidence. Luckily the number of powerfully received stations is considerable and except on the very worst of nights the long-distance set can do useful work in bringing in alternative programmes from abroad.

Looking through the records in my log for several weeks past, I am able to give the reader a list of the stations which never seem to falter and whose strength is greater than moderate use of reaction. These are generally receivable with good quality and without undue interference unless atmospheres are exceptionally violent.

A Long List.

The list of medium-wave stations is surprisingly large. Starting near the top of the band and working downwards it reads: Brussels No. 1, Florence, Prague, Langenbiel, Bernomute, Rome, Toulouse, Strasbourg, Brussels No. 2, the Poste Parisien, Hilversum, Heilsberg, Turin, Gleiwitz, and Trieste. The list includes no less than fifteen stations which are now "all the go."

WHO IS IT?

These listeners certainly seem to have struck something good! Perhaps it is one of those fascinating Continental accordion bands, which are now "all the go."

NOTES FROM THE MIDLANDS

News about programme activities in this important area.

Negotiations have been carried out for broadcasts this summer in the Midland Regional programme from Skegness and other resorts. It is hoped that Fred Clements' Concert Party from the Rhondda, and De Moid's Party from the King's Theatre will be relayed from Skegness.

The land-line from Skegness to Birmingham is rather a long one, the distance between the two being about 100 miles, but the engineers do not anticipate any difficulties. Land-lines of much greater length are, of course, regularly used by the B.B.C. nowadays. There are also several inland resorts on which the Midland Regional Director intends to dwell. Relays of bands and concert parties have already taken place several times this season from Cheltenham and Leamington.

Out of Bounds!

On the east, the Midland Regional station can draw on Skegness and possibly one or two other resorts, but Yarmouth and seaside towns further south belong technically, I believe, to the London Regional area. Similarly, relaying from coastal towns on the west is out of the question as there is nothing nearer than Welsh resorts, and in many cases these are the preserve of the B.B.C. West Regional administration at Cardiff. To avoid overlapping of activities, England and Wales were recently divided up roughly between the various regional administrations, and the boundaries decided upon gave the West Regional station the whole of Wales and a large part of the south-west of England.

The four corners of the Midland region according to this division are Shrewsbury, Mablethorpe, south of Skegness, and Swindon. London administers the rest of the south and south-west of England as far as Lyme Regis. Cornwall comes under the Plymouth station. The Northern Region is bounded by Berwick, Grimsby, Stoke, Chester and Carlisle.

A First Relay.

Outside broadcasts by Midland Regional are averaging over fifty a month. Two rather unusual O.B.'s during June are the first relay ever carried out from Pershore Abbey, Worcestershire (June 20th), and the running commentary on the motor-car hill-climb at Shelsley Walsh (June 20th).

In addition, studio activities continue vigorously, though the absence of a really good-sized orchestra at Birmingham prevents the production of ambitious musical programmes in the studios, and it is on the dramatic side that the greatest activity is to be found.

A very interesting experiment was made on June 15th when a broadcast version of the Leicester Pageant was produced in the Birmingham studios. Mr. Percy Edgar, the Midland Regional director, and his principal assistant, Mr. Charles Brewer, did not consider that a relay of the Pageant at Leicester would be a satisfactory broadcast. A special adaptation was, therefore, made and the cast came over from Leicester to act in the Birmingham studios.

Talented Officials.

Miss Gladys Ward, who is an official of the Midland Regional station and is the liaison in Birmingham between the B.B.C. and the Press, was the authoress of a play called "Love in Idleness," which was broadcast from Birmingham on June 2nd.

When, as in this case, a B.B.C. official takes a personal part in the programmes, his name appears on the programme as "official." This naturally appears to us but one of our own. Miss Brewer's name appears so frequently as author and producer of programmes that it is probably better known than any other.

L. W. A. B.
LETTERS TO A YOUNG "HAM"

by Ariel

In his second bright epistle, "Uncle Ariel" takes his young nephew seriously to task for preferring model railways to modern radio! As he points out, it is much better to get Sydney on one valve in daylight than to know whether the 6.45 from Lower Pudlington runs on Sundays!

My Dear Young Ham,—Since I last addressed you Time has plucked you from the perambulator and deposited you in Miss Sniffer's Juvenile Academy for Grown-up Post-War Products. Your pa and ma tell me how clever you are; that's why uncles leave their money to Dogs' Homes! But I never did like too clever neevies. You doubtless recall your cousin Homes!

"As Man To Man!"

What I am driving at is—where do you stand in relation to radio? There! I put the point to you, bluntly, frankly, as man to man! Is the loco, biz, the be-all and end-all for you, or is it merely a blind? You see, I lay the cards on the table! Face up—and no conjuring! Come on, what do you say? Is it to be grades or kilo-cycles? Porters or portables? Bogies or billifarads? I can't say fairer than that.

I do not think that the Snock-Portles would be happy to have a member of their clan in Rails, especially with Great-Uncle Timothy in Overseas Air Lines. Moreover, Rails have had a depressing effect upon the clan's expectations since Grandpa invested so much in San Matadorian rails—said rails being blown up quarterly by the revolutionary party and the only locomotive having a boiler like a colander! No, Horrie, do not nourish an anachronism in your young bosom. You are of the Radio Age!

It is true, as you point out, that from the railway emerged a Jimmie Thomas. But I never did like too clever neevies. Perhaps the first time in history a two-sided conversation was carried on recently between the famous "Flying Bootsman" and the air liner "Hercules," when both of them were travelling at full speed. Here is the compact apparatus which was installed on the train for the experiment.

Two-Way Talks 'Twixt Train and 'Plane

For the first time in history a two-sided conversation was carried on recently between the famous "Flying Bootsman" and the air liner "Hercules," while both of them were travelling at full speed. Here is the compact apparatus which was installed on the train for the experiment.

Your affectionate
Uncle Ariel.
THE MIRROR OF THE B.B.C.

A "WAR" IN SCOTLAND!

By O.H.M.

THE KING AND MILITARY BAND MUSIC—B.B.C. AND CARL ROSA

FOREIGN OPERA RELAYS, etc.

THE trouble about the Highlands has been overshadowed by the new conflict between Sir Daniel Stephenson, on behalf of the Glasgow Choral and Orchestral Union, and Mr. David Cleghorn Thomson, the B.B.C. Director for Scotland.

Glasgow has never forgiven the B.B.C. for moving its Northern Headquarters to Edinburgh. But the present crisis is concerned with the formation of the new Scottish National Orchestra, which the B.B.C. is sponsoring.

Sir Daniel Stephenson takes the view that the attitude and action of Mr. Cleghorn Thomson make the co-operation of the Glasgow Union difficult, if not impossible. There have been some very angry public exchanges.

The balance of the argument seems to rest with Mr. Thomson, although he, in the opinion of many, might have dealt with some aspects of the situation on rather different lines.

The King and Military Band Music.

Apparently His Majesty is a great enthusiast for Military Band Music, and is an assiduous listener to Mr. Walton O'Donnell's Military Band. Indeed, this liking by the King is so widely known that the absence of Mr. O'Donnell's name from the Birthday Honours List caused some comment.

I believe, however, that more will be heard about this next January.

B.B.C. and Carl Rosa.

The Carl Rosa Opera Company has been suffering from the hard times common to all artistic enterprises except the B.B.C. It is understood that the B.B.C. has actually stepped in to help the Carl Rosa Company round a difficult corner in the last fortnight of its present season.

If this is so, it reflects great credit on the B.B.C., which has come in for some very hard knocks from spokesmen of the Carl Rosa interests. It has always been a cause of complaint that the Opera Subsidy should be administered by the B.B.C. in the interests of only the Covent Garden Syndicate.

The Carl Rosa Company has a warm place in the hearts of thousands of music lovers up and down the country. It has, indeed, contributed far more to spreading the love of Opera than any other organisation.

If the B.B.C. can so contrive matters that the Carl Rosa Company is able to go on permanently without too great a drain on B.B.C. finance, there will be general public approval.

Foreign Opera Relays.

The nations are certainly getting together with sensible plans for programme exchange, and nothing, I think, could be more acceptable to the English listeners than some forthcoming opera relays from Germany.

Following so close upon the all-too-short Covent Garden season, will be the relay on Wednesday, June 22nd, of the second act of "Samson and Delilah" to London listeners from the Berlin State Opera, followed on Friday, July 1st, by the first act of Verdi's opera, "The Sicilian Vespers." Another relay is arranged for Friday, July 8th, of Weber's "Euryanthe," which has been specially abbreviated for broadcasting; while I understand that negotiations are in progress for a relay, on Wednesday, July 27th, of the first act of Mozart's "Don Giovanni," from the Residents Theatre, Munich, where it will form part of the Munich Festival.

IT CAN'T BE THE VALVE!

It can't be the valve he is indicating, for this is the "revolutionary" set used by those English electrical geniuses, and it uses no valves at all. They claim it repeals in the foreign with amazing ease.

Mr. ERNEST NEWMAN must have delighted all Wagner enthusiasts with his plea for more tolerance on the part of anti-Wagnerians.

I must confess I thought his argument very sound, and his remark on the popularity of the long opera as shown by the fact that people can and do enjoy five hours of Wagner really unanswerable.

It is quite true that we must allow the artiste to do his own job in his own particular way. "We must try and cultivate an open mind, endeavouring to understand what is in the artiste's mind," said Mr. Newman.

The thought struck me, how much of this reasoning was applicable to the B.B.C. and its critics. A good deal, I think.

Although Mr. Lyte was more restrained this year in his running commentary of the Derby, one could sense that he wasn't entirely free from excitement.

I suppose that the majority of listeners (and it would be a record "house" for this commentary) were anxious to hear both events, viz. the result; but I always feel that, on the occasion of the next Derby broadcast, there's a good deal of really interesting matter left unsaid.

Don't you think that excellent comedy team, Alexander and Dowd, would improve their turn if the more gloomy of the two (I don't know whether it is Alexander or Dowd) would cheer up just a little bit.

(Continued on page 456.)
The development of the indirectly-heated-cathode valve has been remarkably rapid. It is only a comparatively short time ago, since the first 1 amp. A.C. valves made their appearance, and since then we have been led rapidly through steadily improving types to the 5, 25, and (shortly to be released) the 1 amp. valves for use with D.C. mains.

There are no S.G. types yet available, and I can say I was most agreeably surprised. A two-valve set using these valves is just about as good as one using the lower voltage types we have in this country.

But it is at the same time not only very much easier to build, it is cheaper, and it can be used, without change, on either D.C. or A.C.

This seems absurd, I know, but it must be remembered that as the heaters of the valves take the full mains voltage across them they need neither a breakdown resistance (in the case of D.C.) nor a step-down transformer (where A.C. is concerned).

No Voltage Regulation. Illustrating this article are photographs of the two-valve Oster-Ganz receiver (the third valve is a rectifier) and the circuit on which it is based.

From this it will be readily seen that the fact that the heaters need no voltage regulation greatly simplifies things. The rectifying valve can, if desired, be used on either D.C. or A.C. In the former case it is a passenger, while in the latter it is essential to provide smooth anode current for the rest of the set.

Smoothing is carried out by means of a specially round double choke, and apart from this everything in the set is perfectly standard. The choke, I understand from the valve people, is obtainable, or will shortly be obtainable, from Messrs. Igranic Electric, and from Ormond.

D.C. or A.C. Apart from the choke the set is perfectly normal and resembles the usual D.C. receiver (minus the heater resistance) with which we are familiar. Where it does differ is in its application to A.C., for it is decidedly novel to be able to operate the same set on either D.C. or A.C., and the lack of mains transformer in the latter case is very striking.

Naturally one is limited in the available H.T. to the voltage of the mains, and any step-up that could have been arranged by the transformer has to be foregone. But this is important only in cases of low-voltage mains, such as the 105-volt supply at Hampstead and other places, and where it is desired to use very big power.

For all ordinary cases the 200-240-volt supply is ample, and users of the Oster-Ganz circuit would be as well off from the voltage point of view as they would with the standard set.

(Continued on next page.)

WITH RECTIFIER VALVE REMOVED

The rectifier valve has been taken out, and, with the cathode and anode valve sockets shorted, the set is ready for D.C. operation. Alternatively, though wanting a valve, the set can be used on D.C. with the rectifier in situ. The letters (with the exception of P., the potentiometer refer to the types of valves used in the set. Note the copper "fishing net" over the bulb of the detector.
THE NEW TYPE MAINS SET

(Continued from previous page.)

Naturally the lack of the transformer provides very much easier construction, more compactness, and a great saving in cost. The rectifier is simply in series with the mains, with its heater across the mains, and that is all there is to it.

In constructing a D.C. set the rectifier would usually be left out, its cathode and anode connections being joined together. The potentiometer, which is essential on A.C. for balancing out hum, would also be omitted in the case of D.C. Otherwise there is no difference between the two circuits.

Metallised heater wiring is advisable, though the ordinary twisted flex is suitable in many cases.

Wire Mesh Screen.

The characteristics of the various valves so far available are very good, and no doubt these will be improved as time goes on. The screened-grid valve has already passed experimental stages, and I am daily expecting to hear that it is released for "general consumption."

HARDLY ANYTHING IN IT!

The simplicity of the set is remarkably striking when you compare it with the average D.C. or A.C. receiver of standard type. This is all the wiring—underneath the baseboard.

An interesting feature in the case of the detector is the wire mesh that is fixed over the bulb of the valve to act as a screen. This is in lieu of the zinc metal coating which we give our valves, it being "earthed" to the cathode in just the same way.

No Mains Hum.

During the tests with the set illustrated here, it was noticeable how free from either D.C. or A.C. hum the reproduction was. The set could be handled in exactly the same manner as the normal two-valve set of British design.

Most of the wiring, as you can see, is carried out under the baseboard, and the lack of the usually necessary mains components makes the set almost ridiculously light and compact.

The circuit shown in the theoretical diagram is quite complete. Should enthusiastic readers wish to hook up a set of this description, the choke has the usual inductance, but must be properly balanced, and will be obtainable as mentioned, while the other values are marked on the diagram.

The rectifier is simply in series with the mains, with its heater across the mains, and that is all there is to it.

In constructing a D.C. set the rectifier would usually be left out, its cathode and anode connections being joined together. The potentiometer, which is essential on A.C. for balancing out hum, would also be omitted in the case of D.C. Otherwise there is no difference between the two circuits.

Metallised heater wiring is advisable, though the ordinary twisted flex is suitable in many cases.

Order Your Voltage.

Should you want to get hold of these valves (they will probably be generally available before long), they can be obtained from the agent, Eugen Forbat, Farnham, Surrey. A number of voltages are available, for it must not be forgotten that these valves, unlike the types we have been accustomed to, are sold like electric lamps, for the particular voltage of the mains on which they will be used. Thus you can get them in practically any voltage from about 150 to 250 volts, and when ordering you must specify the voltage you require.

The usual detector and various L.F. and A.C. types are available, and details will be readily sent upon application.

Naturally, whether or not this type of valve becomes popular in this country will depend upon the attitude of our valve manufac-turers. A full vol-tage valve seems to me to be much needed aid to radio, for although we can get down to .1 amp. on D.C. sets, there is still a great waste of voltage in breakdown resistances for the heater circuit.

The Ostarc-Ganz valves have a current consumption of something like 30 to 40 amp, giving them a wattage on 200 volts of about 6 to 10 watts, so that the drain on the mains is practically negligible until a very large multi-valve set is considered.

With 200 volts and .1 amp. valves the wattage is, of course, 20 watts up to the maximum number of valves available, while for the 3 amp. type it is 100 watts. I shall await the future of the new valves with the greatest interest.

DECOUPLING FOR YOUR SET.

The Editor, Popular Wireless.

Dear Sir,—With reference to my article, "Decoupling for Your Set," I would like to point out, in order to correct a possible wrong impression, that although a simple untapped choke, or a tapped choke as an output filter as a simple untapped choke, the latter is far and away better when viewed purely as a filter.

Where a tapped choke or a transformer is necessary to ensure adequate matching of valve and speaker, in order to obtain the best results from them, there is still no addition to the difficulty in that adopted with some moving-coil speakers.

In this case the speaker is both choke and transformer coupled, and the transformer will be quite cheap as no D.C. has to pass through its primary. Readers who are interested in output transformers should consult the various valves, when they may still be used without ill effects. If trouble is experienced the above scheme should be tried.

Yours faithfully,

A. B. GIBSON.

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Yours faithfully,

A. B. GIBSON.
The question of operating a radio-gramophone from batteries is always cropping up, and last time in those notes I mentioned that there were two ways out of the output voltage problem—to use either push-pull or one of the new pentodes.

In either case the consumption of current from the anode power source will be high, but the need for high voltage is obviated. How much power you are going to dissipate in your radio-gramophone depends upon several factors. These include whether or not you have a mains unit for the H.T., what loudspeaker you desire to use, and most important of all, how loud you require the reproduction to be.

Select a Sensitive Speaker.

This latter is the deciding factor in every case, for upon the answer to that question depends the size of the output valve or valves, the type of loudspeaker, and therefore the power consumption of the set.

The degree of loudness will depend upon the sensitivity of the loudspeaker (given a definite output wattage), and it is best, when designing a radiogram that is to have a definite output wattage), and it is best, therefore, to use either push-pull or one of the new pentodes.

But even with a sensitive speaker you will be surprised at the amount of power that is required to give anything like a good punch to gramophone reproduction, for the use of a very sensitive pick-up will probably not help you. This does not mean that a sensitive pick-up should not be used, but if one of exceptional sensitivity is employed, the detector (or first L.F. valve when used as a gramophone amplifier) will probably be badly overloaded on loud passages, unless the sensitivity of the pick-up is offset by means of a volume control. Thus, you can start with a big input from the pick-up and hope to get a big output that way. The size of the output valve is the main consideration, and it is upon this that the success or failure of the receiver rests.

Something Up Your Sleeve.

Obviously, if your room is very small, you will not need so big an output to "fill it" comfortably as when the room is large. The average room requires, with a sensitive pick-up, at least 500 milliwatts to give an adequate input.

Thus, you can start with a big input from the pick-up and hope to get a big output that way. The size of the output valve is the main consideration, and it is upon this that the success or failure of the receiver rests.

The easiest way to do this is to use one of the new pentode valves but it cannot be obtained without the consumption of a considerable amount of current. You cannot get something for nothing, and if you want a large output, you must be prepared to give an adequate input.

With the Mazda Pen. 220A the total consumption of a three-valve radio-gramophone would be in the order of 20 to 25 milliamps at 150 volts H.T. Thus, for a dissipation of 3,000 milliwatts you will get about 1,000 milliwatts of useful A.C. "speech" energy. Not bad going, that? But your speaker and the valve must be matched, if you are to get anything like the maximum undistorted power output of the valve.

There are speakers on the market now that are designed to work on 500 milliwatts or so. They are admirable for the small battery radio-gram, for they ensure that the most will be made of the energy passed on to the speaker.

A Cheap Battery Model.

Where a set is to be used only occasionally as a full-blooded gramophone, and will normally be employed as a radio receiver at moderate volume, it is worth considering the substitution of the Pen 220A type of valve by the Pen. 220, which is a much "smaller" valve, though it is capable of giving an output of 500 milliwatts. But it takes very much less than the 220A from the H.T. battery.

This valve is sufficient in some cases for the gramophone side of the set, where only small volume is required; but, as I said before, it leaves very little for safety. For those who are interested in battery radio-gramophones, a simple, cheap home-constructor's design will appear in the July issue of "Modern Wireless." Here the larger pentode output valve is used, and one of the sensitive loudspeakers I have mentioned.

K.D.R.

The question of the battery-driven radiogram will always be a vexed one, owing to the difficulty of getting adequate power without prohibitive cost due to battery energy expenditure.

The PRICKED FINGERS issue of "Modern Wireless."
JULY 7th.—The actual ceremony of “Crossing the Line” seems more amusing to look back upon than it did when I was figuring as one of the “victims.”

A procession was formed, headed by Father Neptune wearing a cloak, a string of white beads about his neck, and carrying a large wooden sword with jagged edges. Next came the barber with a wooden razor about two feet long, and the barber’s assistant, the soap boy, carrying a pail of water which could be smelt from one end of the ship to the other.

The rear was brought up by four policemen and the rest of the ship’s company, including the captain, who on such occasions has to take a back seat and put up with quite a lot of nonsense from the crew.

Arrived on the lower deck, where there was a large canvas tank full of dirty water, Father Neptune ordered me to be shaved. While this was being done he began a long speech.

Beer All Round!

One has to be sensible on these occasions, and if one wants to be let off lightly it’s best to struggle or make a fuss, but—I must admit that it was difficult to resist the barber’s boy slapping me all over with the expenditure wash well supplied with much filthy muck.

After a short respite, I was eventually thrown into the canvas tank and ducked over with a whitewash brush well supplied with such filthy muck.

This picture shows the scene when listening for submarines with a “hydrophone”—the ingenious electrical ear which picks up the regular thump of the engines, and thus discloses the presence of an under-sea enemy.

After a short rest, I went ashore with a good part of my clothes and ironing, and was back at sea again before sunset.

Masses of Monkeys.

JULY 11th.—Sierra Leone, West Coast of Africa. We arrived here just in time to cross the boom before sunset. As we steamed slowly up to our anchorage, V— and I, standing on the boat deck, noticed a small promontory. As we were passed by, we both exclaimed in one voice, “The Blue Lagoon!”

Certainly the effect was indescribably lovely, for the promontory was covered with masses of palm trees, and as we passed by we could see that they were alive with parrots and monkeys. The water of the bay was perfectly calm and to complete the beauty of the scene, the beach was of a deep orange colour, fringed with palm trees and great masses of flowering shrubbery.

Particularly noticeable was the brilliant yellow of the mimosa. We eventually anchored off this little town, which nestles at the foot of a range of hills, luxuriantly covered with the tops of which are often hidden by clouds. Dotted over the face of the hills are dozens of little villages, and from the sea they look just like doll’s houses.

(To be continued.)
The Unit Control Panel, showing:
Top: The S.G. Plug, with its three alternative voltage tappings: 80-90; 70-80; 50-70; up to 3 m/a.
Centre: Negative Plug.
Bottom: The 50/80 v. Plug, adjustable in three positions, High, Medium and Low, up to 3 m/a; and the 120/150 v. Plug—120 volts at approximately 21 m/a up to 150 v. at approximately 11 m/a.

All models are similar in external appearance. Size, 9 x 5 1/2.

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<th>Voltage Tappings</th>
<th>Price</th>
<th>EASY PAYMENTS Initial Payment / Monthly Payments</th>
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<tr>
<td>A.C. 12</td>
<td>12 mA</td>
<td>S.G. ; 80; 120/150</td>
<td>£2.15.0</td>
<td>6/6 / 5/-</td>
</tr>
<tr>
<td>A.C. 18</td>
<td>18 mA</td>
<td>S.G.* ; 50/80; 120/150</td>
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<tr>
<td>A.C. 25</td>
<td>25 mA</td>
<td>S.G.* ; 50/80; 120/150</td>
<td>£3.17.6</td>
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<tr>
<th>Model</th>
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<th>Price</th>
<th>EASY PAYMENTS Initial Payment / Monthly Payments</th>
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<tr>
<td>K.12</td>
<td>12 mA</td>
<td>1 amp at 2, 4 or 6 volts</td>
<td>£3.19.6</td>
<td>9/- / 7/3</td>
</tr>
<tr>
<td>K.18</td>
<td>18 mA</td>
<td>1 amp at 2, 4 or 6 volts</td>
<td>£4. 12.6</td>
<td>10/3 / 8/5</td>
</tr>
<tr>
<td>K.25</td>
<td>25 mA</td>
<td>1 amp at 2, 4 or 6 volts</td>
<td>£5. 7.6</td>
<td>11/9 / 9/10</td>
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To attempt a literary reconstruction of any historical incident or period is always a risky proceeding. To attempt such a reconstruction in a medium as comparatively experimental as broadcasting still remains, and of an episode so generally well-known as the Campaign of Waterloo, may seem almost unjustifiably audacious.

But to those who maintain both interest and belief in the possibilities of radio as a medium, the idea of making use of it as a means of historical reconstruction has been, for a considerable time, a fervent plea for such reconstructions, and an actual example of a programme of this kind has already been broadcast in "Crisis in Spain," which was composed last year by Mr. E. A. Harding. It may be objected that, as far as the Battle of Waterloo is concerned, the last word must already have been said.

"The Battle of Waterloo.

"In the eyes of a good many people items in radio programmes approximate far more nearly to contemporary and journalistic activities than to historical treatises, to novels, or to plays. And while "Crisis in Spain" can be justified rather on the lines of a Radio Topical Budget—an illustration in sound of contemporary happenings—a reconstruction by wireless of the Battle of Waterloo immediately puts itself into competition with such well-established competitors that its hopes of success appear slight indeed.

It is, of course, true that few of the decisive battles of the world have so much literature to their credit as Waterloo. It has been set down in every conceivable way; by purely popular writers such as Fitzcarral and Sir Edward Creasy; by military experts of every nationality such as Sir John Fortescue or Captain Brooke, in the most sonorous prose of fiction by Victor Hugo, and the equally sonorous verse of Thomas Hardy, Lord Byron and Sir Walter Scott.

In addition, almost all of the stupendous literature devoted to the career of Napoleon deals with it in greater or lesser detail. What then remains?

It is the modest hope of the authors of the programme that is to be broadcast on June 18th this year, that by means of the particular medium in which they are interested a reconstruction of certain aspects of Waterloo can be achieved, which shall be more vivid than any stage representation can be, as their medium is not subject to the stage limitations of space and time. And possibly more satisfactory than even any film can be.

In the strictest sense of the word, this is Mr. Val Gielgud, the author of the accompanying article and part-author of "The Battle of Waterloo," a radio drama to be broadcast on Saturday, June 18th.

DIRECTOR OF PRODUCTIONS

The main problem was how to make all these comparatively disconnected episodes a coherent whole, and to solve this problem the authors fell back upon the method which was first used in broadcasting by those who first brought adapted versions of novels to the microphone. Once the prologue is over, the scenes of the panorama are held together by a double thread of narrative: briefly and concisely written.

The double thread of narrative was chosen because it has been proved by experience that the effect of a single narrator is apt to become boring; while by means of two voices a certain effect of balancing rhythms can be achieved, which is very helpful to the flow and rhythm of the programme as a whole.

At Least Five Studios.

For this type of programme, the Dramatic Control Panel and its attendant multiple-studio system is, of course, vital, and for "Waterloo" at least five studios will be employed. Each of these studios has its own acoustic properties, and by dividing the cast between them for the various scenes making up the panorama it should be perfectly easy immediately to establish the considerable effects that are the vital element in a programme which begins in Vienna and ends on St. Helena.

When dealing with so extraordinary a personality as that of Napoleon, there is an almost irresistible temptation to indulge in the picturesque, to call upon the Effects Department for every shot in their lockers, every cannon in their armoury and every coconut shell in their cupboards. Every attempt has been made to envisage this temptation clearly, and to avoid it in proportion, for to reproduce the sound of a heavy cavalry charge—if such a thing were even remotely possible—would be a very poor substitute for reading Hugo's description of the battle. And the sound of Mercer's, or, alternatively, General Gourgaud's, cannon would be very much the same as the sound of the cannon in any other engagement of that twenty years' war.

Establishing a Precedent.

So, for the most part, the characters will speak for themselves. And the listener who agrees with the prevailing view that war has become permanently unfashionable and out of date, need not be deterred by any fear that in the course of this programme he will be brought too close to the grisly realities of the battle-field. The battle itself is handled strictly from the points of view of the two staffs concerned, and, as the Duke of Wellington remarked on the morning of that famous Sunday, "Generals have better things to do than to shoot at each other"; thereby establishing a precedent most satisfactory for staffs in later and less romantic campaigns.

In sum, the programme is an experiment, and the main issue lies in whether it gives any clue to the possibilities of the reproduction in sound of the equivalent of an historical document. For if any degree of success, however small, can be found in the broadcasting of "Waterloo," an immediate and almost illimitable prospect of similar programmes, expertly contrived and skilfully written, will be available, on the one hand, for the listener to hear, on the other for the radio dramatic author to exploit.
Making the most of a Milliammeter

Here you will find some very helpful information on choosing a suitable instrument, as well as hints on using it in the most effective manner in order to check overloading, to test circuits, and to discover leaky insulation.

By H. A. RAMPTON.

If you leave the meter in this position it will be possible to check up whether the current increases at any time. Another point in that the efficiency of the by-pass condensers can be checked by assuring yourself that no H.T. flows when the set is switched off.

If there is an indication of current it is an easy matter to connect the meter in the anode lead of each valve in turn in order to trace the culprit.

By connecting a milliammeter in the lead to the anode of the output valve it is possible to check whether it is being overloaded. In normal practice the needle should remain almost steady. If it swings about when loud passages are received, the volume should be reduced, otherwise there is bound to be distortion of the received signals.

Try This!

Or you can get over the trouble by increasing the H.T. voltage, and, of course, the grid bias to correspond.

If the grid bias is not correct the needle will not kick evenly both ways. If it kicks upwards, the G.B. is too high; if downwards it is too low.

Don't forget to disconnect the H.T. plug before altering the grid bias. If you have an old partly worn-out valve you do not want, plug it in the last valve holder in place of the usual one and try altering the G.B. with the H.T. connected up.

Watch the milliammeter as you do so. Note the tremendous increase in current while you are altering the bias (that is, while the plug is out), and you won't try it with your best valve!

With the correct value of bias the current registered should agree fairly accurately with the figures given by the makers.

Fix a Fuse.

In tracing troubles in a receiver that refuses to work, the meter may again be connected in the anode lead of each valve in turn. If the normal current is registered, you will have proved (a) that the valve is getting its correct I.T., H.T., and G.B., and (b) that there is no break in the anode circuit such as a burnt-out transformer, or in the circuit that passes the grid bias to the valve. (In a detector circuit this means the grid leak connections and not the tuned circuit.)

But by proving that there is no break, it does not prove that the circuit is completely O.K. There may be a short-circuit somewhere. This is not unlikely in these days of all-metal receivers, fixing screws and screening cans being frequent offenders.

A final hint. It is best to use a low-resistance fuse in series with an expensive meter. It should be rated to blow at a current slightly greater than the maximum reading of the instrument.
SHORT-WAVE NOTES

By W. L. S.

Who has many interesting tit-bits for readers, including preliminary details of the newly-discovered potentialities of the waveband around five metres.

THE little private "competition" arranged between M.S., of Harlow, and F.N.B., of Hale, Cheshire, has fizzled out rather tamely, since M.S. has failed to send me any details at all! F.N.B., on the other hand, has had a wonderful log of 120 amateurs on telephony, during the one period of twenty-four hours.

A Formidable List.
The list of stations includes "hams" from Spain, Portugal, Belgium, Germany, Denmark, France, Holland, French Morocco, Czecho-Slovakia, and U.S.A. The only reader he has among V.H.C. (Northfleet), who sent in a good list of British amateurs, but was not nearly so successful with the foreigners. This being the case, F.N.B. scores a walk-over!

Next time we organise a listening competition, I really should have to enter myself. The only trouble is that, being a journalist, I should have great difficulty in persuading people that I was telling the truth.

The week's news is fairly scarce, concerning Bandoeng.

The only Americans that readers mention specifically as being at all good are W2 X A P and W2 X A D. What we should do at this time of year without the latter station to cheer us up I really don't know.

P.D.T. (Redhill) passes on the following information, received direct from Bandoeng on their QSL card. Five transmitters are active—P.M.B. (14.00 metres), P.L.E. (15.03 metres), P.M.C. (16.56 metres), P.L.V (31.86 metres), and P.M.Y (58.3 metres). The regular Tuesday afternoon broadcast (14.40-16.30 B.S.T.) is taken always by P.L.E and P.L.V, and sometimes by P.M.Y.

Incidentally, another good Tuesday programme is that broadcast by Poznan on 31.35 metres between 18.45-21.45 B.S.T. E.H. (Bristol), among others, reports this as a good RS on one valve. Yes, E.H., the high power C.W. signal on 54.20 metres is the Vatican, H.V.J.

That Mystery Station!

I find that the station just above the 20-metre amateur band that I mentioned last week was not W.A.J, but our old friend W.I.Y, who is usually to be heard all day on C.W. How long his irregular musical broadcasts will continue I cannot say.

We hear the term "epoch-making" applied to lots of things these days, but I do not think Q.S.T. is for wrong when it describes the recent developments in 5-metre work by that term. The tale of the amateur transmitters' steady "downward trek" from 440 metres to 20 metres, and even 10 metres, is ancient history; but everyone did think that 20 metres would be about the shortest wave that was of any practical use to them.

Now, however, thousands of American hams are working on the unexplored territory of 5 metres, and are obtaining all the thrills once more. In this country, too, we are not by any means asleep. There are probably at least fifty active stations on 5 metres in London alone, and the chief craze appears to be "duplex" telephony. The band is of such an enormous width that broadly-tuned, frequency-modulated telephony can be tolerated until the transmitters are improved.

Great Strides in the States.

Only short-distance work has been possible as yet over here, but in the States they have erected transmitters on the top of skyscrapers, fire-towers, and even in aeroplanes, with the result that communication up to 150 miles has been established with "vest-pocket" transmitters and minute inputs.

Busy Times Ahead.

I predict some great developments in this work, and hope to be "first with the news" when they occur, as I shall be well in the swim by the time you read this.

One thing seems certain—that the super-regenerative receiver has all the others note work for 5-metre work. It is so simple to make and operate that it looks to me as if it will be the ideal gear for the 7-metre broadcast when that starts. One rather surprising feature of the circuit is that the chassis strikes one as being quite broad. Imagine a 5-metre receiver with a 0.001 condenser and a direct-drive dial!

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1st of the Month. Price One Shilling.

In response to the many readers who are not content with the "tame" one-valver that I recently described, and who insist on a description of my own "hot" set, I have said all that I can think of about this "hotting-up" process in a separate article, now in the hands of the Editor.

Much Useful Data.

My recent article on "Location" has brought forth some interesting experiences from readers. One man receives the whole world with the exception of Nairobi; another in the same town finds Nairobi his star station. Another complains that W2 X A D is always weak, although W2 X B J, W.A.J, and W.I.Y (none of them far off in wavelength) are always good when they are on.

A Wolverhampton reader mentions one of the most peculiar effects that I have met—that of receiving practically everything that is going, but at the wrong time. He gets Sydney, for instance, when others find that he is on the point of fading out. He gets W2 X A D when I find him weak, and when he should really be coming up well this man finds him going off! This short-wave business certainly is a big freak!

An Interesting Band.

Soon after this I hope to have my own station going again with telephony on 42-25 metres, the usual times being Sunday mornings, and sometimes Saturday afternoons.

The worst of 20-metre work is that the DX work done there tempts one to forget all about one's friends in the same country, who can only be heard on 40." Judging from last Sunday, all the old friends are still there and very much there! Unfortunately, the B.B.C.'s longer Sunday programme will probably have the effect of cutting down the "phone" time for the amateurs.

They are quite within their rights, of course, to work there at any time of day, but most of them become martyrs to the cause of broadcasting.
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will give you much higher amplification without instability. Lissen research has succeeded in reducing the inter-electrode capacity of this Screen-Grid Valve to the minute figure of .001 micro-microfarads. (Inter-electrode capacity causes instability and howling.) The magnification figure of this valve has been increased to 1,000. To get immensely increased range, ask for Lissen S.G.215. Price 12s.

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The Lissen Power Pentode Valve—P.T.225—converts any set with one stage of L.F. amplification into a fine, full-volume "Pentode-output" receiver. This valve puts new power into your loud-speaker, and new brilliance of tone, too. Use it instead of a power valve and at once you get an amazing step-up in volume. Where before you got a whisper, now you get a torrent of pure sound, and it takes no more current than the power valve it replaces—its H.T. consumption is only 7 mA. Ask for Lissen P.T.225. Price 12s.
The single switch has only one job to do, switch, we now need nothing more than a shilling more than ordinary condensers; Extenser. Most of the Extensers cost a few shillings more than ordinary condensers; but against this can be credited the fact that, instead of the rather elaborate control circuit into which figures on the panel doing the one "stop-start" job. The Extenser not only simplifies, but it also tends to increase a set's operating efficiency because it reduces and simplifies the wiring. These facts will, of course, be well known to your readers. 

Having closely examined the "Decade"—at least, by means of the published specification—readers may wonder how this set could possibly be simplified without sacrificing some of its outstanding qualities. But it can; and the simplification isn't theoretical, or even insignificant. It is achieved by the introduction of an Extenser. Most of the Extensers cost a few shillings more than ordinary condensers, but against this can be credited the fact that, instead of the rather elaborate control switch, we now need nothing more than a simple push-pull on-off type. 

Automatic Circuit Control.

So in this new model of the "Decade" the single switch has only one job to do, and that is to switch the set on and off. The Extenser automatically does the wave-changing. Its dial is numbered from 0-100 and 0-200, and rotates through 360 degrees instead of the normal 180. And, as you twist it from 0-100, so you tune in the medium-wave stations. From 0 to 200 the long-wave stations come in, the change-over from one band to the other being absolutely automatic. Also, the Extenser automatically carries out the necessary Moderator circuit rearrangement which was, in the first model, accomplished by the rather complicated control switch. From the household's point of view the Extenser is pure gold. For the Daventry's, Radio Paris, London Regional, Northern Regional, and so on are all, in effect, welded into the one tuning band.

And it must be admitted by all that it is no small advantage to have the one switch which figures on the panel doing the one "stop-start" job.

The Extenser not only simplifies, but it also tends to increase a set's operating efficiency because it reduces and simplifies the wiring. These facts will, of course, be well known to your readers.

A high-quality output is achieved by the introduction of an Extenser. Most of the Extensers cost a few shillings more than ordinary condensers; but against this can be credited the fact that, instead of the rather elaborate control switch, we now need nothing more than a simple push-pull on-off type. The Extenser automatically does the wave-changing. Its dial is numbered from 0-100 and 0-200, and rotates through 360 degrees instead of the normal 180. And, as you twist it from 0-100, so you tune in the medium-wave stations. From 0 to 200 the long-wave stations come in, the change-over from one band to the other being absolutely automatic. Also, the Extenser automatically carries out the necessary Moderator circuit rearrangement which was, in the first model, accomplished by the rather complicated control switch. From the household's point of view the Extenser is pure gold. For the Daventry's, Radio Paris, London Regional, Northern Regional, and so on are all, in effect, welded into the one tuning band.

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THE DECAD-CAD "TELEXOR".

档 to regular readers of "P.W.," and we have summarised them for the benefit of an ever-increasing circle of new readers.

A further advantage which accrues from the use of an Extenser in this particular receiver is that a very attractive panel appearance is obtained. This is particularly the case with the Telsen "Telexor," for that component has a handsome escutcheon, and there is also a panel light for illuminating the dial, although the use of this is quite optional.

The "Telexor" retails at 12s. 6d., and at this figure it is an excellent investment.

A MINIMUM OF WIRING

The "Telexor" not only reduces the wiring, but many of the remaining leads are considerably shortened owing to the placing of the Telexor terminals, with a consequent increase in the set's efficiency.

All the other components are perfectly conventional and are easily obtainable at any radio store.

We would, however, advise constructors to select their makes with due consideration of both performance and price. A few pence can be saved here and there by going outside our recommendations, but this is the kind of economy which, in the long run, is not likely to pay.

Take the L.F. transformer, for instance. It is possible to pick up L.F. transformers for three or four shillings these days, but while all of these may not be hopeless "duds," the fact remains that many are.

And of those which will give passable results, a proportion may, and probably have, very low reliability factors, and be liable to early breakdowns.

Using Existing Parts.

Care should also be taken that the selected components are not "outizes," and cannot be built into the set without materially altering the layout—a fatal variation from the specification.

We mention this because we fully appreciate that most constructors desire to use as many existing components as they can in their sets; indeed, we bore this in mind when designing the "Decade," as you will (Continued on next page.)

THE WAVEBANDS

A FULL MODERATOR ADAPTABILITY

The flexibility and adaptability of the three panel controls will amaze those unacquainted with the potentialities of "moderated" sets.
In the assembly of the set there is only one point which calls for special mention, and that concerns the mounting of the "Telexor". The L.T. switch must be wired up before the "Telexor" is finally in position.

Wiring for the Dial Light.

You will notice that the wiring diagram shows dotted lines running to the top two "Telexor" terminals. These indicate the dial-light leads.

Obviously, a dial light is not essential to the operation of the set, but it is a valuable refinement and one which we recommend constructors to take full advantage of. This light is wired across the low-tension supply in such a way that the on off switch of the receiver controls it as well as the valves.

Next week we will give you some further notes on the construction and installation of this outstanding receiver.
"has indeed solved my H.T. worries"

Pinewood Avenue,
Crowthorne,
Berk.
April 30th, 1932.

Dear Sirs,

I would like to congratulate you on the efficiency of the Milnes H.T. Unit, which has indeed solved my H.T. worries.

I test the Unit weekly with the voltmeter, and I find that it never registers less than 130 volts, and very often it is as high as 150 volts. I have four 2-volt L.T. accumulators which enables me to have one on charge as a spare, but I can honestly say that I have not noticed any change in the L.T. consumption.

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Yours truly,

F. L. THOMPSON.

THE Milnes H.T. Unit gives better reception than any other type of H.T. supply, and is cheaper than mains operation. You can't damage the robust nickel-iron cells by careless maintenance—there is no buckling of plates—no sulphation—no mains hum, and practically no attention is needed. The Milnes unit will give 40 milliamps at a definite voltage against a dead silent background, and is charged automatically from your L.T. accumulator.

Colvern components for every receiver

For "The Decade" Colvern RM3 Dual Range Coil with reaction.

8/6

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

COLVERN LIMITED

MAWNEYS ROAD, ROMFORD, ESSEX.
HAVING closely examined the "Decade"—at least, by means of the published specification—readers may wonder how this set could possibly be simplified without sacrificing some of its outstanding qualities.

But it can; and the simplification isn't theoretical, or even insignificant. It is achieved by the introduction of an Extenser. Most of the Extensers cost a few shillings more than ordinary condensers; but against this can be credited the fact that, instead of the rather elaborate control switch, we now need nothing more than a simple push-pull on-off type.

Automatic Circuit Control.

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These facts will, of course, be well known by G. V. Dowd who describes a "P.W." set which represents no doubt read about the first model of "P.W." all the features found in this "D.E." model. The "D.E." has the same dominant qualities as the "P.W."

### YOUR SHOPPING LIST FOR THIS SET

- 1 Panel 12 in. x 7 in. (Peto-Scott, Permco, Ready Radio, Wearite, Lissen).
- 1 Baseboard, 12 in. x 7 in. x 3 in.
- 1 Cabinet to fit above (Peto-Scott).
- 1 0005-mlfd. Extenser with disc drive (Telsen, Telexor, Colum, Wavechanger, Formo).
- 1 0001-mlfd. differential reaction condenser (Magnus, cyldon, Wavemaster, Formo).
- 1 00075-mlfd. solid dielectric condenser (Formo, cyldon, Ready Radio).
- 1 Push-pull on-off switch (Bulgin, Lissen, Telsen, Ready Radio).
- 3 4-pin valve holders (Lissen, Telsen, Graham Farish, Telsen, Ready Radio).
- 1 Dual-range coil (Colvern R.M.3).
- 1 Moderator coil (Ready Radio, Peto-Scott, Sovereign).
- 1 001-mlfd. max. compression condenser (Lissen, Sovereign, Formo, Ready Radio, Goltone, Graham Farish).
- 1 01-mlfd. para condenser (Lissen, Graham Farish, Telsen, Ready Radio).
- 1 0001-mlfd. fixed condenser (Telsen, Graham Farish).
- 1 H.F. choke (Lissen, Telsen, Graham Farish, Varley, Ready Radio).
- 1 4-meg. leak, with holder if required (Igranic, Lissen, Graham Farish, Ready Radio).
- 1 15,000-ohm resistance (Graham Farish, etc.).
- 1 100,000-ohm resistance (Graham Farish, etc.).
- 1 1-meg. resistance (Graham Farish, etc.).
- 1 1-ohm resistance (Graham Farish, etc.).
- 1 1-meg. resistance (Graham Farish, etc.).
- 1 L.F. transformer (Lissen, Telsen, Graham Farish, etc.).
Popular Wireless, June 18th, 1934

**Associate I.E.E.**

The ultimate in simplified effectiveness. You have discovered receiver—well, this model embodies it plus Extenser tuning!

to regular readers of "P.W." and we have summarised them for the benefit of an ever-increasing circle of new readers.

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**THE WAVEBANDS**

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**ACCESSORIES.**

LOUDSPEAKER.—Blue Spot, Selection, H.M.V., Marconiophone, R.T.H., Erioh, R. A., Cossor, Graham Finch, W.B.


L.F. Cossor 210 Det. or 210L.F., Bulgin P.M.H.1, Marconi L.F.1, Ornam L.F., Mazda L.210, Tungsten L.210, Eia B.Y.210, Lissen L.210, Six-Sixty 210 L.F.


BATTERIES.—H.T.—120 to 150 volts (Lissen, Genlax, Ever Ready, Drycell, Siemens, Cossor.

Super capacity should be used.

G.S., to suit output valve (Ever Ready, etc.).


MAINS UNIT.—To give 30 millamperes at 120 volts (Atlas, Haywood, R.I., Tunoway, Radio, Recreations, Farms, Lotus).

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**SWITCHING**

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**DECADERS**

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**OTHER-ATTRACTIVE RECEIVER**

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gather from the rather unusually large number of component alternatives given in the accompanying list.

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Colvern LIMITED
MAWNEYS ROAD, ROMFORD, ESSEX.
OUTSIDE INTERFERENCE—EFFECT OF CONE ON TONE—RUNNING A LONG LEAD-IN—CONCERNING CONDENSERS.

Curing Crackle.

B. B. (Hastings).—"I am unfortunate in being situated near an electric motor which causes crackling noises in my loud-speaker. A friend has advised me to put my set in a metal box. Do you think that this would help matters?"

Take off the aerial, being sure this does not allow the set to oscillate.

To be sure of this, touch the aerial terminal with your finger. The loudspeaker must not go boomp, boomp, or make any loud sound as you put your finger on and off.

You have now got a set with the aerial disconnected and yet not oscillating. Does the crackle continue?

If moving the aerial does not stop the noise, and if you have electric mains, and if you work the set from the electric mains, you may find a cure by inserting air-cored chokes of low D.C. resistance in the mains and shunting with a small (if A.C. mains) or large (if D.C. mains) condenser, as shown in my diagram.

This may stop crackles.

Moving Coil Diaphragms.

N. K. L. (Southampton).—"In the case of a moving-coil loud-speaker, what bearing does the diameter and rigidity of the cone diaphragm have on reproduction?"

"Does stiffness improve the high notes, and any increase in cone diameter the low notes?"

Phew! No, sir! This problem involves about ten independent values, as, e.g., position of coil drive relative to cone dimensions, cone dimensions, cone edge mounting stiffness, cone stiffness, cone homogeneity, cone mass, eddy currents in pole-pieces, and so on and so forth.

I, for one, am not such a fool as to think I could tackle the problem, while I am wise enough to suspect the theoretical results of those who have been brave enough, at any rate, to tackle them.

In general, one may say that at low notes it is probable that the cone moves in and out like a piston as a whole.

At higher notes, the cone tends to break up, when parts of the cone are stationary and parts move.

This breaking up contrives to be more pronounced and complex as the note is higher. You can damp the edge of an M.C. speaker without affecting most high note reproduction.

A Rattling Baffle.

W. W. (Stony Stratford).—"I have been using for some time a thin baffle-board approximately 4 ft. by 4 ft. Would there be any advantage in increasing the thickness of this to, say, ½ in., or would even 1 in. be better?"

"My trouble, which I am unable to cure, is an annoying rattle coming from certain notes."

Question.—Does the baffle rattle, or is the rattle due to something other than the baffle?

Answer.—Remove the speaker from the baffle and see if you can hear the rattle. If you cannot hear the rattle it was the baffle, but if you still hear the rattle you cannot blame the baffle.

Advice.—If it is the baffle which makes the rattle, shake the baffle till you locate the rattle, and then use your common sense to cure the rattle in the baffle. Make it thicker, or would even 1 in. be better?"

Walls give what is called "di-electric loss"—that is, a loss due to setting up electric fields, whereas iron and steel near aerials give rise to "eddy current" or magnetic field loss. The absorption of energy is from the aerial into the wall, and hence there is less energy available for the set.

Non-Inductive Condensers.

E. J. R. (Dovercourt).—"Recently a number of manufacturers have produced non-inductive coupling condensers. Would there be any advantage in using this type of condenser for coupling purposes in the R.C. stage of my set—as against my present mica?"

"I think the non-inductive type of condenser was produced largely for high-frequency decoupling, wasn't it?"

In any case, if you've got a mica condenser for R.C. coupling you cannot do better. Lucky man!"

So many people use these other paper condensers, and while they are perfectly good for fairly low-voltage work, I always like a high voltage and a good mica condenser.

A MAINS SILENCER

[Diagram of a mains silencer]

You should try this scheme if you are troubled by H.F. interference coming "down" your mains.
A World-Famous Make of
TRIPLE SPRING
GRAMOPHONE MOTORS

BRAND NEW

At Less Than Half Price

If you have a gramophone or radio-gram, here is your opportunity to convert it easily into a long-playing, silent-running super instrument. Or you can make a fine new gramophone at very little cost. These Super Triple-Spring Gramophone Motors were specially made by the famous Garrard Company for one of the largest English gramophone factories, which has since closed down. The motors were intended for use exclusively in gramophones selling at £25 and upwards. List Price 81/3, but now offered to readers of “Popular Wireless” for only 35/-.

This is indeed the opportunity of a lifetime. Secure yours while the offer lasts.

This Super Triple-Spring Motor embodies three distinct spring-drive units, and is thus three times as powerful and long-running as ordinary single-spring motors. Fitted with motor plate, speed-regulating lever, safety friction clutch, 12-inch tone-table, winding handle, and automatic brakes. All bright parts heavily nickel-plated. All working parts totally enclosed. Silent running, silent wind.

CABARET ELECTRIC CO.
170, Vauxhall Bridge Rd., London, S.W.1

Festal Orders and Money Orders should be crossed and Treasury Notes sent by registered post.

For the Latest and Best Modern Fiction...

You must buy the finest all-fiction magazine in Britain—THE STORY-TELLER. Neither expense nor care is spared in maintaining the very high standard which has for so long been the hallmark of this great publication. Every month it provides a regular feast of good contemporary fiction and contains the work of our most accomplished authors.

The STORY-TELLER
Monthly—At all Newsagents
A FIXED POTENTIOMETER.

There are many sets which would undoubtedly benefit by the introduction of the Bulgin fixed centre-tapped potentiometer. This component is electrically identical to an ordinary 400-ohm potentiometer, but instead of a moving contact, it has a centre tap, thus enabling the grid leak return of a detector valve permanently to be joined to a point midway between L.T. positive and L.T. negative.

But there is, in addition, a .001-mfcl. fixed condenser incorporated in this Bulgin component which has the important duty of by-passing stray L.F. currents. Nevertheless, the price of the compact little article is only 3s. 6d. ; so, in addition to its simplifying qualities as compared with a separate potentiometer and condenser, it scores in point of cost.

The advantage accruing from the use of the device in a detector circuit is an almost invariably smoother reaction control. But it has other uses, such as the formation of a centre tap in the filament winding of a power transformer in a mains set. I have used the Bulgin centre-tapped fixed potentiometer for both the above-mentioned purposes, and find it perfectly satisfactory.

MARCONIPHONE DRY BATTERIES.

A new range of these has just made its appearance. It comprises grid bias and H.T. types of popular sizes, selling at highly competitive prices.

LUXURY SOLDERING.

Once you have used an electric soldering iron you never want to go back to the flame heated kinds. For one thing, an electric iron maintains an even heat and enables long jobs to be tackled without the necessity of frequent stops, while the iron is "cooking up." Again, there is no risk of rapid oxidation to combat and so it is much easier to make clean, efficient joints.

Brownings' Electric Co., of East Ham, manufacture an excellent electric iron for radio work. It is light and only weighs 7 oz. and its consumption, 45 watts, is less than that of one ordinary electric-light bulb.

Its price, complete with adaptor and flex, is 10/-, and the article carries a six months' guarantee. What I particularly like about it is the fact that its element is very easily replaceable and that new elements are readily obtainable at only 2/9 each.

VERY USEFUL.

I have just met "Celfix" for the first time, and henceforth I am always going to have a 6d. reel of it by me, for it is a most useful material. It is a fine cord or a thick thread ( whichever you like), treated in the same way as that sticky tape— not the black but the medical variety.

And if you want to bind up the end of a radio set lead or bind the handle of a cricket bat or golf club or tennis racket, or cover the handle of a kettle, or do any one of a hundred other such jobs, you merely wind some Celfix on and it fixes itself into place. It doesn't soil the hands, either, and is water- and heat-proof. Also, it is tough.

Radio enthusiasts, electricians and sportsmen alike should all welcome this new material with open arms.

THOSE SIBILANTS.

During a practical test of the M1 Ferranti moving-coil chassis, I compared the reproduction of this speaker with an earlier type of different make. The result was interesting, even amazing.

And the most marked difference between the two instruments was the difference between their rendering of sibilants. Indeed, to all intents and purposes, these were absent in the one case, and speech came over like this: "Here i' th' fit' new".

But with the Ferranti M1 the "s's" were crystal clear, and there was not the faintest suggestion of muzziness.

The M1 is a fine speaker, wonderfully sensitive and bell-like in its clean over-all response. Many constructors might think it high-pitched simply because it does do the high notes justice and has none of that woody booming so commonly met with in the earlier moving-coil speakers.

But, thank goodness, the "mellow" phase of radio reproduction has practically ended. Do you remember the time when the popular idea of loudspeaker "perfection" was not the faintest suggestion of muzziness.

Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department with the strictest of impartiality, under the personal supervision of the Technical Editor.

We should like to point out that we prefer to receive production samples picked from stock, and that we cannot in any circumstances undertake to return them, as it is our practice thoroughly to dissect much of the gear in the course of our investigations! And readers should note that the subsequent reports appearing on this page are issued as guides to buyers, and are, therefore, framed up in a readily readable manner, free from technicalities unnecessary for that immediate purpose.

Please note

From the Technical Editor's Note Book.

HIGH-GRADE MOVING-COIL SPEAKERS.

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B.I. Enamelled wires are unequalled for the field windings of small motors, measuring instruments, radio transformers, and other pieces of electrical apparatus where space is all-important. They are produced throughout in our own works, from the raw material to the finished wire, and every phase of manufacture is under the strictest control as regards quality of material and accuracy of gauge. B.I. Enamelled Wire is unexcelled for its high insulation, dielectric strength, flexibility of enamel, and general dependability. We regularly manufacture Enamelled wire as fine as ‘002” dia.

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Telephone No.: PREScot 6571.
London Office: Surrey House, Embankment, W.C.2
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THE SHERLOCK HOLMES
OF RADIO

Solve any radio problem with a Pifco “All-in-One” Radiometer. Distortion, weakness, or even a complete fade-out—whatever the trouble, this marvellous instrument shows the cause in a few minutes. It is invaluable to every radio owner—novice or expert. Saves its first cost over and over again. No other instrument in the world like it.

Standard Model for Battery Sets only.
12/6
De Luxe High Resistance Model for Electric Receivers and Mains Units
£2-2-0

Ask to see the “All-in-One” Radiometer at your radio or electrical dealers. If any difficulty write direct to:
PIFCO Ltd., High Street, MANCHESTER.
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QUESTIONS AND ANSWERS

SUPER CAPACITY NEEDED.

"Lonon" (Manchester).—"With the set I always paid a little over ten bob for the H.T. Battery, and with one much-ousted exception it always lasted satisfactorily. (Much less than three months, and often quite a bit more.) According to the milliammeter tests made at different times, 9 milliamps was the normal for that set, though it varied a little on either side of that figure according to the actual valves in.

The new set takes 13½ or 14 milliamps. And the dealer says that is why my old standard type of batteries will not be suitable for the set, and why I should not attempt to run it from one of them.

"He wants to sell me one running up to the £1 mark (but only the same voltage!), and he says it will be the most economical way to go to work. Is that correct?"

"I asked because he said, if I liked, I could write to you and he knew you would say he was right."

Yes, he is quite right. If the set is used under normal conditions an output of 14 milliamps or thereabouts is too much to expect from standard size batteries, and you need one of the super sizes. A "COSMIC" DISAPPOINTMENT—AND THE CAUSE OF IT.

L. G. (Nr. Gillingham).—"Imagine my disappointment when I switched on the 'Cosmic' and heard nothing. Nothing at all.

"I turned the tuning and I turned the reaction, but not even a whistle rewarded me. It was sickening.

"Perhaps you can guess what was wrong, but I can tell you I had no means of knowing where to look for a fault, and I just kept turning the dials and looking back at the blue print, only to find everything appeared all right, though nothing in the way of a sound was forthcoming.

"But one thing I did notice. When I put the H.T. +2 plug in the H.T. battery, I got a good click in the loudspeaker. But H.T.+1 could be moved to any voltage, and there was no click.

"In the end, I put the set away and went to bed, heavy hearted. But I mentioned this click business of the one plug and not of the other to my friend when he came over the day after. And he said it looked as though the 100,000 resistance was a dud.

"He had a 50,000 spaghetti on him so we thought we would try this, but the results were no different. Finally, he said, perhaps it is the H.F. choke so we took that out and put the 50,000 in instead, and away she went! Glorious.

"Evidently there was a break inside the choke—it was all right as far as you could tell by looking—but what is puzzling me now is, whether I ought to get another choke, or leave it out and use the spaghetti instead. Is there any objection to this? I certainly do not want anything better than the results I get now?"

X. There is no objection to the use of the resistance instead of the H.F. choke if reaction is O.K.

"The idea of the choke instead of the resistance is, that with some detector valves and H.T. conditions it gives better reaction results. But in your case the spaghetti is perfectly O.K. apparently, so we should continue to use it.

WAS IT THE BATTERY?

"The question above which was raised by a Watford reader in 'P.W.' No. 319 (dated May 11) seems to have attracted such wide attention that the trouble experienced—unexpected running-down of a new H.T.

battery in about three weeks—must be much more common than is generally supposed.

Most of the readers who wrote, mentioning the experience of 'Worried' admit that in their own cases they found the cause to be one of those named: but some interesting exceptions occurred in which the cause of the trouble was in no wav connected with a rundown battery.

For instance, a North London reader—A. S. of Highbury—recounts an unusual experience in the following letter:

"I was in the same position as 'Worried' (Watford) but I am using a 12 m.a. Eliminator, with 60 volts on the Det. (H.L. 2). I have tried a 20-henry choke and condenser, but only to find that it sets up distortion.

"I removed these and purchased a P.M.2.DX, but it still whistled. I tried all the hints that I have read in 'P.W.' but to no avail.

"At last I tried a tinny rubber round the H.L.2 and the whistling stopped. 'I have since tried a very cheap det. valve, and that does not whistle, but it does not give such good results.'

"With regard to the 'Cosmic Star,' I have nothing but praise. Up to the present I have received 30 stations including America, but the medium-wave stations are received in queer places on the disk e.g. Midland Regional dial 23 is Broadcasting 2, or any other (Continued on page 454.)

WHAT'S WRONG?

COIL MOUNTING

One of the most important things to watch when mounting coils is that they are well spaced from other coils, and also from metal screens, etc.

In the illustration the Coil Qoill on the left would give very poor results, because it is lying on the metal baseboard. Lift the coil by an insulator, such as a piece of black (right), and the fault would disappear.
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These Dubilier Metallised Resistances are astoundingly sturdy. They have withstood a weight of 64 lbs. on a knife-edge across their circumference, and weights of 45 lbs. each have been suspended from their connecting leads.

Their performance in every way matches their phenomenal strength. Dubilier Metallised Resistances are made under a patent process and their range embraces a Resistance for every need.

Like all Dubilier products, these Metallised Resistances are as dependable as daylight. Whenever you need a Resistance . . . be sure it is Dubilier.

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Dudon Works, Victoria Road, North Acton, W.3
RADIOTORIAL QUESTIONS AND ANSWERS (Continued from page 452.)

"P.W." PANEL No. 76. ABOUT THE VALVE.—MUTUAL CONDUCTANCE

The mutual conductance of the valve is the factor relating plate current change (under working conditions) to grid voltage change. It is, in a sense, a measure of the valve's efficiency to do the work for which it was designed.

If the "impedance" and amplification factor of the valve are known, its mutual conductance can be found by dividing the impedance into the amplification factor multiplied by 1,000.

Thus a valve with 180 ohms and Impedance = 100,000 has a mutual conductance of 180 x 1000 = 1.8

results from my detector valve which for the past twelve months has been perfectly satisfactory.

I am now making another set which incorporates an S.G. stage, and the owner of this is wondering whether he can do vice-versa, i.e. use an H.F. choke in place of the 600-ohms resistance which is recommended for the screen of the valve.

The resistance is the only component to be wired in this lead apart from the bypass condenser which is connected at the screen and was wondering whether his H.F. choke would act all right at the resistance.

We do not want to put it in and try it out because the space is rather scarce and there is a bit of screen to be cut away, etc. But if you think the H.F. choke will be just as good as the resistance, we could do this while the construction is still in the early stages.

"Would it work the same?"

H.F. chokes are not always interchangeable with resistances in this way, but apparently the purpose of the resistance in this case you mention is just to act as an H.F. choke, in which case a proper H.F. choke would quite likely be satisfactory in that place.

In many cases this would not be satisfactory because the resistance is designed to drop the voltage simultaneously, and an H.F. choke in place of it would not have the same effect. But where, as in this case, the normal allows the correct adjustment to be made it will probably be quite satisfactory to use an H.F. choke instead of a resistance.

THE ANSWERS

TO THE QUESTIONS ASKED ON PAGE 452 ARE GIVEN BELOW:

(1) Six.
(3) Sir Oliver Lodge, F.B.S. (now "P.W.'s Scientific Adviser").
(4) Manchester.
(5) The electrical unit of power. (It is the power represented by 1 amper at 1 volt.)

DID YOU KNOW THEM ALL?
We couldn't have put it better

Extract from the June issue of "Modern Wireless"

A new condition is upon us. At one time the superiority of the moving-coil loudspeaker over all other types was freely acknowledged, but the price difference was great.

Nowadays, however, this price gulf is closing up—indeed, it can be said to have closed up so that the moving-coil faces the electro-magnetic principle on equal price terms.

A direct comparison can now be fairly made between the two. And when this is done, the moving-coil does not, in general, stand out as vastly superior as might have been expected.

For one thing, the other types have been greatly improved, and, for another, price-paying the moving-coil some makes have lost greatly in quality.

Blue Spot 100U gives a performance equal to a good Moving-coil speaker. Its remarkable sensitivity ensures perfect reproduction for the full musical range and the difficult bass notes especially desired. This perfection in the lower register is not obtained at the expense of the treble which is clear and liquid in tone with every note given its true value.

Blue Spot 100U is sensitive even to very small inputs and is particularly suited for all battery sets. It can be used with normal or Pentode valves—no matching transformer being required.

100U
Price complete mounted to chassis
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Write for Catalogue No. P.W. 39/U.

The British Blue Spot Company Ltd

Model Aeroplane Chat

If you are interested in model aeroplanes and wish to keep right up to date in all aeroplane matters, you must write to The MODERN BOY about it. Full particulars of what you have to do are given in this week's first issue. Make sure of your copy now.

The MODERN BOY
Buy a copy TO-DAY.
2d.
THE LISTENER'S NOTEBOOK
(Continued from page 434.)

so as to make himself easily heard? As it is, one has to listen rather hard to get everything.

And don't you think that Imboto's imitations of the trilling birds are absolutely perfect? With the animals, on the other hand, he isn't nearly so clever. And why does he include the cuckoo in his repertory? I have thought about it but I can't think of any accomplishment for a man of Imboto's ability.

I should think, Anne Thrusfield has supplied amateur sopranos in quest of attractive numbers with songs till Doomsday.

What a prolific song-writer Schumann was, and how tuneful (and short) all his songs are! I think the Children's songs best.

Those of you who saw and enjoyed Conrad Veidt's acting of Metternich in that remarkable film, "Congress Dances," must have been mildly thrilled to hear him say, over and over again, that he and all the film stars were on the public.

It is, I suppose, something of a thrill to know that we do have so much to do with the ordering of such people's lives.

What fun the Effects Department must have had with Filson Young going West! It was difficult at times to realise that Mr. Young's car was capable of doing the speed he claimed to be doing. To say the least of it, if I were in a car doing sixty, and it made the row his did, I should feel rather uneasy.

Outside Salisbury Cathedral, with the engine still running, it did, I confess, sound something like a lorry.

As regards the talk itself, although there is much to be said for the style of it, I can't say that I agree with the melodic drama of delivery. Such a talk doesn't seem to confirm to impression. (Such a talk doesn't.

It led me to think that the traveller was going to his doom, and the car seemed to confirm that impression, too!

What have Okehampton and Launceston folk done to our Mr. Young to deserve the testimonial he gave them? I doubt whether they appreciated such advertisements.

It is easy to see why Miss Margaret Bondfield has made such a success of her life. It is not because opportunities just came her way, but rather that she went in search of them and, finding them, made the most of them.

It is extraordinary how certain people and things can always rub one up the wrong way.

"Squirrels' Cage" certainly got my goat. Its ultra-British dialogue irritated me to such an extent that I gave it up after persevering with it for half an hour. This satire, however, wasn't entirely devoid of merit, but perhaps it was that on this particular evening I wasn't in the mood for such.

THE DECADE

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EASISTAY ITEMS


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Dear Sir,—I have read with great interest the article by Capt. P. P. Eckersley, M.I.E.E., in your issue of the 21st May on the subject of Dry Batteries.

The object of this letter is not in any way to enter into an argument with your distinguished contributor on a subject so controversial as the battery-driven set versus the all-mains set, but, being in the dry battery business, I do feel that Capt. Eckersley has not been quite fair to us, as I maintain that reception from a dry battery is at least equal to the reception which can be obtained from any all-mains set or a set working through an H.T. eliminator.

Doubtless you will consider these remarks are somewhat biased in view of my position, but the trouble which a battery manufacturer experiences working through an H.T. eliminator can be obtained from any all-mains set or a set working through an H.T. eliminator.

A copy of this booklet has been enclosed for your perusal, and I would like to avail myself of the opportunity of saying that if any of your readers who are battery users would be interested to receive a copy of this booklet free of all charge to readers, I shall be only too happy to send it to them forthwith. It will be good enough to send to the Edison Swan Electric Co., Ltd., Dry Battery Dept., Poulter Rd, Newbury.

Naturally, this booklet has not been issued without the fact that it will bring to this company a return of battery users where battery users would be interested to receive a copy of this booklet free of all charge.

THE LISTENER'S NOTEBOOK
(Continued from page 434.)

In doing all this I was following in the footsteps of other and distinguished investigators and Probably, R. E. H. Carpenter, the father of fine quality technique, H. L. Kirk who did elaborate experiments for the B.B.C. on the same lines and proved the necessity for resistance-capacitor and pull-pull, and Mr. Dennis who actually made practical use of his confirmation of those results and used Mr. Carpenter's circuits in the Science Museum Receiver. It has always seemed strange to me that the B.B.C. did not use Mr. Carpenter's circuits, but doubtless there is some explanation.

B.B.C. Practice

Thus, I cannot think that transformers are good in high-quality practice, and the curious thing is that their use is still to be questioned (and may still produce a noticeably worse result) even after the B.B.C. have considerably spoiled things by using—doubtless for some good reason—five or six of them in cascade before the result reaches us.

In all this I am speaking of real quality, quality very few people ever hear or dream is possible to hear. In fact, so good is the kind of quality I talk about that some people saturated with the technique say they do not like it—it doesn't sound like a loudspeaker any more! This kind of quality is affected by the non-linearity and the transient-distorting qualities of iron.

BATTERIES OR ALL MAINS?

The Editor, POPULAR WIRELESS.

Dear Sir,—I have read with great interest the article by Capt. P. P. Eckersley, M.I.E.E., in your issue of the 21st May on the subject of Dry Batteries.

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Amplification Without Valves.

A GOOD deal of success is being attained in regard to the amplification of the sound from gramophone records by means of a pick-up comprising a carbon microphone instead of the usual magnetic pick-up amplified by valves. The idea of a carbon microphone attached to the stylus of an ordinary gramophone soundbox is a very old one, and dates back long before the war. But in those days small microphones were not nearly so efficient as they are now and, although good amplification could be obtained quite easily, the quality was apt to be rather poor.

But in these days very efficient small microphones can readily be obtained, and the quality which you can get by this sort of arrangement is very much better.

A Microphone Dodge.

The scheme is simply to attach the microphone either to a special stylus bar or more simply to the centre of the sound-box diaphragm and, using a pair of very fine flexible leads, to place it in series with a battery of, say 4 or 6 volts, and in series also with the primary of a suitable step-up transformer. The amplified output is obtained from the secondary of the transformer, and may be reproduced through a loudspeaker.

There are various elaborations of this scheme, but the above-mentioned is the basic arrangement. It has the obvious advantage that no valves or other apparatus are necessary, and if you do not want a particularly large amount of amplification you will find the arrangement very interesting to experiment with.

Radio in Cars.

This summer will also see a great increase in the use of radio sets out of doors. The popularity of wireless sets installed in cars has now increased so much in the United States that practically all the car manufacturers there are equipping cars with built-in aerials. It seems likely that the same kind of thing will happen in this country, and, indeed, several manufacturers are now prepared to install an aerial in the roof of a car and fit in the necessary receiving gear as an alternative standard equipment.

Pentode Output.

A pentode valve is particularly designed to provide a large output from a relatively small input. (Continued on next page.)
TECHNICAL NOTES

(Continued from previous page.)

small input. Quite a small pentode will give as much as 400 milliwatts when fully loaded using, say, 150 volts high tension and a grid bias of about 72 volts negative. It is true that the same output can be obtained from an ordinary power valve; but for that purpose not only must 150 volts high tension be used, but also a negative grid bias of 21 volts, or even more is necessary.

Overloading Troubles.

Whilst a pentode can be used in any part of a low-f frecuity circuit, nevertheless care must be taken that it is not preceded by too much L.F. amplification, otherwise the input into the pentode will be too large and the valve will be seriously overloaded. This is what often happens when pentodes are used, particularly by amateurs, who tend to kill the goose that lays the golden eggs, as it were.

Knowing that the pentode gives a relatively large amplification, they seek to overdo this by putting in a larger input and expecting a correspondingly larger output. As I have said before, the benefit of the large amplification of the pentode can only be obtained when the whole power dealt with is kept within the proper limits. The way to look at the matter is not so much that the pentode gives a very great amplification, but rather that for a reasonable output it requires only a very much smaller input than ordinary valves. This overloading of pentode valves produces large voltages between the electrodes, and is a frequent cause of the breakdown of these valves.

Pentode Voltages.

With small pentodes the anode voltage may generally be about 120 and the auxiliary grid voltage about 120. If you are using batteries it is a simple matter to adjust these voltages fairly accurately, but with a mains unit quite a good deal of care must be taken.

Not only is the voltage from any tapping on the mains unit liable to be very different from the rated value, but it will jump about according to the load which is placed on the unit, and any alteration of the load on different parts will necessitate a check-up of the voltage delivered by any tapping. This is specially important with pentodes and screen-grid valves, both of which depend so very much for their efficient working upon correct voltages being applied to the different electrodes.

Filter-Feed.

With a pentode it is generally desirable to feed the auxiliary grid by means of a filter circuit consisting of a resistance and condenser, the grid being connected to the mid-point of the two.

Where the voltage of the grid is to be kept below a certain definite value any extra voltage from the high-tension supply can very conveniently be "dropped" in this resistance. A flexible wire-wound resistance forms a convenient unit for this purpose, by the way.

With an ordinary valve one is accustomed to assume that little or no current passes in the grid—which, of course, is the control...
grid—but with a pentode, remember that the auxiliary grid may carry quite an appreciable current, as much as three or four milliamperes.

Importance of Auxiliary Grid Voltage.

The output from a pentode depends very much upon the voltage applied to the auxiliary grid, which consequently should be as high as possible if we wish to get the maximum output. As the voltage on this grid is reduced the anode current falls accordingly, and therefore also the power which the valve gives.

A curious and important feature of a pentode valve is that the load does not greatly affect the current flowing in the anode circuit as a result of the signal applied to the grid. This is owing to the relatively high impedance of the valve. From this it follows that the higher audio-frequencies are apt to be stronger in the anode circuit with a pentode valve than with an ordinary three-electrode valve is used.

H.F. Stoppers.

Fixed resistances are often introduced into the grid-leads of L.F. valves in order to prevent or minimise trouble owing to H.F. currents getting into the L.F. circuits, and so on to the loudspeaker. The effect of the resistance is to bring down the voltage of the H.F. currents applied across the grid-anode filament path of the valve. You will notice that we have here a capacity: that is, the working capacity of the valve across the grid-filament, and in series with this is the resistance just mentioned.

The question of how much voltage is developed across the end of the resistance depends upon how much the resistance compares with the impedance due to the capacity. Obviously, if the impedance due to the resistance is large compared with the rest, most of the voltage will be set up across the resistance.

Weakening The Upper Frequencies.

The low-frequency voltages in the circuit, however, must reach the grid through the resistance and, therefore, if this resistance is made too high, there will be a weakening of the upper audio-frequencies. The same thing will happen if the capacity is too large.

Although for other reasons it may be useful to increase the value of the resistance it is, for the above-mentioned reason, necessary not to increase it unduly, and the value of the resistance should only be large enough to achieve the desired object.

Generally you will find that for a single stage a resistance of perhaps 100,000 ohms will be necessary, but for two or more stages 50,000 ohms is generally quite sufficient.

That Response Curve.

It is very difficult to know with any sort of certainty just how uniformly our receiving sets respond to different frequencies throughout the entire audio range. We talk glibly about uniform response curves, but I wonder how many of us have ever made any very careful tests on this important point. And, in any case, however much we might wish to check over the response of the set, what really reliable means have we at hand for making the test?

(Continued on next page.)
TECHNICAL NOTES
(Continued from previous page)

Broadcast, so far as we are concerned, can only be interpreted in terms of the response which our receivers give us, and it is no use blaming the broadcast transmissions for any defects unless we are certain that the defects do not arise in the course of reception and reproduction. In other words, it is hardly fair to blame the transmission for what may very probably be faults of the receiver by which these transmissions are reproduced.

A Useful Check.

It has often been suggested that pure notes covering the whole of the audio range from, say, 50 cycles up to 10,000 cycles, should be broadcast from time to time by the B.B.C. so as to give listeners a really scientific means of checking up on their receivers. Something of this kind has often been done by broadcasting musical notes covering the most important part of the audio range.

This is very useful so far as it goes, but it does not cover the extreme frequencies, particularly the higher ones, which play an important part in the quality of the reproduction, nor is the apparent loudness of the transmitted musical tones kept strictly to a level. Furthermore, the musical tones transmitted for this rough-and-ready test are by no means pure tones. Tests of this kind are sufficient to tell you if there are any pick-up or resonance points in your receiver or loudspeaker, but beyond that—which you probably know, anyway—it is doubtful whether they are of very great value.

Some Useful Records.

Gramophone records have been made, giving a series of relatively pure tones ranging in frequency from about 30 cycles to as many as 10,000 cycles, and these are very useful for testing a receiver. But there, again, you can only make the test yourself by means of an electrical pick-up.

The scheme has shortcomings in that, in the first place, the record has to be interpreted through the pick-up, which itself introduces faults, and secondly, however uniform the apparent volume may have been in the recording, there is no guarantee that it will be similarly reproduced from the record.

Frequency and Quality.

It seems to me that the transmission by broadcasting stations of pure tones of uniform loudness over the whole of the range from perhaps 50 cycles to 15,000 cycles, will form a much better test for estimating the "factor of merit," as it were, of a receiving set. By tones of uniform loudness, which is perhaps rather a vague phrase in itself, I mean obviously tones which the "perfect" receiver would reproduce in the form of musical notes which would sound to the ear of the same loudness irrespective of the pitch.

Owing to the limitations of most ordinary loudspeakers, we are apt to fall into the habit of assuming that the audio frequencies above about 4,000 cycles are not worth talking about, but in point of fact it has been very definitely shown that frequencies up to at least 10,000 per minute are an important part in determining the quality of the reproduced sound. In the best types of talking-picture reproducing apparatus the makers strive very hard to preserve these higher frequencies.

What is Wrong with Home Recording?

I do not seem to hear very much about home-recording these days. Perhaps this is due to the approach of the summer season. Of course, home recording makes its appeal most particularly in the winter months, when listeners are more likely to be indoors.

At the same time, I have often wondered whether the types of home recorder which we have so far had, have made the appeal which was expected. I think many people have found that they are not quite so simple to operate as they seemed, or perhaps I should say that good results are not so easy to obtain.

In one sense, that makes the thing all the more interesting to the experimenter, but on the other hand, there are many people who are not quite so bent on experimenting and who prefer something which gives good results without very much trouble or practice.

OUTSTANDING FOR
QUALITY ALONE

Popular Wireless, June 18th, 1932.

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The "FLEXIDYNE" — AN ORIGINAL AND POWERFUL BAND-PASS DESIGN

By VICTOR KING

In this fine four-valve set, Victor King has excelled himself! For the "Flexidyne" has a "Range" switch on the panel — and when you push it in, you have a one-knob tuning set for family use; pull out the switch and you have a highly-selective long-distance four!

You simply must read about this remarkable set and examine the clear diagrams that make its construction so extremely fascinating and simple.

Among the other contents of this remarkable sixpennyworth are:

The Editor's Chat
"On the Grid"
The Month on Short Waves
The "Localisor"
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