

**THE VERY SET FOR EASTER** (See Page 96)

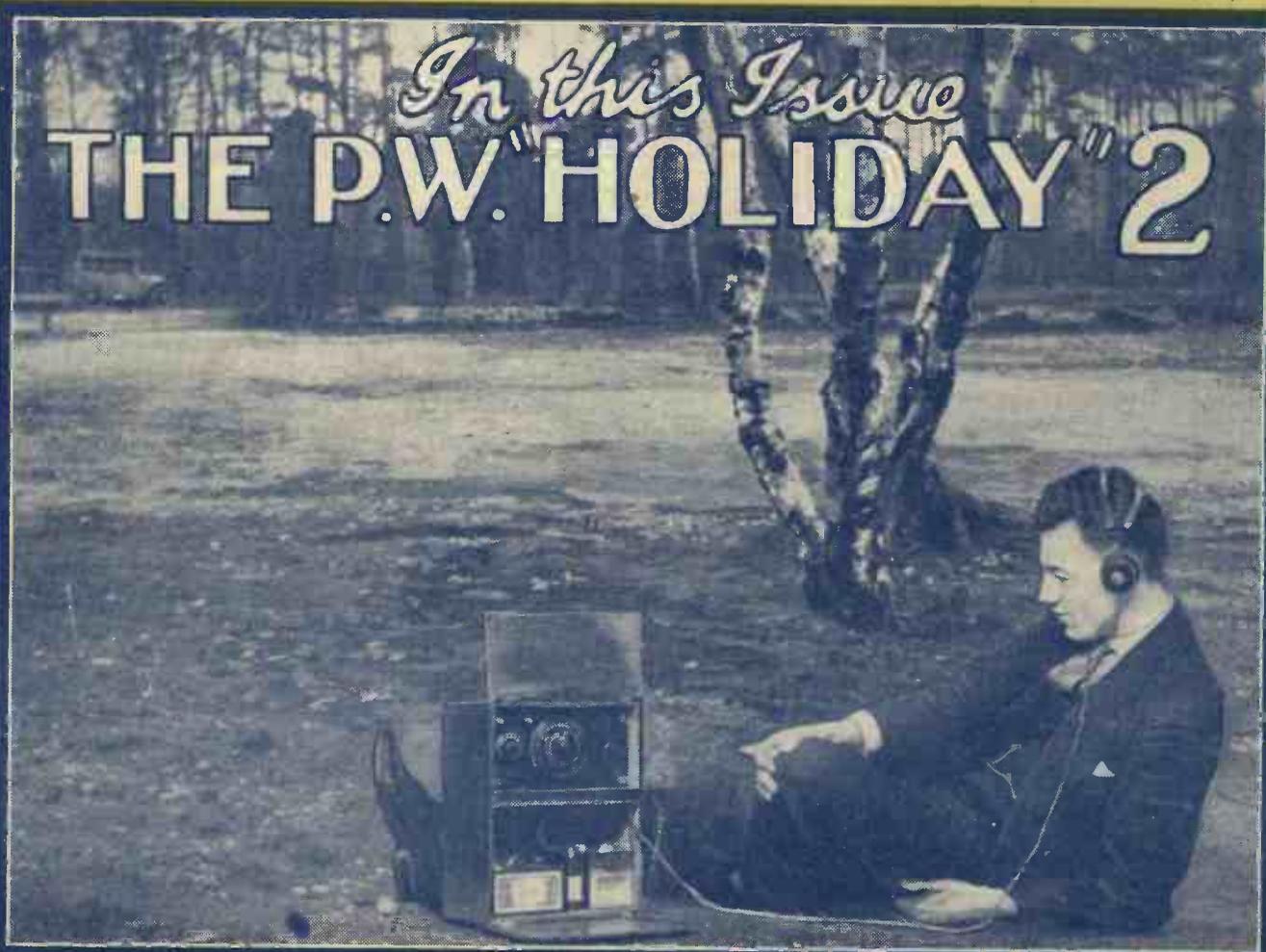
# Popular Wireless

Every Thursday  
PRICE  
3d.

No. 356. Vol. XV.

INCORPORATING "WIRELESS"

March 30th, 1929.



*Other Special Contents*

**MAKING YOUR OWN COMPONENTS**

(The First Article of a New Series for the Home Constructor)

**America's Television Progress. Short-Wave Selectivity**

**PENTODES AND PICK-UPS FOR THE "TITAN" THREE**

**"P.W." WHITE PRINT No. 17**



# ARE YOU GOING TO BUILD A SET?



If so, you must not miss the new

## "BESTWAY" WIRELESS BOOKS

### Four Fine Sets in Each!

"Bestway" No. 328 tells you how to build

A Wave-Change One-Valver

A Two-Valve Amplifier

The "Bestway" Wave-Change Three

The Home-Circle Four

"Bestway" No. 329 contains full details of

A "Regional" Crystal Set

A One-Valve Amplifier, and

An All-Wave Two-Valver

The S.G. & Pentode Three



PRICE  
**6d.**  
NOW  
on  
SALE



# Reliable Resistances result in Rich Reception

The most perfect form of Coupling between Stages



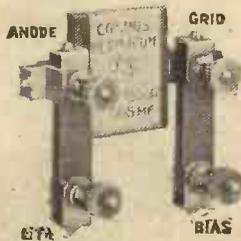
Lowest in Cost due to 'Met-Vick' Moulded Resistances

## MET-VICK COUPLING UNITS

complete for

**5/-**

The results obtained from Met-Vick Skeleton Resistance Units cannot be improved upon, even by using expensive wire-wound resistances. The values of the components have been carefully calculated to give maximum amplification per stage and as moulded resistances and leaks are used, their values are retained indefinitely and they are noiseless in operation. List MS 4761



Met-Vick Skeleton Resistance Coupling Units for Mains Operation with Met-Vick A.C. Valves:—

Anode Resistance 200,000 ohms }  
Grid Leak 1 megohm } **5/-**  
Coupling Condenser '005 mfd. }

Similar for Battery Operation:—

Anode Resistance 400,000 ohms }  
Grid Leak 2 megohms } **5/-**  
Coupling Condenser '005 mfd. }

Extra for Moulded Base . . . 1/3

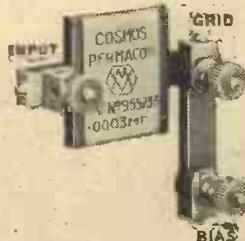
## MET-VICK DETECTOR UNITS

complete for

**2/6**

The use of moulded resistances in 'Met-Vick' Skeleton Detector Units, ensure freedom from 'rushing' noises often experienced with surface deposit leaks. Both the condenser and the grid components retain their original values, quite unaffected by climatic or other variable conditions.

List MS 4761.



Met-Vick Skeleton Detector Unit for Mains Operation:—

Grid Condenser '0003' mfd. . . : } **2/6**  
Grid Leak 1/2 megohm . . . : }

Similar for Battery Operation:—

Grid Condenser '0003' mfd. . . : } **2/6**  
Grid Leak 2 megohms . . . : }

Extra for Moulded Base . . . 1/3

## MET-VICK MOULDED RESISTANCES

Anode & Grid Leak for

**1/2**

Similar to those embodied in the Coupling and Detector Units 'Met-Vick' Moulded Resistances are available as separate components. They are chemically inert, the entire material being the actual resistance element. They

1. Carry heavy currents 5-10 milliamps without becoming noisy.
2. retain their values
3. Are non-inductive. They are ideal and inexpensive.

List MS 4760



Anode Resistances:—

100,000 ohms . . . . .	1/2
250,000 " . . . . .	1/2
500,000 " . . . . .	1/2

Eliminator Resistances:—

25,000 ohms . . . . .	1/2
50,000 " . . . . .	1/2

Grid Leaks:—

1 megohm . . . . .	1/2
2 megohms . . . . .	1/2
3 " . . . . .	1/2

Clips for mounting . . . . 1/3

# MET-VICK

## Components, Valves and Sets

RP  
127

Metro-Vick Supplies, 155, Charing Cross Road, London, W.C.2

Proprietors: Associated Electrical Industries, Ltd.

Make the Melody  
**LOUDER**  
 and  
**CLEARER**



Get the best out of your Set—enjoy the thrill of living music—change *now* to Cossor Valves. Cossor Valves will give you greater volume—sweeter tone—increased range. Your Dealer sells them for 2, 4 or 6-volt Accumulators.

with

**COSSOR**

BRITAIN'S FINEST VALVES

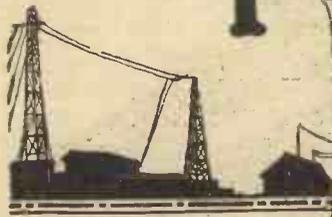
A. C. Cossor, Ltd., Highbury Grove, London, N. 5.

Have you got your copy of the **COSSOR** Broadcasting Map?

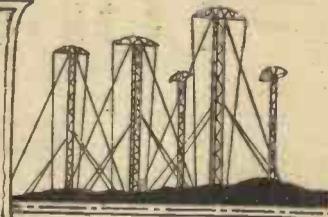
It shows positions and gives wavelengths and dial readings of 200 European stations. It will double your Radio enjoyment. Write for it now, enclose 2d. stamp to cover cost of postage, etc.

Send at once!

# Popular Wireless



Scientific Adviser:  
 Sir OLIVER LODGE, F.R.S.  
 Editor:  
 NORMAN EDWARDS.  
 Technical Editor: G. V. DOWDING, Grad.I.E.E.  
 Assistant Technical Editors: K. D. ROGERS, P. R. BIRD,  
 G. P. KENDALL, B.Sc., A. JOHNSON RANDALL.



## RADIO NOTES AND NEWS.

### A Holiday Note—The Latest Merger—Are They At It Again?—The Largest Broadcasting Station—Schenectady's Schedule—Another B.B.C. Secret?—Self-Starters.

#### A Holiday Note.

ONCE more Easter is here, with its weather lottery and the usual conspiracy of deception on the part of Nature and the countryside. How cunningly a brave show of sun can camouflage a treacherous cold wind! And how the trees and plants assist in mesmerising us into light holiday garb by pretending to bud! Let us hope that my "dismal Jimmy" forecast will be given the lie at about 80 degrees in the shade.

#### How Happy with Either.

MANY radio fellows are much perplexed just now by the rival beauties of two loves, namely, the set and the garden. The holiday provides sufficient leisure for a good "go" at a new set; and the garden cries aloud for planting. Shall it be bulbs for the beds or extra tubes for the panel? I know a man who for years past has devoted his Easters to giving his trellis-work a new coat of pure pea-green paint. He was converted to radio last summer, and is now about to break his Easter habit in favour of pranks with a portable. Risky, what?

#### The Latest Merger.

IN spite of the B.B.C.'s educational pretensions wireless interests persist in associating themselves with amusement interests. In the U.S.A. I believe, the Radio Corporation of America goes in harness with the Victor Company, and now we have the very unexpected sight of the Marconi Company disposing of the Marconiphone and Sterling Companies to the H.M.V. gramophone people.

#### The German Tendency.

WHILE I am in a commercial mood I may as well say that a review of German radio goods at the Leipzig Fair shows no startling advance or superiority over our own products. All-metal cases seem to be gaining ground, but they will never look so "good" as wood and ebonite articles. Portable sets and sets of parts are practically unknown, and I am given to understand that the loud speakers would not stand an "earthly" compared with ours.

#### Are They At It Again?

I HOPE the following bit of news is not really a war bulletin, but it looks uncommonly like one. The French are planning a new 3,500,000 francs station for Strassburg, to be ready next January; and the Germans have decided to increase Zeesen to 200 kw. and alter the transmitter at Friburg to 120 kw. Apparently they think that this is a "reply" and that

powerful station is difficult to see, but I suspect propaganda, otherwise why should Prague desire to broadcast beyond its borders?

#### Radio: Clerk of the Weather.

HERE is another note which is suggestive of an interesting and useful line of research for amateurs bored with DX and Chamber Music. Dr. Colwell, of

### CROYDON 'PLANE PICKS UP AUSTRALIA.



Flying over Croydon Aerodrome in this 'plane, piloted by Bert Hinckler, the radio operator listened-in to a Melbourne concert broadcast direct from 3 L O, Melbourne, thus beating the world record for reception in the air.

Friburg will interfere with Strassburg. We shall have to put "Uncle" Arthur Burrows on to this.

#### Largest Broadcasting Station.

AND it is not in America, either! No, it has been ordered for Prague and, 'tis said, will be rated at 120 kw. in the aerial. The largest station in America does not have much more than 50 kw. in the aerial. Why Czecho-Slovakia wants such a

West Virginia University, noted that the intensity of the signals from a given station (K D K A) was a guide to the weather. Falling intensity after sunset was followed by clearing weather next day, while rising intensity denoted cloudiness or rain. On the strength of this, weather forecasts were made from 40 intensity curves last autumn, of which 38 proved to be correct. Now then, here's a chance for a would-be prophet.

(Continued on next page.)

## NOTES AND NEWS.

(Continued from previous page.)

## Edison and Son.

THE juxtaposition of two paragraphs in an American paper struck me as peculiar. The first was a question put to Thomas A. Edison, and the answer. "Will it ever be possible to completely eliminate static?" (Atmospherics. Ed. "P.W.") Answer: It is improbable.

The very next paragraph stated that T. M. Edison, son of the inventor, arrived in Los Angeles to make experiments with "static." It looks rather as if the young 'un burns to prove that pa is wrong!

## When I Look and Listen.

A SPORTY cove who signs himself "Reflex Reggie" says on a postcard that when he looks at his valves he thinks of Sir Ambrose Fleming; at his tuning circuit, of Sir O. Lodge; at his aerial, of Marconi; and at his set, of "P.W." But that when he listens—"but that's another story—there's another talk on." All this suggests "Fleming Lodge" as the name for the B.B.C.'s new headquarters. "P.W." is modest enough to stand out.

## The Early Bird, etc.

JUST as we are entering, so we fondly hope, into spring, is an appropriate time to announce that from October 16th to 26th inclusive the Sixth Manchester Radio Exhibition will be held. It is organised by the Manchester "Evening Chronicle," the Radio Manufacturers' Association, and Provincial Exhibitions, Ltd. All enquiries to be made to the last-mentioned, at City Hall, Manchester.

## Schenectady Schedule.

I AM indebted to S.H.B. and G.G. for this:  
 W 2 X A D (19.56). Sunday, 20.30-04.15.  
 Monday, 23.00-05.00. W 2 X O (21.96)  
 Monday, 19.00-21.00 W 2 X A F (31.48).  
 Monday, 23.00-05.00. Tuesday, 23.00-05.00.  
 W 2 X A D (19.56). Wed. 23.00-05.00.  
 W 2 X O (21.96). Thursday, 19.00-21.00.  
 W 2 X A F (31.48). Thursday, 23.00-05.30.  
 W 2 X A D (19.56). Friday, 23.00-05.00.  
 W 2 X A F (31.48). Saturday, 23.00-05.00.  
 All G.M.T.

## Television Schedule.

W 2 X A D (19.56). Tuesday, 18.30-19.00.  
 W 2 X A D (19.56). Wednesday,  
 18.30-19.00. W 2 X A D (19.56).  
 Friday, 18.30-19.00. W 2 X A D (19.56).  
 Sunday, 04.15-04.45. W 2 X A F (31.48).  
 Tuesday, 05.00-05.30. All G.M.T.

I should be very pleased to hear from any reader who succeeds in receiving pictures from the U.S.A., as I am thinking of instituting the noble order of "P.W." Valve Barons for feats of this kind.

## New Light on B.B.C. Methods.

THE B.B.C. has now discovered that the Kit Cats are kittle kattle to deal with, and I must say that in the light of the facts as I read them the Kit-Cat folk have my sympathy. Bless me! Give broadcast facilities gratis; must not sing; must not announce the names of pieces; hoity-toity! If that is how the B.B.C. does business it is small wonder that

London is getting fuller and fuller of disgruntled bands and singers, and that the public loses its favourites.

## The "Wireless Theatre" Notion.

I REGRET that I find myself opposed to the idea of one of the daily newspapers that the public wants a "wireless theatre." I take it that loud-speaker performances are to be provided from B.B.C. programmes, the management sorting out the evening's items and making from them a programme based on their own ideas. I think very few people would patronise such a place if they could go to the "pictures" or run a gramophone, for only rarely does one want to listen for 2½ hours at a stretch.

## SHORT WAVES.

B.B.C. officials recently failed in an endeavour to record the screams of seagulls for an effect in a wireless play. We understand that in the end an ordinary soprano was used.—"Passing Show."

"Why you should 'cork up' your aerial," runs a headline in the "Bristol Times."

Well, we know why quite a lot of people should cork up their loud speakers, anyway.

Son: "Where is that lady telling the bedtime story?"

Dad: "In the W X Y Z studio."

Son: "What is a studio?"

Dad: "A studio is like a small theatre."

Son: "Why do they make the children sleep in the theatre?"—"Radio News."

Extract from letter addressed "To my Postmaster":

"I decline to dismantle any apparatus which Tom has left standing, or to haul down my aerial. The gas company does this much better. It does not send me little buff postcards suggesting I should dismantle my gas-fire or geyser. No. It just cuts off my gas. So if you fear I am evading payment of the ten shillings tax, you are at perfect liberty to cut off your gas. I suggest you begin by cutting me off from all items by learned professors."—"London Opinion."

Teacher: "Which country is farthest from us?"

Johnny: "I know, teacher. D X !"

"A vertical BUTTER PIPE aerial system is employed," we read in a provincial newspaper.

With the summer drawing nearer, too!

If you have a neighbour, who has previously been very difficult to get on with, suddenly develops a marked tendency to become sociable, beware! Someone may have given him a wireless set for his birthday.

## TRANSMISSION INTERVAL.

Caller: "Is Mr. Jones in? This is Mr. Smith, who has come to see him."

Butler (a radio enthusiast): "Yes, sir; will you kindly stand by for a moment?"—"Radio News."

## Three L.F. Stages.

COMMENTING on Mr. Burnard's letter in "P.W." No. 351, B. T. (Rhondda) says that he uses Det. and three L.F. stages, two stages being R.C. coupled and one transformer coupled. He finds grid-leak rectification better than "anode bend." Incidentally he swears by the "Antipodes Adaptor." He puts this poser: What station was transmitting gramophone records on (about) 31 metres at (about) 4 p.m., Feb. 26th? Anyone logged it?

## Ubiquitous "P.W."

NICE letter from Wilhelm P. (Kenya Colony), who is struggling with radio and, apparently, English. He began with the "Short-Wave" Two, but has added a second L.F. stage, and now gets stations

all over the world. He propounds one or two questions which I am passing to the Q. and A. section. He seems to be handicapped by want of materials—a deficiency which will be remedied by his countrymen if English traders don't get busy there.

## This School Radio.

"DIAL" (Heywood), whose letter strikes several responding chords in me, writes to suggest that if the B.B.C. must give radio lessons to school children they should do it between 9 a.m. and noon, when most owners of sets are at work. It appeared that "Dial" tried to entertain some visitors recently with his wireless set, but all he could give them was a French lesson and an exhibition of Sir W. Davies singing Tra La La to the kids. I think this suggestion is worthy of consideration.

## Another B.B.C. Secret?

NOW what is Capt. Eckersley up to? R. C. (Dalston), says that at quarter past midnight on the morning of March 1st 2 L O was making an unusual noise, "something like a quick, hollow knocking—distinct, I may say, from that cow-in-agony noise of the picture transmissions." He wants to know if this has anything to do with television. I was either asleep—or counting the sheep over the gate—at that time, so R. C. can count me out. But I would humbly suggest that it might have been the Ideas Department trying over a broadcast of "The Ghost of Cock Lane."

## The Self Starters.

AS reported on page 1299 of "P.W." No. 352, Mr. Watkins has a set which sings to itself without the aid of 'phones or loud speaker. This has brought a note from a Sunderland reader who goes one better; his set imitates a "spark" station when the loud speaker is disconnected. However, as no variation of the condenser made any difference to the noise I am afraid the source of the noise was not radio. I shall be glad to hear of any similar cases, but I would point out that one cannot disconnect the loud speaker or 'phones with impunity.

## Whose?

CONSIDERABLE interest has been shown in Commander Kenworthy's article in "P.W." in which he propounded the question whether executions should be broadcast. The answer, of course, is "It all depends. Whose?" But we must be serious, and so I would suggest that the matter is quite out of court for the simple reason that those shocking ceremonies are already taboo for the public. Incidentally, it may be remembered that centuries of public executions failed to evoke any considerable wave of feeling against capital punishment.

## Germany Forges Ahead.

THE last quarter of 1928 produced an increase of 301,314 listeners in Germany, making a total of 2,635,567 on January 1st, 1929. Bavaria, having a scattered peasant population, has inaugurated a scheme designed to increase listeners. Every listener who canvasses a new listener and gives his name and address to a certain radio paper gets a money prize equivalent to the value of a month's radio licence.

ARIEL.



Although television has still a very long way to go before it can be regarded as a really practical proposition, some slow but sure progress is being made in the U.S. Here is an interesting account of some of the latest steps taken.

By J. MARSHAM.

SINCE the first tests of the principles of television or picture transmission in America the public has shown an immense interest in each new development, hoping at any moment to be able to procure a combined television and sound-broadcasting receiver that would enable it to hear and see the broadcast events at the same time.

**The First Burst.**

However, since the first burst of enthusiasm and the statements of well-known experts that we are only just starting in to tackle the television problem, the public has become more conservative, and although it follows announcements of new achievements with interest, it seems willing to wait, believing that scientists will eventually conquer the art of sight at a distance.

And leading research men of the great companies are redoubling their efforts to bring the solution of some of the outstanding problems that must be overcome before television is really on anything like the footing that its older brother, sound broadcasting, enjoys.

One of the main problems concerns the photo-electric cell itself, popularly known as the "electric eye" of television. Leading among the newer types in use are those monster cells of the Television Tube Corporation, made under the supervision of Dr. L. P. Garner. These are used in the Sanabria television system, the first to send recognisable pictures that were received in an aeroplane while in flight, and the first to send voice and pictures simultaneously over the same broadcast wave-length.

**Evolving Electric Eyes.**

The new photo-electric cells of the Bell system, the General Electric Company and the Rathcon Company also are far in advance of the earlier types, and have gone far to the solution of the problem.

Television, as developed by C. Francis Jenkins and his associates, from the peep-hole stage to the screen stage, is about to be transformed from an experiment to a commercial undertaking, according to President Garside of the newly formed Jenkins Television Corporation.

Along with other problems, which have

long ago appeared in his development of television, Jenkins has ingeniously solved that of putting television programmes on the air by scattered and independent broadcasters.

Briefly he produces suitable motion picture films, with the proper action, detail, contrast and story for television purposes. The necessary number of prints are made from the negative. These prints or films are furnished the various broadcasters for use in an inexpensive television projector. Thus he hopes that many scattered broadcasters will have the same television programme with minimum trouble and expense and with positive results.

In his latest type home television receiver

of being limited to the dimensions of the single glowing plate of the single neon lamp, he employs four plates in a single and special lamp, each plate or target serving to illuminate only one-fourth of his total screen.

**"Persistence of Vision."**

The plates or targets are flashed on in rotation, much after the fashion of the automobile spark plugs in a motor-car. Consequently enormous illumination is obtained with an ordinary radio set amplifier. Again, he makes use of special light conducting rods, between targets and slits, in his scanning drum, so as to conserve every bit of light between the glowing plate and the slit.

The slits in the revolving scanning drum are arranged so as to sweep across an opening from one side to the other, line by line. The varying intensity of the glowing target is translated into a varying intensity of the line drawn across the opening. Because of the persistence of human vision, the dot of light moving across the opening appears, not as a dot, but as a line of varying light intensity.

Successive lines are also retained by the human eye, so that we have an entire pattern of glowing and varying intensity, with lights and shadows forming a complete picture.

Another recent development of outstanding merit is Dr. Alexanderson's new projector system that is designed to project two full figures on a screen, and the figures may be engaged in some athletic contest, like a boxing or wrestling match. This system claims to throw a picture that is big

(Continued on next page.)



In order to attempt the presentation of a radio play by television, W G Y used three separate transmitters, each showing simple outlines of objects, such as hands, faces, keys, rings, masks, and so on.

Jenkins makes use of a scanning drum, a multiple target neon lamp of modest current requirements and high efficiency, together with a novel projecting and magnifying system, so that a group of persons may view the television image.

Without going into the intricacies of the new system, it may be stated that instead

## AMERICA'S TELEVISION EXPERIMENTS.

(Continued from previous page.)

enough for as many as 200 people to see comfortably.

Regarding this development Dr. Alexanderson says:

"The television system of the future will consist of the television camera, the radio transmission and the television projector. In addition to these three essential elements there will in most cases be a fourth element—a wire connection between the studio and the radio station.

### The Limiting Factors.

"Each of these elements will be improved as time goes on. We are looking forward to more sensitive photo-electric cells for the camera and more brilliant source of light for the projector. The principal difficulties, however, which limit the use of television at the present day are the unknown factors of radio transmission, and constant efforts are being made to solve the new radio problem introduced by television.

"For this reason we are broadcasting experimental television regularly from Schenectady five times a week. These television broadcast programmes are being sent out both on the regular wave of 390 metres and one of the short waves, 22 metres or 32 metres, which is used for international broadcasting.

"In this way our own investigators are able to make their observations, while at the same time we are enlisting the co-operation of many amateurs. I have been making systematic observations for some time at my summer home at Lake George, which is at a distance of 50 miles from the transmitting station.

"These observations have been intensely

interesting from a scientific point of view, but not encouraging if we were looking for immediate practical results from television. On the other hand, we have had consistent and encouraging reports from amateurs in Los Angeles."

### On Television's Trail.

Dr. Alexanderson's transmitting camera, as used to-day, consists of three units, a cabinet containing a 24-hole disc and a 1,000-watt lamp as a light source, and two smaller cabinets each housing a photo-electric tube of new construction with amplifiers. All three cabinets are mounted on tripods, enabling the operator to raise, lower or tilt the light source to suit the height or position of the performer.

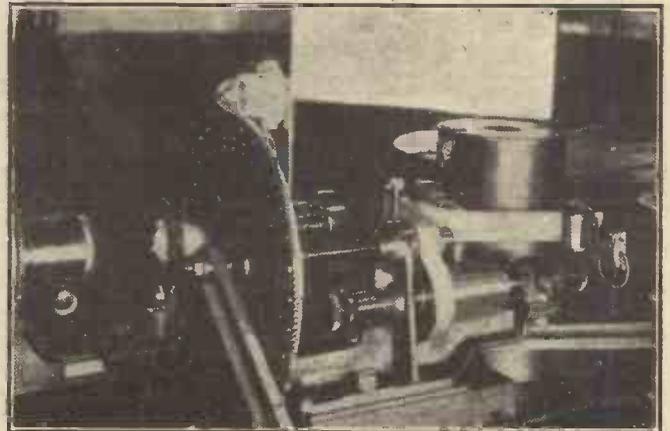
Some of the illustrations show this apparatus in action in the test studio. The portability of the instruments is so designed to make the radio-television drama possible. A large silvered screen, not unlike the motion-picture screen, is used to receive the image in clear focus, about 15 ft. from the disc.

Dr. Frank Conrad's brilliant work in the development of radio movies must not be passed over without comment. He has developed a method that utilises a mercury-vapour lamp as the light source for picture reproduction on a distant screen with such clarity as to nearly be acceptable, it is adjudged by experts, for a more or less public service.

According to H. P. Davis, the Vice-President of Westinghouse, the system heralds the time when the radio listener in

America will sit at home and have that most popular form of entertainment, motion-pictures, projected by his own individual radio receiver.

Of course, the amateurs and independent experimenters of America are going in hot-foot on the trail of television, and quite a number of improvements are being made by these workers. Among these is James Millen, who has invented a "framing device," operating on the planetary drive system, by which it is possible to keep the picture from sliding out of the frame.



A section of the television apparatus used for transmitting films. By using films instead of the original objects much more light becomes available for energising the light or responsive cell.

Mr. H. P. Donle, the well-known radio physicist, inventor of the Sodian tube, has also developed what is perhaps one of the most ingenious television units yet produced for home television. It is small and compact, about the size of the ordinary receiver, and employs a disc as small as 6 in. in diameter.

He uses an ingenious lens system to bring the pictures up to a size where they may be viewed by a number of persons. The device is automatic, and may be left for long periods of time without adjustment. The device makes use of specially controlled magnetic brakes. Reasonably clear and distinct pictures have been transmitted by this system.

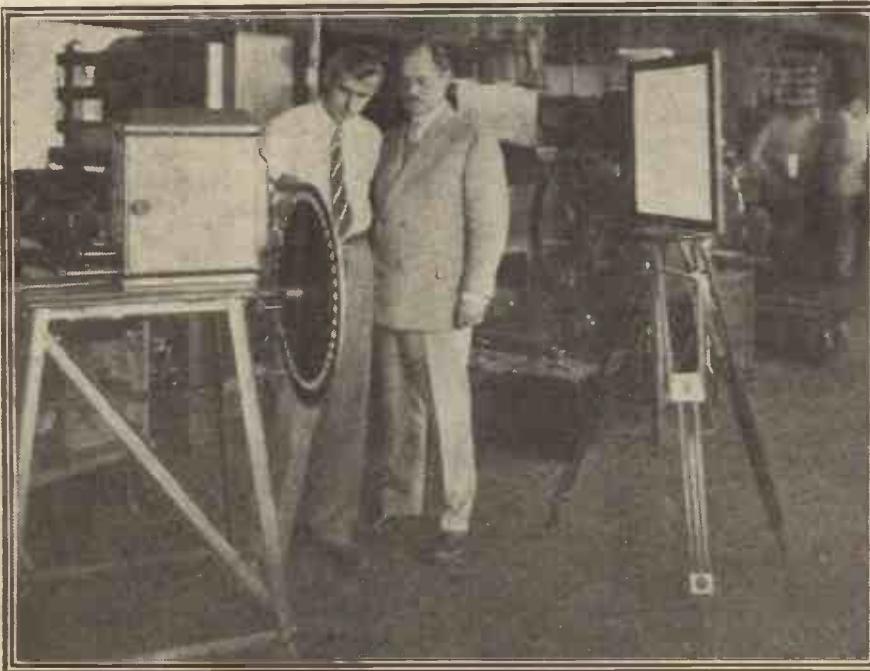
### Outlook for the Future.

Taken on the whole, the television situation in America is a promising one, for now that the first rush of the imagination has subsided, the research men are working steadily and earnestly, without disturbance by the public, while not promising any set time when all of the difficulties will have been overcome, and when television is as perfect as are the movies.

## TWO REMINDERS.

If your aerial wire is allowed to pass near to an iron gutter pipe or similar large metal surface, high-frequency leakage can take place at this point even although the aerial wire is properly insulated by rubber or silk covering.

Two new "Bestway" wireless books have just been published, each containing full descriptive details of four sets. The price of the "Bestway" Wireless Books is 6d. each.



Dr. Alexanderson, chief consulting engineer of the Radio Corporation of America, and consulting engineer of the General Electric Co., with his assistant, R. D. Kell, examining the new television projector described in the accompanying article.

ALMOST every-one who has had anything to do with short-wave reception will realise the necessity for slow-motion dials and extremely careful manipulation when receiving on waves below 50, or even 100, metres, but how many readers appreciate the real reason for this apparent sharp tuning?

Why, for example, should it be any more difficult to tune in a broadcasting station on 30 than it is on 300 metres, and to take things a stage further, why should it not be necessary to use H.F. stages on short waves in order to get sufficient selectivity to separate stations?

The whole question of sharp tuning on short waves is one of considerable interest, and although in attempting to give an answer it is necessary to delve into figures running into eight noughts, the reason for it should not be quite so mysterious after the explanation which is to follow.

Let us make a start with the largest number with which we shall have to deal, namely, 300,000,000. This figure represents the speed or velocity of ether waves in metres per second.

**Frequency and Wave-length.**

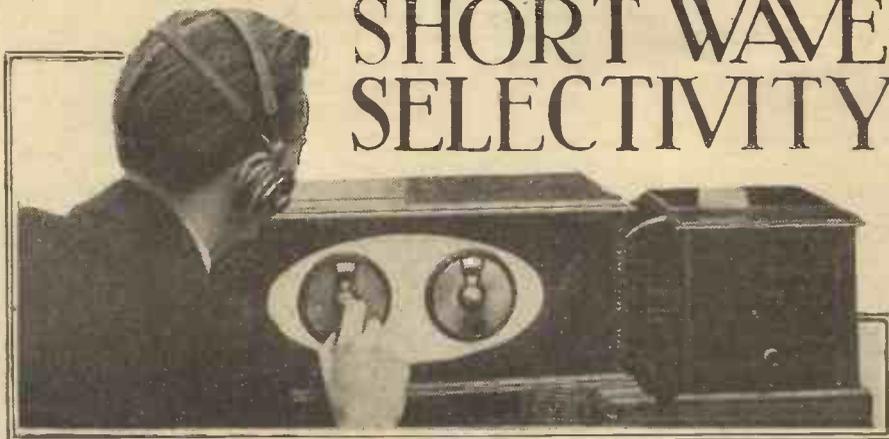
Given the wave-length of any station, it is a simple matter to work out the frequency from this large figure since it is only necessary to divide the wave-length into the velocity.

To take a simple example, if a station is said to be working on a wave-length of 300 metres, the frequency of the carrier-wave of the station would be 300,000,000 divided by 300, which is 1,000,000 cycles per second. To simplify matters still further, if the answer is divided again by a thousand, the frequency of the station can be expressed as 1,000 kilohertz, which is another way of saying 1,000 kilocycles per second.

Were this station transmitting a note of one frequency only it would be possible to have another station working without interference with a frequency separation of only a few kilocycles, assuming, of course, that the receiver was sufficiently selective. But, as many of you will know, in practice, a station requires a small "band" of frequencies of its own as soon as modulation commences, and the extent of this "band" is 10 kilocycles on either side of the carrier frequency.

From this it would be imagined that all the stations on the broadcast band would require to be separated by 20 kilocycles in order to avoid overlapping, but owing to the large number of stations now transmitting in Europe, it is impossible to

# SHORT WAVE SELECTIVITY



10 kilocycles, it is a simple matter to see why it would be possible to allocate positions to 15,000 stations.

Now, to come back to the question under discussion, if a movement of five degrees on your tuning dial were to alter the wave-length to which the receiver was tuned, from 300 to 310 metres, you would, in so doing, have passed through a frequency band of approximately 30

kilocycles, and on this band it would, therefore, have been possible for you to have heard four stations, assuming, of course, that the stations were transmitting and that you were able to receive them.

Very well, then, let us consider what is likely to happen between 20 and 30 metres which, as in the above example, is a 10-metre change. In the first case, it would probably require a 40-degree movement of the tuning dial on these wave-lengths to effect the 10-metre change, but in moving the condenser dial over 40 degrees we should have passed over the difference between 15,000 (20 metres), and 10,000 (30 metres), which is 5,000 kilocycles!

**Stations and Degrees.**

Reverting to the previous example, we found that it would be possible to receive four stations between 300 and 310 metres and in a movement of 5 degrees of the tuning dial. Between the 20- and 30-metre tuning positions, allowing the 10 kilocycles separation, it would be possible for 500 stations to be placed.

If you just consider exactly what that means for a few moments, you will see that for a 5-degree movement of the tuning dial on short waves it would have been possible to have passed through just over 60 stations!

Of course, the very idea of 60 stations in a matter of 5 degrees on the tuning dials is sufficient to give anyone a nightmare, yet theoretically it is possible, and in any case the example should serve to show the reason for sharp tuning when receiving stations on short waves.

\* \* \* \* \*

"The whole question of sharp tuning on short waves is one of considerable interest."

By G. T. KELSEY.

\* \* \* \* \*

carry this into practice. To get over the difficulty, then, the Geneva Conference decided to space stations by 10 kilocycles, keeping those with adjacent frequency "bands" as far apart as possible geographically.

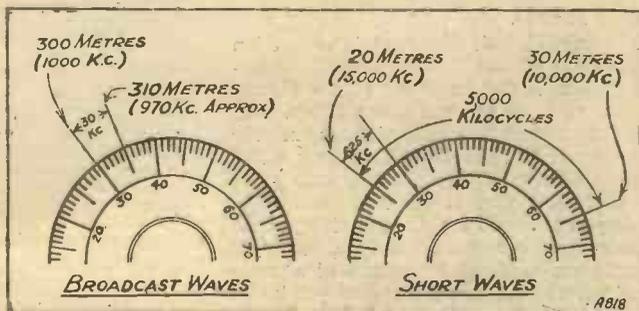
You are probably wondering what on earth all this has to do with sharp tuning on short waves. As a matter of fact, it has very much to do with the subject, as will be seen from the following.

Bearing in mind what has been said about frequency separation, do not be unduly alarmed when you learn that with a separation of 10 kilocycles it would be possible to get 15,000 stations between one and two metres!

**The Dial Movement.**

This seems such an alarming statement on the face of it, that it would, perhaps, be as well if the figures were given from which one arrives at this answer.

The frequency in kilohertz (kilocycles



per second) of a station working on 1 metre, assuming that such a thing were easily practicable, would, according to our previous formula, be 300,000. At 2 metres, the frequency would be 150,000 kilohertz, which means to say that between 1 and 2 metres there is available a band of frequencies equal to the difference between 150,000 and 300,000 kilocycles which is, of course, 150,000 kilocycles.

Allowing the recognised separation of

\* \* \* \* \*

FOR YOUR NOTEBOOK.

\* \* \* \* \*

A good method of tidying frayed ends of flexible wires is to use a little blob of Chatterton's compound to seal off the odd lengths.

When buying reservoir condensers for a home-made mains unit it is important to see that the rated working voltage is well above the normal voltage which the finished unit will take.

To find out which of your D.C. mains is earthed take a lamp of the supply voltage to earth, the other side of the lamp being joined to a flexible lead. If this is touched on the mains in turn the connection with that main which is not earthed will light the lamp.

## LATEST BROADCASTING NEWS.

RELIGIOUS  
BROADCASTING

An Important Development.

THE TWO BLACK CROWS—  
INTERVALS OF SILENCE—  
A WEAKNESS FOR TOWERS.

Religious Broadcasting: An Important Development.

AN innovation well worthy of extended consideration is to be introduced into the Sunday religious broadcasts from stations in the Manchester grouping, on April 7th, with the relay of a service from the Church of the Holy Trinity, Kingston-upon-Hull. It is intended to broadcast services during the summer from other well-known places of worship in the Northern Region: and the second, on a date yet to be arranged, will come from Sheffield; others follow from Liverpool, Manchester, Bradford, and Leeds Parish Church.

## Largest Parish Church?

Unless there have been good reasons against such a scheme, it is somewhat surprising that more has not been done to develop it before now. No country is richer in churches, both historically and architecturally, than ours, and no nation is prouder of its sacred edifices and more devout than we, or so ready to accept the principle (which all will admit has much to commend it) of Sunday broadcasting being carried out in accordance with the best traditions.

Yet so far the number of churches in which the microphone has been used is remarkably few, and in this connection it can hardly be argued that religious broadcasting has received all the stimulus it might have had. The Church of the Holy Trinity, Kingston-upon-Hull, is one of at least three claimants to the title of the largest parish church, with a history dating back to the thirteenth century.

The preacher on April 7th will be the Rev. Canon A. E. Smallwood, Rural Dean of Hull and Vicar of All Saints Church in that city. There is undoubtedly a great desire among those listeners who are interested to have their broadcast religion from places of worship rather than from studios. Incidentally, there is no ground at all for the suggestion that this part of broadcasting is any less popular than it was. People would like to have an appropriate entertainment alternative, but they would not tolerate the disappearance of religion from the programmes.

## The Two Black Crows.

The B.B.C. is in negotiation with a view to securing broadcast by these famous comedians during their forthcoming visit to Europe. Fantastic figures are mentioned, but the probability is that co-operation with music-hall interests will make it possible for listeners to hear the voices of those who have provided so much amusement on the gramophone.

## Intervals of Silence.

The B.B.C. is about to revert to its original practice of intervals of silence between programmes. The change is being made at the instance of those who believe that a programme is an artistic unit, and if its full effect is to be achieved it should have silence at both ends.

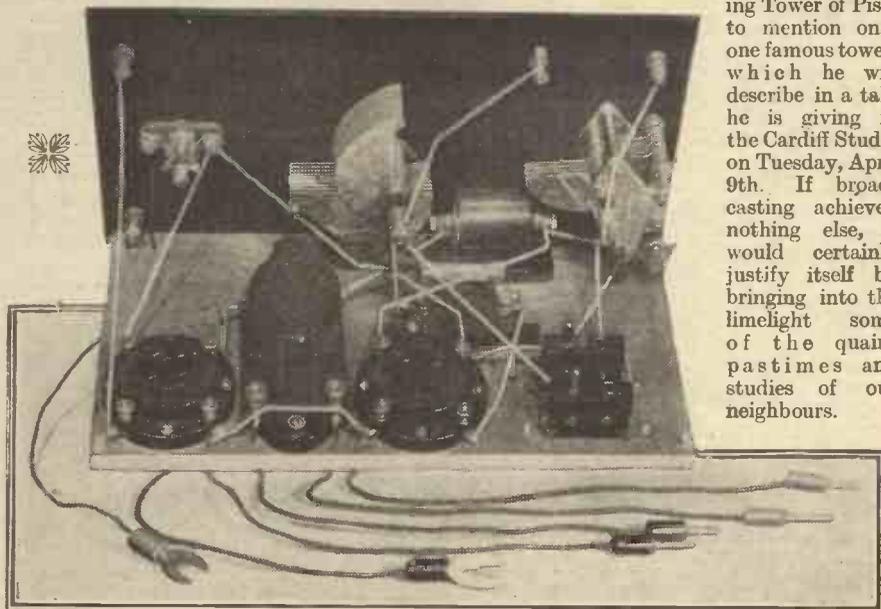
Practice on the Continent is to keep a clock ticking or arrange for some other steady background noise during intervals in order to prevent listeners oscillating on the assumption that their sets have broken down. It will be interesting to see how the B.B.C. tackle this particular problem.

If the silence lets loose innumerable shrieks and howls the result will hardly be artistic. Also, it would be instructive to know what Mr. George Grossmith thinks of the reversion to the system which was changed chiefly owing to representations from him.

## A Weakness for Towers.

Some people prefer this, other people prefer that. Mr. H. T. Richards has a preference for the study of towers, a hobby for which long travelling in many parts of the world provides a fair amount of opportunity. Naturally he knows quite a

lot about the leaning Tower of Pisa, to mention only one famous tower, which he will describe in a talk he is giving in the Cardiff Studio on Tuesday, April 9th. If broadcasting achieved nothing else, it would certainly justify itself by bringing into the limelight some of the quaint pastimes and studies of our neighbours.



Another view of the "Holiday" Two, the fine set which is described in detail elsewhere in this issue of "P.W."

## TECHNICAL NOTES.

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

## PICTURE RECORDS

TRANSFORMING BACK—VALVE DESIGN—DX RECEPTION, ETC., ETC.

## Picture Records.

A CURIOUS development in connection with picture transmission and reception is the recording of the picture first of all upon a gramophone record and the subsequent reproduction upon the picture receiver. Perhaps this may sound a little obscure at first, but in reality the principle is a very simple one.

As you know, in a picture receiver, of the Fultograph or any similar type, incoming signals are received by means of a radio receiver, and these actuate the printer in such a way as to produce the light and shade effects which gradually build up the picture upon the rotating cylinder. It is clear, therefore, that these impulses—although in the ordinary use of the picture receiver they remain in the electrical form—may be converted by means of a simple electromagnetic device (corresponding exactly to the movement of a loud speaker) into some form of sounds.

Whether these sounds would convey any meaning when reproduced audibly is a

matter of no importance. The important point is that the sounds may be recorded upon a gramophone record in the usual way.

## Transforming Back.

And a further important point is that, by means of an electrical pick-up, the "sounds" may be transformed back into precisely the same electrical impulses which were originally received. The gramophone record, therefore, represents for the time being a "potted" version of the impulses which were originally received over the broadcast, and for subsequent operation of the picture receiver it is only necessary to "play" the gramophone record, reproduce the electrical impulses and feed these into the picture receiver, which then operates in exactly the same way as though the impulses were coming over the broadcast.

Whether this recording of the picture impulses upon a record has any commercial importance other than its scientific novelty is a matter of opinion, but it is obviously

(Continued on page 102.)

# PENTODES AND PICK-UPS FOR THE "TITAN"



**T**WO special questions about the "Titan" Three have been raised so often in readers' letters that we think it will probably be of general interest to go into them in some detail.

Curiously enough, they are not points which are often mentioned in connection with other sets, but that is probably explained by the fact that the "Titan" has appealed to a much wider circle of readers than usual.

Just what they are you will have gathered from the title of this article, so we can get down to business without further delay. First of all, the pentode question. Now, it might seem that this is too simple a matter to call for any comment but there are, as a matter of fact, one or two points which would be all the better for a little explanation.

## Need For Output Transformer.

Of course, it is simple enough to push a pentode into the last socket, re-adjust grid bias to suit, and call the job done. You will certainly get a very large gain in amplification that way, but it does not follow that quality will be quite all you could wish for unless you do a little more. With very many loud speakers the result would be a distinctly "edgy" and high-pitched effect which is not very pleasing.

Just here and there, of course, one comes across a very "woolly" cone speaker giving a lot of false bass, which is actually improved by running it direct from a pentode in this way, but the general effect is not so pleasant.

The remedy is to use a special type of output transformer between the valve and the speaker, which has the effect of bringing the tone down to normal and enabling you to get very good quality as well as the tremendous magnification of the pentode type of valve.

## First Trials.

When this is done the "Titan" Three becomes an extraordinarily impressive set, giving a performance such as one used to expect from nothing smaller than a five-valver.

The conversion is very easily made, and you need not alter the set itself at all if you like. Just insert the pentode valve in the last socket, connect the terminal on the valve base to H.T. +3 with a piece of flex, adjust the grid bias according to the leaflet with the valve, and connect up the output transformer outside the set.

The transformer is quite a small component, and will hardly be in the way, but you can get it out of sight by screwing

\* \* \* \* \*

This article has been specially prepared by the "P.W." Research Dept., in response to numerous requests from readers for instructions for modifying their "Titan" Three receivers for gramophone work and to enable a pentode valve to be used to the best advantage.

\* \* \* \* \*

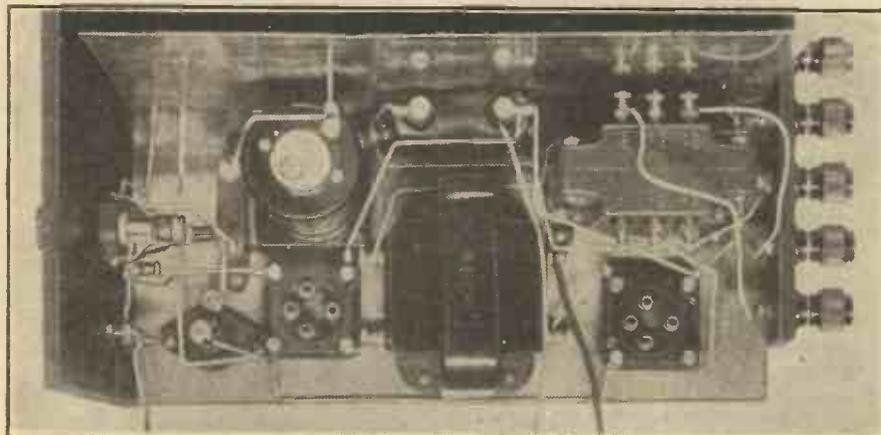
it to the back of the cabinet, either outside or inside, as desired (more about this in a few moments). The connections of the transformer are quite simple, but since in most makes provision is made for getting various ratios and so suiting different

connected to  $S_1$  and  $S_2$ ,  $S_1$  and  $S_3$ , or  $S_2$  and  $S_3$  (these are the secondary terminals). With any given speaker you should try each of these three pairs and see which gives the best tone and volume.

## Making It a Permanency.

Having tried out your pentode in this simple way you may decide to make it a permanency, and you will then probably wish to work the output transformer into the set itself and wire it in place. With a compact type of transformer like the Marconiphone, there is room to do this, and we have actually made the modification and photographed it to show you how it is done.

The plan view photo will help to show how the parts are arranged, and you will



If you compare this view with your set or the original blue print, you will see just what has to be done to make the modifications discussed in this article.

speakers, it is as well to read rather carefully the instruction sheets accompanying the transformer.

For example, the Marconiphone "Universal" output transformer, seen in the photos, has three primary and three secondary terminals, and this is how they are used. With a pentode the  $P_1$  and  $P_3$  terminals of the transformer are to be wired to the L.S. terminals (i.e. output) of the set, and the loud speaker should be

note that it is necessary to move two existing components a little to make room for the transformer. If you compare this photo with the blue print of the set in its original form, or with your own existing set, you will see exactly what is needed.

To make a neat job of all this a little re-wiring is obviously needed, although practically all the connections of the parts which have been moved remain the same.

(Continued on next page.)

## PENTODES & PICK-UPS FOR THE "TITAN."

(Continued from previous page.)

The new connections concern the leads from the H.T. + 3 terminal, the loud-speaker terminals, and the anode of the last valve, and I think I can make these quite clear in words.

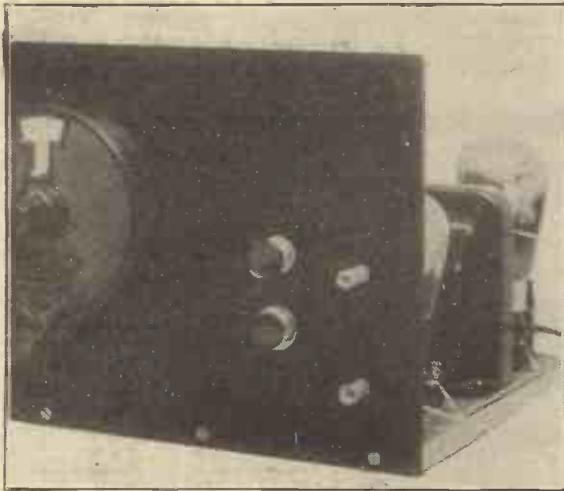
With the set in its original state the H.T. + 3 terminal was wired to one L.S. terminal, to one side of the 1 mfd. Mansbridge condenser on the L.F. side of the screen, and to one side of the H.F. choke. The new connections here are as follows: H.T. + 3 to P<sub>1</sub> on output transformer, to one side of Mansbridge condenser, to one side of H.F. choke as before. The anode of the last valve, instead of being wired to the other L.S. terminal, now goes to P<sub>3</sub> on the output transformer.

### A. Grid Bias Point.

To each of the L.S. terminals a short piece of flex is soldered, and these go to the secondary terminals of the output transformer, the best pair for your particular speaker being found by trial, as has been explained. That completes the alterations.

Just a hint or two about the pentode in actual use. First of all, about grid bias. Many pentodes will take considerably more bias than their curves seem to indicate, and you should try the effect of 3 or 4½ volts more than the figure quoted by the makers.

Unless you are trying to handle very exceptionally loud signals quality will be just as good as before, and you will save a good deal of H.T. current.



Here you see the right-hand end of the panel after the addition of the pick-up change-over switch and connection points.

Having dealt with the first section of our main subject, it appears that we still have some space available, and it seems likely that the best use we can make of it is to consider some miscellaneous practical points concerning the "Titan" Three which have been raised in readers' letters.

We are receiving a great volume of correspondence about this set, indicating the extraordinary interest which it has aroused, and from it we think we can cull some matters of general interest.

Most of these letters, of course, concern

modifications to use up existing parts or valves, and so on, and it is difficult to generalise in a really helpful way. However, one point has been raised so often that we think it will probably be interesting to clear it up, and that is the question of the use of one of the older "double-ended" S.G. valves instead of the later type with the plate terminal on a cap on top of the bulb.

Well, one of these valves *can* be used, and if you have one it is interesting to try it; but they are not, as a rule, very suitable, and have not been found to permit the set to work at its best. The difficulty is that they do not behave at all pleasantly as regards reaction in most cases, and give a very floppy control. However, they vary somewhat in this respect, and some specimens may be quite fair.

To use one of these valves means, of course, a slight alteration. It is to be inserted in the H.F. holder in the ordinary way, and the flex lead provided for the anode terminal of the ordinary S.G. valve must now be fitted with a socket, such as a valve leg, to slip over the anode pin of the valve (the one nearest the moulded ridge at one side of the upper cap). In addition, you will need to run a short piece of flex from the "P" terminal of the valve holder up to the remaining pin on the upper end of the valve, with another socket to make contact.

Speaking of reaction, by the way, reminds us that one or two readers have inquired as to the real degree of smoothness of control to be expected in this special type of circuit.

Well, probably the best way to answer this question is to say that when the correct adjustments are made the reaction should be nearly, but not quite, as smooth as a good Reinartz.

### What to Expect.

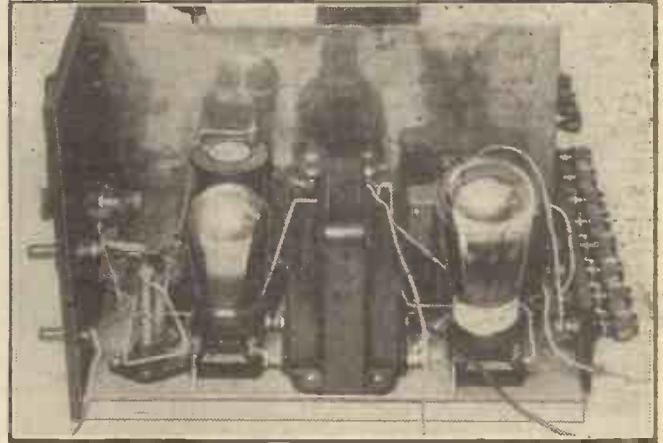
There will usually be a slight but by no means pronounced pop on passing into oscillation, chiefly because there is so much amplification going on that it is magnified up considerably.

There should be no appreciable overlap, however, and so a perfectly satisfactory control is obtainable, the faint pop serving as a useful warning that the set has begun to oscillate, and so may be causing interference. There should not be the slightest difficulty in obtaining the right setting even on weak signals.

If your set is not answering to this description, the most likely cause is incorrect adjustment of the voltage on the screening electrode of the H.F. valve

(H.T. + 1), and a little testing here will usually put matters right very quickly. An adjustment of the aerial tapping on the coil is also helpful in some cases where the S.G. valve happens to be a specimen with a tendency to awkward control.

Mention of H.T. voltages, by the way, brings us to rather an important point which we have noted, which is that many



The special output transformer for pentode work can be embodied in the set itself, if desired.

readers do not appear to have realised that it is absolutely useless to expect good results from any screened-grid set if the H.T. supply is not adequate.

### Don't Stint the H.T.

To try and run the set from a 60-volt unit or a 100-volt one in doubtful condition is simply asking for disappointment.

Many sets will put up with this sort of treatment, and give merely rather poor quality and slightly reduced volume, but not so the S.G. type. The volume falls away hopelessly, and it becomes impossible to receive distant stations at all. This is a point to be borne in mind, for even if the H.T. battery is a 100-volt one, it is quite possible that its voltage is falling if it has been in use some time, and results will suffer. (Incidentally, if the H.T. goes below about 100 volts, the voltage on the screening electrode, i.e. H.T. + 2, should be tried at various adjustments down to 60 volts.) From 110 to 120 volts total is really desirable for good results.

Now a selectivity point. The selectivity of this receiver is unusually good for one possessing only one tuned circuit, particularly on the lower wave-band; but you must not expect it to perform impossible feats of cutting out a local station only a mile or so away without the aid of a trap.

We have mentioned this point before, but return to it because some of our readers seem to be puzzled by the fact that its selectivity is obviously high; yet they have a little difficulty in getting rid of a very nearby local. One reader, for example, was very dissatisfied with his "Titan" because it would not cut out a main station at one mile! He mentioned casually that it gave 50 per cent more volume than his old three-valver, so probably when he gets a trap going he will not have much to complain about. Seriously, though, you must expect to use a trap with any single-circuit receiver in cases like this.

Further notes on Pick-ups, etc., will be found in our next issue.

# MAKING YOUR OWN COMPONENTS



## 1. FIXED CONDENSERS.

"WHO wants to make his own components, anyway?" I can quite imagine that plenty of readers will make some such comment to themselves when they first see this page, and no doubt from their point of view they will be perfectly justified.

Now that components are becoming so cheap and yet reliable and efficient, it may be that from a strictly utilitarian and common-sense point of view it is difficult to see why anybody should go to the trouble of making them at home. For example, one can buy good fixed condensers nowadays for as little as eightpence, yet the ones we are going to describe involve quite a deal of work to make.

### Another Point of View.

But is the strictly commonsense and utilitarian point of view the only one? After all, we are dealing with a hobby, and its main object is to give pleasure to those who indulge therein.

After a while one does certainly tend to grow a little tired of turning out sets in a

them in component building at home, and they wish to supplement the ordinary pleasures of set assembly in this way.

No doubt, the majority of constructors will continue, as in the past, to regard the actual building of the set as merely a means to an end, namely, the enjoyment of the performance of the finished receiver.

They will therefore just go on taking the simple and obvious course of assembling

he has nothing to fear as to the efficiency of the parts he will turn out by following these articles.

Every component to be described has actually been made in the "P.W." Research Department, and has passed strict tests to ensure that it shall be perfectly efficient and trustworthy in service. Such parts as cannot in our opinion efficiently be made at home will be excluded from the series, but there are not many of these, the L.F. transformer being the only really noteworthy one.

We are starting off with fixed condensers, since these are a particularly plain and straightforward job. Now, if you analyse the present trend of set design you will find that surprisingly few capacities are really needed, and this means that you can soon make up a series of condensers which will meet practically every case.

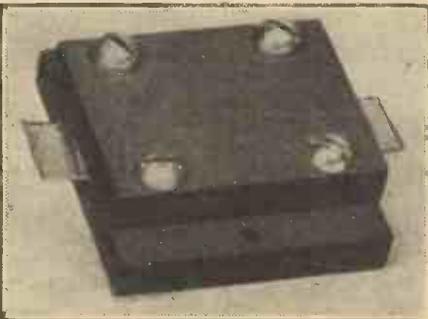
This is the first of a new series of articles we are publishing in response to the direct request of a large number of readers desirous of constructing components for their sets. It is not every radio enthusiast who wants to do this, but it would seem, judging from our correspondence, that the number who do is increasing very considerably.

Readers can follow the instructions given in these reliable "how to make" articles, certain that success will follow their efforts, providing they adhere to the various specifications. The articles have been prepared by the "P.W." Research and Construction Department, and every component dealt with has been assembled and then very carefully tested for electrical efficiency and, in the case of condensers, coils and like devices, its value closely measured.

The devices will be found to be very easy and certainly most inexpensive to make, and the most inexpert constructor should find the fascinating work well within his mechanical powers.

### Capacities Required.

The capacities actually used in the great majority of sets are these: .0002 mfd. (occasionally used as an optional series aerial condenser), .0003 mfd. (detector grid condenser), .001 mfd. (by-pass or stopping



The original .0003 mfd. condenser. Note how a portion of each plate is left projecting to act as a soldering point.

their receivers with bought components, for this is for them evidently the correct procedure.

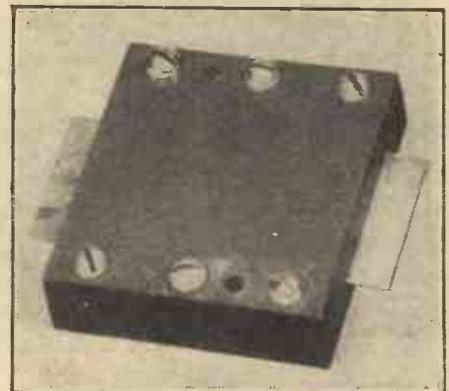
For the lesser number who regard the constructional work itself as one of the main and most enjoyable parts of their hobby, however, we have prepared this series of articles. In it we shall show how to make up at home quite a wide range of components of efficient types, with only the simplest of tools.

### Efficiency Precautions.

We are assuming, let it be stated, that these articles are for the benefit of the man who really likes constructional work, and does not mind a bit of trouble over a job at times. Accordingly, we have not necessarily chosen the easiest possible way at all times.

Rather have we chosen methods which produce the neatest and soundest job, even though it means a little more work.

While we are discussing these general points let us take the opportunity of assuring the prospective constructor that



Another method of arranging the clamping pieces and fixing holes is illustrated here.

more or less mechanical fashion by assembling a series of ready-made components with the aid of a blue print or other scale diagram.

The scope for individual skill on the part of the constructor is getting more and more reduced these days, and so it is perhaps natural that we should be receiving requests from an ever increasing number of readers for real constructional details of the actual parts used in assembling a set.

Evidently these readers are realising that there is a very interesting field awaiting

condensers), and .01 mfd. or thereabouts (L.F. grid condenser in resistance coupling). Now, not one of these condensers needs to be of exactly the right capacity for the purposes mentioned, and this makes it a perfectly practical proposition to make them at home.

As a matter of actual fact, errors of as much as, say, 25 per cent in these capacities would not make the slightest perceptible

(Continued on next page.)

## MAKING YOUR OWN COMPONENTS.

(Continued from previous page.)

difference to the performance of any ordinary set! For example, a detector grid condenser of .00037 mfd. would not really make the slightest difference to the efficiency of any ordinary circuit.

Here is how the condensers are constructed. For each you require two pieces of ebonite  $\frac{3}{8}$  in. or  $\frac{1}{2}$  in. thick, to act as clamping pieces to hold the assembly together. These pairs of plates can be arranged in two ways. In one method the two pieces are the same size, and a pair of holes are drilled right through both for the two screws which will fix the component down to the baseboard of the set.

### Methods of Fixing.

Alternatively, the upper piece can be a little narrower than the lower, and the fixing holes are then drilled in the projecting portions of the larger one only. To illustrate the two methods we have used the first for the .001 mfd. specimen illustrated and the latter for the .0003 mfd.

The two ebonite blocks are clamped together with screws, and a very neat job

Suitable dimensions for the .0002 mfd. .0003 mfd. condenser ebonite pieces are these: lower one,  $1\frac{1}{2}$  in. square, upper one,  $1\frac{1}{2}$  in.  $\times$   $1\frac{1}{2}$  in. For the .001 mfd. and .01 mfd. the two blocks should be  $1\frac{1}{2}$  in. square.

### How they are Assembled.

Now about the condenser portion proper. In the cases of the first three capacities (.0002, .0003 and .001 mfd.) we have used only two "plates" in each condenser, and this makes matters very simple indeed. We have in each, then, merely two pieces of copper foil (any thin gauge which can be cut easily with scissors) and a piece of sheet mica between. The pieces of copper must overlap the correct amount, and a portion of each is left projecting from the side of the component for the connection from the set wiring to be soldered on.

The two pieces of foil for the .0002 and .0003 mfd. sizes are 3 and 4 centimetres long respectively and 1 centimetre wide (measurements given in cms. because this unit is practically always used in scientific work). For the .0002 mfd. capacity the plates overlap for a length of 2 cm. and for the .0003 mfd. for 3 cm. Between them a piece of mica of .002 in. thickness is placed, of a size a little larger than the area of overlap, so that there is no chance of the plates touching.

Be careful to arrange the plates and the

two "plates." The only difference, of course, is in the size of the plates and their over-lap. The size is now 5 cm. long and  $2\frac{1}{2}$  cm. wide, and the length of overlap is 4 cm.

For the .01 mfd. condenser we can no longer use just a pair of plates, because they would become far too large for convenience, and so we must build up a bank of plates to get the desired capacity. The plates will be the same size as those for the .001 mfd. condenser, and will have the same overlap, and they will be arranged with 5 plates on one side and 6 on the other.

Between each plate and the next above will be a piece of mica. You will then have a set of 6 plates all projecting a little from one side of the finished condenser, and another set of 5 interleaved between them and projecting on the other side, with mica separation all the way.

### Be Careful Here!

To make all this a little clearer, this is how you should proceed: Start with the lower piece of ebonite, put a little dab of Seccotine in the middle, press a piece of copper down on this so that it projects to the right, then put another tiny spot of adhesive on the copper, drop on a mica sheet, put a spot of adhesive in the middle of the mica, add a copper sheet with its projection to the left and over-lapping the first for a length of 4 cm., then another piece of mica, a copper plate with projection to the right, another piece of mica, another copper plate with projection to the left, and so on, with adhesive as required, until you have 6 plates projecting to the right and 5 to the left.

Now clamp up, and the condenser is finished but for one last operation. This is to bond together all the projections at

## TECHNIQUE OF TELEVISION.



A most elaborate scheme was recently framed in connection with an American Television experiment. In order merely to "get over" simple objects, such as hands and revolvers in outline, to illustrate a radio drama, three television transmitters were used.

results if you use round-headed brass screws with a clearance hole in the upper block and a tapped one in the lower.

Failing the wherewithal for tapping, however, you can use counter-sunk head screws and nuts. Be careful in this case, however, to countersink the holes in the lower block adequately, and so be sure that the screw heads will not project and prevent the component from sitting flat on the baseboard of a set. Four of these clamping screws are really enough, although you will see that an enthusiastic member of the staff used six in the larger condenser.

mica in the correct positions and with the right amount of overlap, and try not to disarrange them as you clamp up, and you can be pretty sure that the capacity will not be far off the rated value. (It makes it a little easier if you assemble the parts on the lower piece of ebonite with the aid of a VERY small dab of Seccotine or other adhesive in the middle of each plate, allowing it to set tacky beforehand.)

### The Larger Sizes.

The .001 mfd. condenser is made up in exactly the same way, and still with only

### Next article in this series : HOW TO MAKE COIL HOLDERS.

one end and then do the same for those at the other. A fairly easy way to do this is to solder the projecting portions up solid at each end.

This is not difficult if you first tin them well, then bend them over double at the corners and pinch up tight with pliers before applying the iron once more to make the solder run and bond them all up solid.

Alternatively, you could punch holes through them and put a screw and nut through to bind them tightly together, with a soldering tag for connections.

### A Sound Method.

The soldering method really makes a sounder job. If you intend to use it, by the way, it is best to tin one end of each plate for about one-eighth of an inch right across its width before assembling. If you then arrange these tinned ends to be the projecting ones the final operation will be made a good deal easier.

By the way, to get mica sheets of the right thickness is none too easy nowadays, but a little visiting round amongst the dealers will probably locate some. Please note, however, that the wrong thickness will upset the capacities obtained. If you have much difficulty probably one of the firms specialising in this material would supply you, e.g., Messrs. Mica Products, Ltd., Langton Road, S.W.9.

**THE "TITAN" TWO.**

The Editor, POPULAR WIRELESS.

Dear Sir,—I thought you would be interested in my experience of your "Titan" Two. I have built the set to your design with the addition of another L.F., as I am a long way from a broadcasting station. I have found it to do all that you claim in a very convenient way. Whether by accident or design I don't know, but by pulling out the switch I get 5 G B, and by pressing it in I get 5 X X. No one could wish for anything more convenient. Alternative programmes on tap.

The only criticism of your tuner I have to offer is that the tappings would be better taken by plugging in than by the crocodile's mouth arrangement on my tuner (Burne Jones).

Wishing you success.

I am, Yours faithfully,  
B.Sc.

York.

[EDITORIAL NOTE.—Some makes of the "Titan" coil do have plugs and sockets, as instance the Wright & Weaire version.]

**"TITAN" RESULTS "ASTOUNDING."**

The Editor, POPULAR WIRELESS.

Dear Sir,—I have made up your most famous set, the "Titan" Three, erected an aerial consisting of 75 feet of 7/22 enamel wire, one piece from the far end right to the set. The only thing I have departed from is that I have incorporated a Brunet transformer 5 to 1 ratio, otherwise to the letter, and I may say without any exaggeration whatever that the results from same are really astounding. I am working from the mains with a Dunham H.T. Eliminator, which also is perfectly silent. The tappings I am using are 60 No. 1, 80 No. 2, 150 No. 3, the last stage being a P.M.2. I suppose when the drop in voltage is calculated, the power valve is getting about 120 volts with 0 volts grid bias. This evening in the presence of a friend I tuned in 25 stations and in nearly all cases without any trace of 2 L O or 5 G B, all at really good loud-speaker strength. They include 5 X X, Radio-Paris, Koenigswusterhausen, Hilversum and two others unidentified, and on the other wave-band 2 L O, 5 G B, Stuttgart, Barcelona, Budapest, Dublin, Hamburg, Madrid, Toulouse, Moscow, etc. I cannot just memorise all, but 25 in all came in well. In conclusion there is great credit due to your staff in constructing such a wonderful circuit. It leaves nothing to be desired. You may, if you wish, publish this letter as a testimony which speaks for itself.

Yours faithfully,

A. A.

P.S.—The tapping used on the coil was No. 8, and the 25th on the long wave.  
Eltham, S.E.9.

**THE "RADIANO TITAN."**

The Editor, POPULAR WIRELESS.

Dear Sir,—As a regular reader of your paper I should like to congratulate you on the production of the "Radiano Titan."

The volume, and especially the tone, was beyond my expectations. What pleases me most is the absolute stability of the set, and I would advise all who have been troubled with motor-boating or threshold howl (as I have been) to build this receiver, and I found it quite easy to wire it up with "Glazite"

I SHOULD like to thank the many readers who have written to me this week on various subjects. For the reassurance of our Cornwall claimant to membership of the "Heard All Continents" Club, I may state, however, that there is not as yet a single other applicant for this distinction except myself! I have heard the South American station several times, and I have also heard a very weak broadcast programme on about 32 metres, the announcement sounding to me suspiciously like "Santiago."

The whole programme was hopelessly weak on three valves, and unless the station, wherever it is, pushes up power a bit, I am afraid it will not be much of an entertainment for the European listener.

**Obtaining Improved Reaction.**

I have seen a rather interesting scheme for obtaining improved reaction control which, borne out in practice, certainly fulfils all that theory claims for it. The originator of the scheme claimed that the unwanted effect of altering the reaction control on the main tuning control (i.e. the slight wave-shift for every movement of the reaction condenser) was due chiefly

**CORRESPONDENCE.**

**THE "TITAN" TWO.**

**"TITAN" RESULTS "ASTOUNDING"—THE "RADIANO TITAN"—"EVERYBODY'S" THREE, Etc.**

Letters from readers discussing interesting and topical wireless events or recording unusual experiences are always welcomed; but it must be clearly understood that the publication of such does in no way indicate that we associate ourselves with the views expressed by our correspondents, and we cannot accept any responsibility for information given.—EDITOR.

wire, shaping them, instead of doing it the Radiano way.

One thing I should like you to advise me on. Am I expecting too much of the set to tune in other stations, seeing that I am so near 2 L O. I seem to get London, whether I have the coil switch in or not, but perhaps I haven't given myself a fair chance to get used to the coil, but a word from you will doubtless put me on the right track. Wishing you every success in the future.

Yours truly,  
W. WILLIAMS.

Kensington, W.8.

[EDITORIAL NOTE.—At so short a distance from 2 L O we should expect to be compelled to use a wave-trap with any single-circuit receiver, even one possessing good "general selectivity." The local simply breaks through all tuning and so is heard on both wave-bands, as in this case. We think our correspondent will find the "P.W." standard trap a complete remedy, and he will then be able to "rake them in" even when 2 L O is working.]

**TWO "TITANS."**

The Editor, POPULAR WIRELESS.

Dear Sir,—I have just completed the construction of the "Titan" Three, also the "Titan" Two, and I feel that I must write and congratulate the "P.W." Research and Constructional Department on two really wonderful little sets. In my opinion, these are the two best I have yet handled. It is rather early yet to give fuller details of receiving stations, etc., but I will certainly write again later giving you more precise details.

Thanking you once again for really two first-class sets.

Yours faithfully,  
JAMES HELLENBRAND, JR.

Southend-on-Sea.

**WONDERFUL "TITAN" RESULTS.**

The Editor, POPULAR WIRELESS.

Dear Sir,—No doubt you will be interested to know I have made the "Titan" Three and even under

the unusual circumstances in which I am placed, have had really wonderful results. When I first tried the set I had the "Titan" unit, which I had made up on a piece of varnished cardboard, guessing the number of turns from a photograph. We were in dry dock at Malta, recognised as one of the worst places for broadcast reception. My aerial ran alongside the ship and through a port, the earth being wrapped round a port clip. I received 14 stations at loud-speaker strength, including 5 G B and 5 X X. Since then I have built a better unit with increasingly better results. The only trouble I find is with hand capacity on the reaction, which I think is, if anything, too critical for general use, can you please suggest any remedy. Wishing you every success.

Malta.

I remain, yours truly,  
J. F. RICHARDSON.

[EDITORIAL NOTE.—Hand-capacity effects on the reaction condenser should be negligible with the original type of condenser, and we suggest our correspondent should try reversing the leads to this component. Critical reaction is usually a matter of adjustment of voltage on the screening electrode of the H.F. valve. Careful setting here will usually give quite a reasonable degree of smoothness. No doubt our correspondent's difficulty is partly due to the fact that the signals he was receiving were initially very weak and required a very delicate setting.]

**"EVERYBODY'S" THREE**

The Editor, POPULAR WIRELESS.

Dear Sir,—I too, have constructed "Everybody's" Three, and have waited a long time for readers' opinions, which now begin to roll in. I consider it is a very fine set.

I have had some difficulty in getting all the components on the 10 in. baseboard, so I mounted the Formo and the 50,000 resistance on the back of the cabinet. How can you get at the Formo with the coils in, and how can you arrange the valves in line, I wonder? As I am very much an amateur (all I know I have gleaned from "P.W.") I, too, would welcome an article or hints as to coils, etc., as suggested by Mr. Watkin. Wishing your instructive paper every success.

Yours truly,  
H. V. RIX.

Norfolk.

**A "SINGING CHOKE."**

The Editor, POPULAR WIRELESS.

Dear Sir,—With reference to the letter of Mr. J. Watkin, (Mont.), and your request for comment re the "singing" of the output choke, I submit the following experience.

With an S.G., detector and Pentode 3-valver, I used the windings of a cheap transformer as the output choke. The reproduction was accompanied by a peculiar note on the speaker, and on disconnecting the speaker I could follow the programme (of course, very faintly) by listening to the transformer.

On replacing the transformer with a substantial choke this "singing" effect ceased, and quality of reproduction was much improved.

Yours faithfully,  
W. DAWSON.

Huddersfield.

**SHORT-WAVE NOTES.**

By W. L. S.

to the field and the capacity to the rest of the wiring of the lead from the anode of the valve to the reaction coil. Either by making this lead dead-short, or by screening it (using lead-covered wire and earthing the case), he was able to cut down to a surprising extent the unwanted effect.

I have always maintained that there is far more in the layout and the method of wiring of a short-waver than most people imagine. That little habit of wiring up the filaments first and then taking the filament circuit connections from the coils, variable condensers, etc., to the nearest available point, for instance, creates all sorts of "loops" in the wiring that may tune themselves to various frequencies and cause quite a lot of totally unsuspected trouble.

I have often been guilty of this sort of thing myself, but I have made it a rule nowadays to take the connections from the bottom end of the grid coil, the grid tuning condenser, and the reaction condenser, if practicable, straight back to the filament terminal of the detector valve.

**Small-diameter Coils.**

It is impossible to dilate at any length on this in short notes of this description, but I hope to compile my experiences in this direction when I have collected a little more data, and publish them in a short article confined to this subject.

The use of small diameter coils is being constantly advocated for short-wave work nowadays, chiefly on account of the supposed advantages of using coils with very small fields, chief among which is the simplification of layout possible when one does not have to exercise such care to remove the coils from the L.F. transformer, variable condenser, screen, etc., etc.

A friend of mine, however, has recently found that with 1-in. diameter coils he cannot hear anything at all on 10 metres, whereas with the same set and 2½-in. coils he seems to get everything that there is!

## FROM THE TECHNICAL EDITOR'S NOTE BOOK

**SIEMENS' GRID-BIAS BATTERY.**

IN some receivers it is necessary to supply 1½-volts grid bias for an H.F. valve or valves. Generally the constructor has to obtain a 4½-volt battery and use only one cell of this. Appreciating this, Messrs. Siemens Bros. have come to the rescue with a small 1½-volter especially made for such purposes. It is small, but of adequate capacity.

Moreover, it is provided with flexible cardboard "feet" so that it can be securely mounted on a baseboard or in the inside of the back of a cabinet by means of drawing



Note the cardboard "feet" on this G.B. battery.

pins, tacks, or small screws. It has two plainly marked and neat brass terminals. This battery, it is known as size "G.T.", retails at 9d.

**MARCONIPHONE VALVE HOLDER.**

An indication of the all-round good value for money one can get these days in radio components is afforded by the new Marconiphone non-microphonic valve holder. This component retails at 1s. 9d. It is sprung on rubber, which is concealed, and its vibration isolating qualities are of an exceptional character. Nevertheless, it is rather smaller than the average valve holder of this nature and its four terminals project horizontally from its side.

This both facilitates the wiring and enables one to keep the leads well spaced and well down on the baseboard. Soldering tags are, of course, fitted. The sockets, which are well sunk for safety purposes, are plainly marked with embossed letters. We find the insulation qualities of the holder are good, as is also the self-capacity factor.

It is interesting to note that the holder is provided with only two holes at diagonal

corners for fixing the device to the baseboard. It is quite unnecessary to use four screws for fixing down such a component, and we have been wondering for a long time when this fact would be generally realised by manufacturers.

**EDISON-BELL RESISTANCE.**

The Edison-Bell Co., Ltd., recently sent us one of their new wire-wound resistances. These resistances are of the cartridge type, and are supplied with substantial bases having clips into which the resistances can be fixed. Two neat, robust terminals are provided.

The actual sample submitted to us has 10,000 ohms marked on it, and on test we found that the actual resistance was within 5 per cent of that value. This is a rather exceptional degree of accuracy. The component is decidedly well made, and its finish is that of a high-class article. At 3s. it is undoubtedly good value for money. The small base and clips are included at this figure.

**CENTRALAB COMPONENTS.**

The Rothermel Corporation, Ltd., recently sent us a representative range of Centralab Components. These are products of the Central Radio Laboratories of America, who devote the whole of their large resources to the manufacture of volume controls, heavy power rheostats, potentiometers and like apparatus.

A novel item in the group is the Modu Plug, which is a volume control in the form of a 'phone plug which can be substituted for a standard type of plug. This device gives an excellent control of volume, and is ideal for gramophone pick-up work. Its price is 10s. 6d. for a model for use with a set equipped with jacks; there is another model suitable for a set having ordinary terminals.

Another particularly interesting Centralab component is a Heavy Duty Potentiometer which, at 10s. 6d., can be obtained in any of eight resistances ranging from 2,000 ohms to 50,000 ohms. It is, of course, wire wound and is just the article for voltage control in H.T. mains units. The potentiometer will dissipate up to 20 watts without burning out.

There is a Centralab Giant Power Rheostat which will handle a power of 70 watts through its whole resistance, without undue heating. It is made of heat-resisting materials throughout, and is a "power" product all through. It is made with

either 2 or 3 terminals at prices ranging from 10s. 6d. to 12s., and with resistances from 25 to 8,000 ohms.

The Centralab Fourth Terminal Potentiometer has an additional variable contact that can be adjusted behind the panel. It will provide two variable voltage tappings and thus provide great flexibility in an H.T. mains unit. The type P.F. 3,000-3,000 ohms costs 11s. 6d. This also is made of heat-resisting materials and is an excellent proposition.

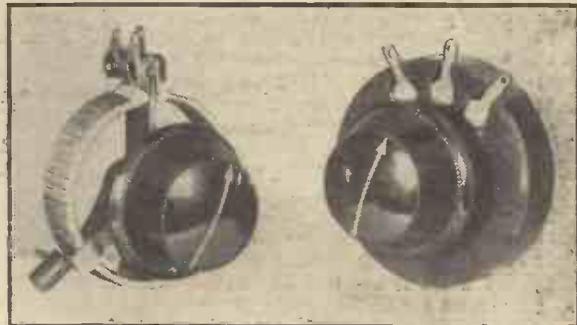
With the name of Centralab Smooth Volume Control there is a Radiohms Two-Terminal Non-inductance Resistance having a graphite element, but minus the unreliable slide. A pressure contact of novel form is used instead to introduce a smooth, constant

Traders and manufacturers are invited to submit radio sets, components, and accessories to the "P.W." Technical Department for test. All tests are carried out with strict impartiality, under the personal supervision of the Technical Editor, and readers are asked to note that this weekly feature is intended as a reliable and unbiased guide as to what to buy and what to avoid.

control. The price of this item is 10s. 6d., and the variable resistances range from 2,000 ohms to 500,000 ohms.

Lastly, we come to the Centralab Potentiometer, whose construction is similar in many respects to the above volume control. This potentiometer is designed for normal volume control work, or for grid biasing purposes in normal circuits. Its price is 10s. 6d., and it is made in 7 resistances, from 200 ohms to 500,000 ohms. It is particularly suitable for use with gramophone pick-ups and its action is as good as anything we have come across.

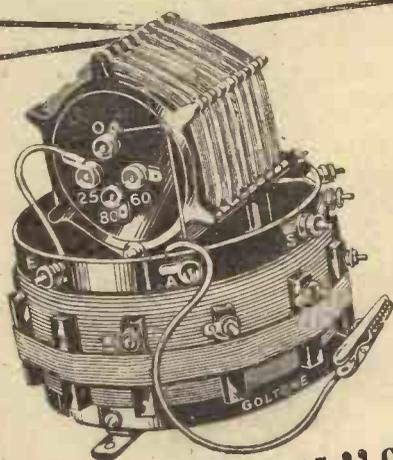
All these Centralab devices appear to be completely satisfactory, both in regard to their operation and to their robustness of construction. Several should be of particular interest to mains units enthusiasts, since there do not seem to be equivalents obtainable from other sources.



Two of the Centralab components described.

**COLUMBIA H.T. BATTERIES.**

In a recent report concerning these efficient and well-known accessories we did not make it clear that they are constructed in cylindrical as well as "Layerbilt" forms. The former are, of course, the cheaper, and are remarkably reliable and excellent value for money.

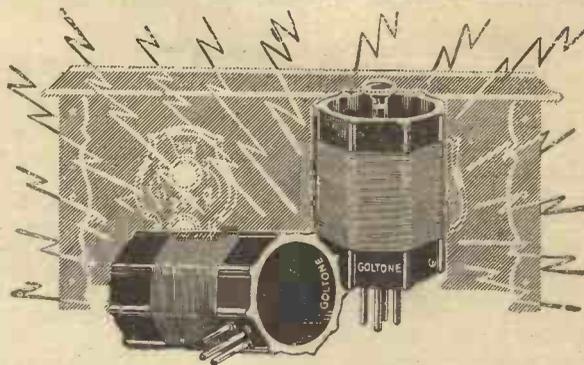


## GOL TONE "TITAN" COIL UNIT

For Best Results.  
A Super-efficient and High-Grade Unit for "P.W." Circuits.  
Complete with Loading Coil

T.C./15.....Price **15/-**  
"GOL TONE" LOADING COIL ONLY T.C./16.....Price **6/6**  
"GOL TONE" H.F. CHOKE T.C./17.....Price **3/9**

Prompt Delivery.  
REFUSE SUBSTITUTES.



## "GOL TONE" ULTRA SHORT WAVE COILS for "COSSOR" CIRCUIT

(Below 100 metres)  
Receiving AMERICAN, AUSTRALIAN and other ultra short-wave stations throughout the world. C.M./U.  
Price (Complete with interesting instructions for obtaining best results) **7/6** Per Pair  
Why not obtain the ULTRA SHORT-WAVE STATIONS with your COSSOR "MELODY MAKER"?

## "GOL TONE" MULTI-STRAND ASTRA WIRE-WOUND COILS

Give infinitely Better Reception, Greater Selectivity, Increased Volume, and enable more stations to be logged.  
SHORT WAVE (250-600 metres) C.M./6 Price **10/-** Per Pair  
LONG WAVE (1,000-2,000 metres) C.M./2 Price **12/-** Per Pair  
From all First-Class Radio Stores. Refuse substitutes—if any difficulty write direct. Large illustrated Radio Catalogue FREE on request.

LONDON DEPOT: 5 & 6, EDEN STREET, HAMPSTEAD ROAD, N.W.1.  
Phone: MUSEUM 4032/3.

**Ward & Goldstone**  
PENDLETON MANCHESTER LTD

# MAGNIFICENT!

## IS THE ONLY WORD

MAGNIFICENT is the only word that does justice to the reproduction you obtain from our new No. 99 Model.

Remember that our cradles are made of girder section aluminium castings, enamelled and burnished.

They are machined dead true and hold the unit perfectly aligned in a vice-like grip.

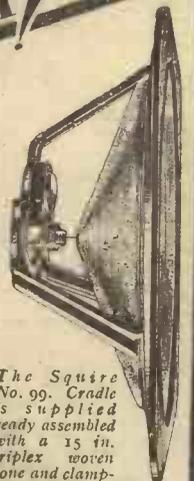
That is why our speakers can take full output without a trace of chatter and give such superb results.

The wonderful success achieved by our cradles and cones has naturally attracted much competition and you should insist therefore on seeing the name Squire embossed on the cradle.

Fredk.

### SQUIRE,

24, Leswin Road, Stoke Newington, London, N.16.

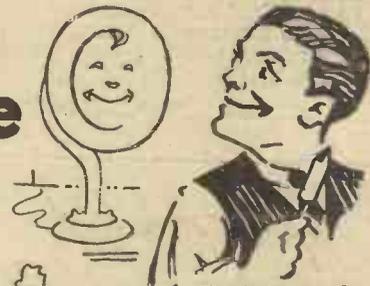


The Squire No. 99. Cradle is supplied ready assembled with a 15 in. triplex woven cone and clamping board. Simply add a Unit and baffle board or cabinet.

In addition you get a Squire Kraft Cone Kit which you can build up yourself.

PRICE COMPLETE **35/-**  
15 in. Kraft Cone Kit separately .. **5/-**  
No. 97. 9 in. **15/6**  
Cradle complete  
9 in. Kraft Cone Kit. **2/6**

# Little before mend



# saves much after spend

# FLUXITE

simplifies all soldering

FLUXITE is sold in tins, price 8d., 1/4 and 2/8.

SOLDERING SET COMPLETE

**7/6**

Another use for Fluxite: Hardening Tools and Case Hardening.

Ask for leaflet on improved methods.

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

or LAMP only, 2/6



BY this time most people have discovered for themselves that the use of the word "portable" does not tell you all there is to know about a set. Nowadays it really seems to mean little more than that the instrument has all its batteries and general odds and ends inside a cabinet, which has a handle and probably some doors!

Its weight, that vital point in a real portable, is not defined at all.

Really, it seems to be time to urge that the word should be used with greater discretion. There is another perfectly good one which suits some of these large and massive specimens far better, and that is "transportable."

# The P.W. "HOLIDAY" TWO

## COMPONENTS REQUIRED FOR CABINET.

### CABINET DETAILS.

- A and B. 2 Pieces of wood, 6½ in. × 12½ in. × ¾ in. thick.
- C and D. 2 Pieces of wood, 6½ in. × 10½ in. × ¾ in. thick.
- F. 1 Piece of plywood, 5½ in. × 10½ in. × ¼ in. thick.
- G. 1 Piece of plywood, 6½ in. × 10½ in. × ¼ in. thick.
- E. 1 Piece of plywood, 5½ in. × 10½ in. × ¼ in. thick.
- H. 1 piece of plywood, 7½ in. × 10½ in. × ¼ in. thick.
- I. 1 Piece of plywood, 1 in. × 10½ in. × ¼ in. thick.
- J. 1 Piece of wood, 1½ in. × 10 in. × ¾ in. thick.
- K and L. 2 Pieces of wood, ¾ in. × ½ in. × 6½ in. long.

### ACCESSORIES.

- 1 Leather handle, with metal end pieces for attaching to top wood board (C), and 4 wood screws for same.
- 6 Brass hinges, ¾ in. long × ¼ in. flaps.
- 24 ¼-in. No. 1 countersunk brass wood screws.
- 60 ¾-in. No. 4 countersunk brass wood screws for screwing frame together. French nails or long brads can be substituted if desired.

## COMPONENTS AND MATERIALS.

- 1 Panel, 5½ in. × 10 in. × ¼ in. or ⅜ in. (Becol, Kay Ray, Ripault, Resiston, Trolite, Red Seal, Ebonart, etc.).
- 1 Baseboard, 10 in. × 5 in.
- 1 .0005 mfd. variable condenser, rather a small type for preference (Formo, Lotus, Utility, Ormond, etc.).
- 1 .0001 or .00015 mfd. reaction condenser (Cydon, Dubilier, J.B., Burton, Utility, Ormond, Raymond, etc.).
- 1 On-off switch (Pioneer, Lotus, Benjamin, Igranic, Bulgin, Burne-Jones, Wearite, Peto-Scott, etc.).
- 2 Sprung valve holders (Lotus, W.B., Ashley, Pye, Igranic, Benjamin, Formo, Bowyer-Lowe, Burne-Jones, Wearite, etc.).
- 1 H.F. choke (Bowyer-Lowe, or other compact type).
- 1 .0003 mfd. fixed condenser, with grid-leak clips (Dubilier, T.C.C., Mullard, Clarke, Goltone, Igranic, Burne-Jones, etc.).
- 1 2-meg. grid leak (Mullard, Igranic, Dubilier, Ediswan, etc.).
- 2 Single-coil sockets (Lotus).
- 1 L.F. transformer of a small and compact type (Phillips, Igranic type J, Mullard, R.I.-Varley "G.P.," Marconi-phonograph "Universal," etc.).
- 5 Terminals (Burton, Belling and Lee, Eelex, Igranic, etc.).
- Wire, flex, battery plugs and spades etc. (For cabinet materials and accessories, see elsewhere.)



regarded as true portables at all (some of the commercial specimens weigh as much as 40 and even 50 pounds!).

Such sets have their uses, and, indeed, we believe they will be very popular in the future, but they are quite distinct from the true portable. Light weight is absolutely

Here is a neat little portable for the summer months, which can be connected up to your ordinary aerial and earth for general use in the winter. The case is home-made, and although it is so compact it provides space for batteries and all the accessories.

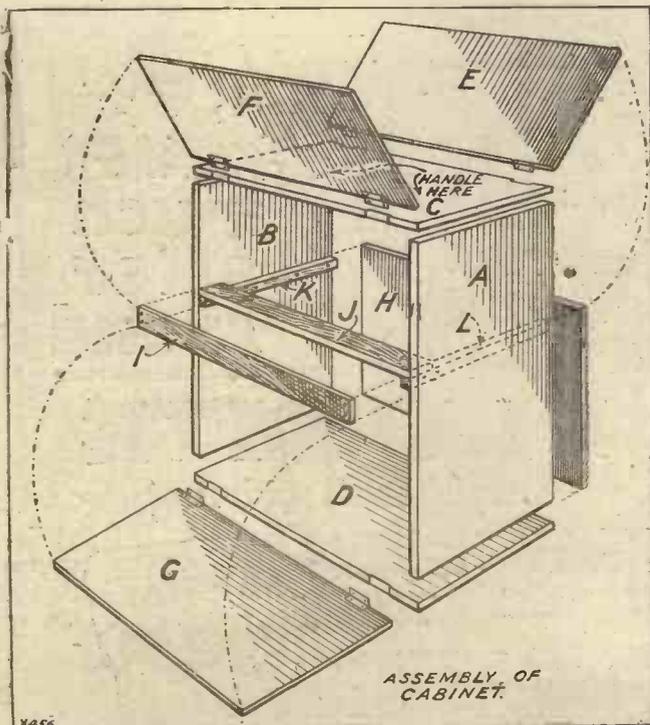
Designed and Described by  
THE "P.W." RESEARCH DEPT.

essential in this last type, and reasonable cost is also important, since it will often be additional to the user's main instrument, and will only be used at holiday times, during week-end outings in the summer, and so on.

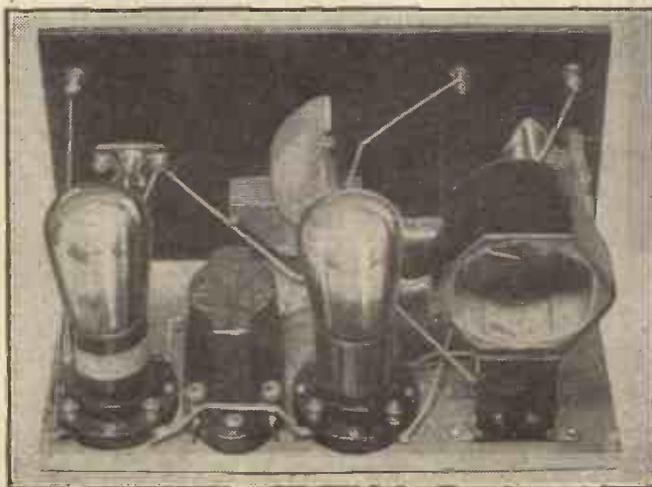
### Making an Early Start.

These were some of the things we had in mind in producing this, the first "P.W." portable of the 1929 season. Yes, we agree that it is early in the year to start thinking about portables, but it is our experience

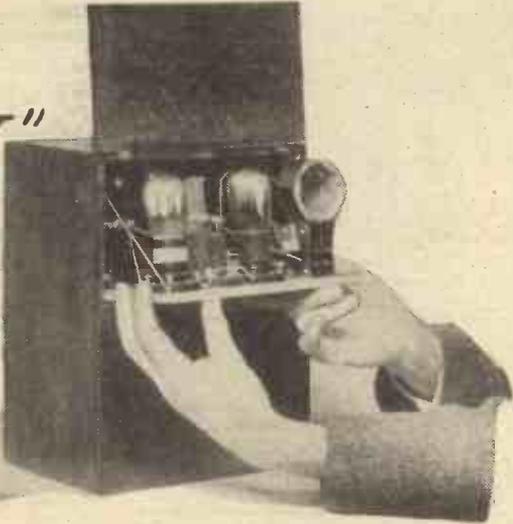
This type includes all those intended to be regarded as self-contained instruments which can be moved from room to room with reasonable ease, but which are too heavy to be



ASSEMBLY OF CABINET.

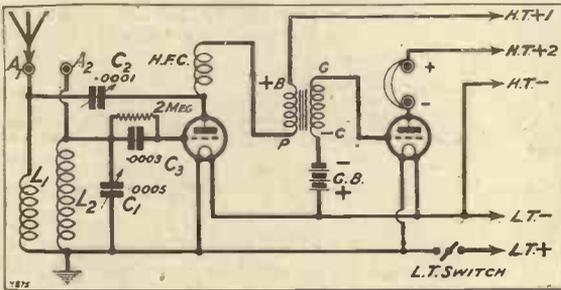


The detailed drawing on the left will enable any handyman to make up the case quite easily. The photo on the right gives a good idea of the very neat and compact design of the set itself.



that most people leave it far too late, and we are hoping to persuade our readers to make an earlier start this season and avoid the usual last-minute rush.

Now let us see if we can give you a clear idea as to just what sort of set this is, so that you can decide whether or not it will suit your own particular requirements.



Well, this is what we aimed at: the simplest and least expensive set which would give really good headphone signals from 5 X X and 5 G B practically anywhere in the country (exceptions are obviously Scotland and perhaps Cornwall).

This was to be done on a very small

improvised aerial, such as a few yards of wire thrown over anything that comes handy out of doors, run round a picture rail in rooms at the seaside, and so on. Further, the set was to be able to do the same from an ordinary main station up to perhaps 30 or 40 miles, or more if a slightly better aerial could be put up. This the set will do, and with skilled handling will bring in a few foreigners also under the same conditions, but if your ideas call for loud-speaker reception on a frame aerial you must look out for something bigger.

**Keeping Down The Cost.**

Cheapness was also kept very closely in mind, and accordingly the set has been made very simple indeed, and everything not strictly necessary cut out. To help in this direction we have produced a design for a home-made wooden case for it which is particularly simple to build and looks quite neat when finished. (A description of the construction of this case is given in a later section of this article, contributed by the member of the Research Department staff who actually made the original one.)

You will see, then, that this set is one to appeal to the man who really likes to build things himself, rather than just assembling them from ready-made parts. All the same, that need not discourage the constructor

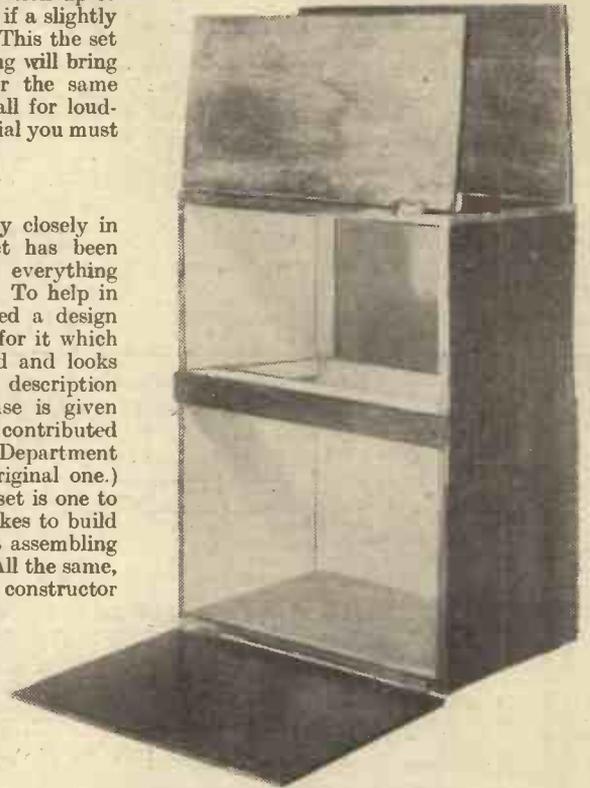
who is not fond of woodwork, because he will find that many of the usual cabinet firms can turn out the case for him at quite a reasonable figure with the aid of the photos and drawing given in this article.

**Winter Use.**

The set itself is built on the usual plan of a baseboard and vertical front panel, and is so arranged that you can, if you like, take it out of its carrying case and fit it into an ordinary cabinet for use as your main receiver during the winter months on your usual aerial and earth.

Used in this way you will find it is quite a good little set, capable of giving you the local station on the loud speaker, likewise 5 G B in good localities. We took special pains to make it suitable for this dual rôle, since we were anxious to cater for the constructor

who does not wish to go to the expense of two separate sets. Of course, it does not possess the modern refinement of wave-change switching, but we had to sacrifice something to achieve our objects of ex-

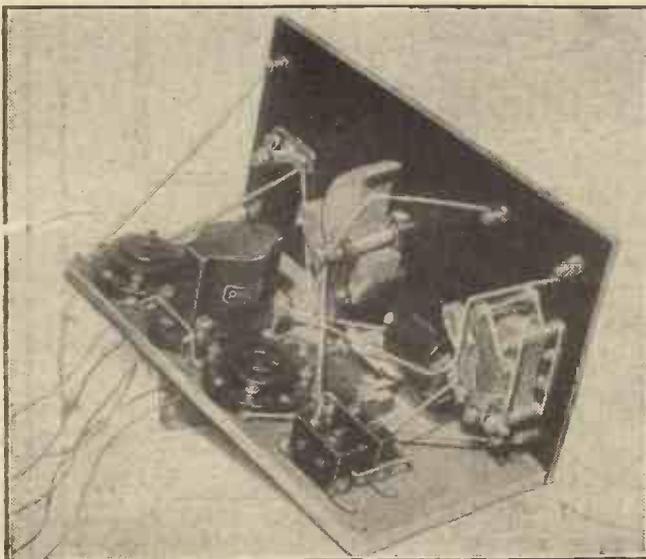


The cabinet is provided with flap doors to give access to the various compartments.

treme simplicity, light weight, and low cost.

The lower half of the case forms a compartment for batteries and accessories, and a few words of explanation about these will probably be useful. A little set like this

*(Continued on next page.)*



The left-hand view here shows how the various battery leads are brought out. On the right you see the complete assembly with all the accessories fitted. (See text about space for 'phones.)



# THE P.W. "HOLIDAY" TWO.

(Continued from previous page.)

does not require much H.T., and so this battery can be quite a small one.

In the original, for example, we used one of the new Columbia 45-volt units, which fits the space nicely, and this is quite adequate so long as signals of 'phone strength are all that the set is handling.

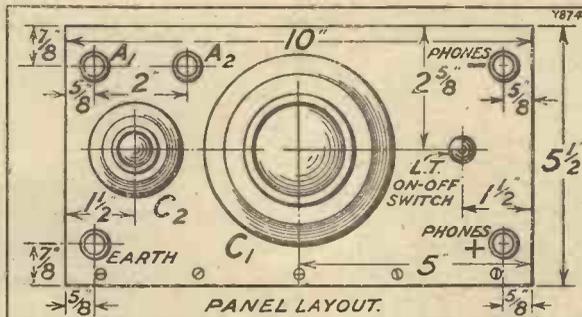
### Packing the Batteries.

Even a 30-volt unit would do, or you might use four 9-volt grid-bias batteries such as the Lissen unit, all joined up in

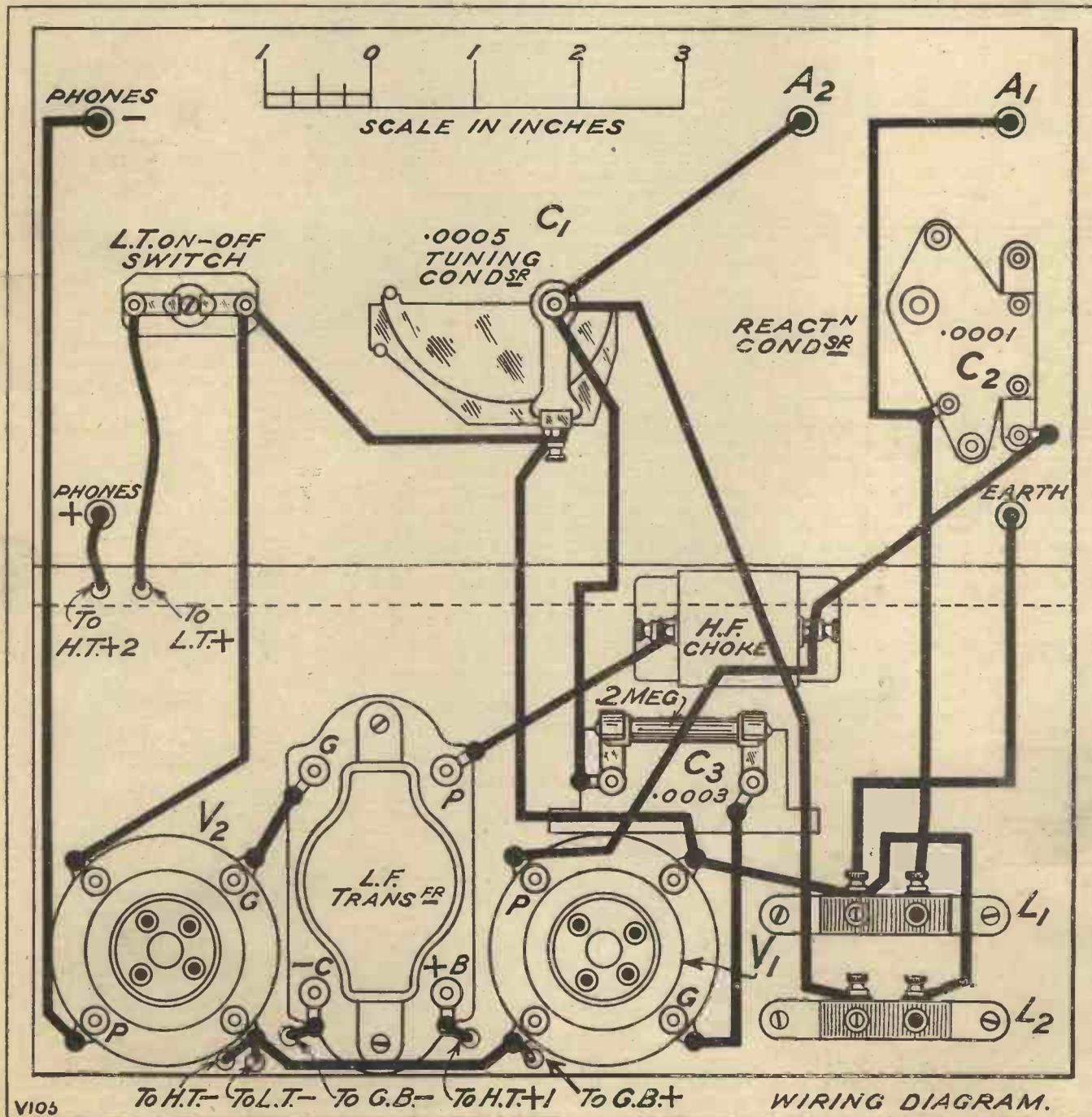
series to give 36 volts, and packed into the space. In addition, you need a 4½-volt grid-bias battery (actually you will probably only use 3 volts) and a small 2-volt unspillable accumulator, which just about fill up the space in one layer, so to speak.

On top of these you can still pack in another layer, comprising a pair of 'phones, a ½-pound reel of No. 22 D.C.C. wire for aerial erection (or a coil of thin rubber-covered flexible) and an earth pin. This last can be a piece of brass rod (about ¼-in. diameter), 10 in. long, with a few yards of wire soldered to it.

Such a pin driven into moist ground will



give you quite a fair earth, but it is by no means essential. Instead, you can just run out 20 or 30 feet of wire (same material as the aerial) on the ground, and connect  
(Continued on page 109.)



WIRING DIAGRAM.



# RADIOTORIAL

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

The Editor will be pleased to consider articles and photographs dealing with all subjects appertaining to wireless work. The Editor cannot accept responsibility for manuscripts and photos. Every care will be taken to return MSS. not accepted for publication. A stamped and addressed envelope must be sent with every article. All inquiries concerning advertising rates, etc., to be addressed to the Sole Agents, Messrs. John H. Lile, Ltd., 4, Ludgate Circus, London, E.C.4. The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless receivers. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialities described may be the subject of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

## QUESTIONS AND ANSWERS.

### THE VIENNA PROGRAMMES.

L. R. D. (Hereford).—“Vienna comes through at great strength, and as it tunes in with a series of V's and also uses Morse for closing down it is an easily recognisable station when once the readings are known. But on two occasions I have caught the same programme coming on different wave-lengths, once not very far below the normal wave-length and once right down on short waves far below London. Would these be relays and, if so, how many stations take the Vienna programme?”

The relay stations associated with Vienna are as follows: Graz, 354 metres; Innsbruck, 456 metres; Klagenfurt, 456 metres; Linz, 247.9 metres. These are all low-powered stations (5 kw.), but when conditions are particularly good they have all been received in this country at considerable strength.

### THE “TITAN” COIL.

M. A. C. (Llandudno).—“I bought one of the ‘Titan’ coils as advertised in ‘P.W.’ but I find its dimensions do not agree with your specification in the description you gave of the ‘Titan’ coil. The trouble seems to be the distance from the centre of the loading coil to the upper end of the tube.

“In your article you say ‘not less than one inch’ but my coil is only about a quarter of an inch. It seems to work O.K., but would it be better if the dimensions were as you give it? Shall I send it back to the makers?”

There is no necessity to send it back to the makers just because it differs from the description which we gave. The coil you have and the coil we described are both “Titan” coils, but the methods of construction, etc., are not identical.

The dimensions given by us in the article on the “Titan” coil applied to that particular method of home construction. If a coil is constructed in this manner at home, it is important that these dimensions should be closely adhered to, but in the case of the particular manufactured coil which you have, the desired effect is obtained in a different way, and you will see that the main tube is sufficiently long to permit adequate spacing between the loading coil and the low wave-length winding, although it is not exactly like the home-made coil which we described.

### AN “ANTIPODES ADAPTOR” MODIFICATION.

W. A. W. (Coventry).—“I have the necessary variable tuning condenser, the two coil holders, etc., and should like to make up a complete unit like the ‘Antipodes Adaptor,’ for plugging into my ordinary broadcasting set, but using two coils instead of three. Can this be done, and if so, what are the connections?”

It is not clear from your letter whether you intend using the coils of the type used in the “Antipodes

Adaptor,” or short-wave coils of the ordinary plug-in variety.

If it is your intention to use “cross coils” as specified for the original “Antipodes Adaptor,” we do not think that it would be entirely satisfactory to do away with the aerial coil, for the following reason: The elimination of the aerial coil would render it necessary to tap the grid half of the cross-coil by means of a crocodile clip, and this would be rather a difficult matter, on account of the method of construction of the coils.

Apart from this fact the wire used in the construction of the cross coil is insulated, and the insulated covering would therefore have to be removed from the point or points at which it was desired to attach the crocodile clip. This being the case, if you had in mind coils as specified for the original adaptor, we advise you to stick to the original idea of using a

## “P.W.” TECHNICAL QUERY DEPARTMENT

### Is Your Set “Going Good”?

Perhaps some mysterious noise has appeared, and is spoiling your radio reception?—Or one of the batteries seems to run down much faster than formerly?—Or you want a Blue Print?

Whatever your radio problem may be remember that the Technical Query Department is thoroughly equipped to assist our readers, and offers an unrivalled service.

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

A postcard will do: On receipt of this an Application Form will be sent to you free and post free immediately. This application will place you under no obligation whatever, but having the form you will know exactly what information we require to have before us in order to solve your problems.

separate coupling coil for the aerial, since we are of the opinion that the arrangement is likely to be slightly more efficient than that suggested by you.

With short-wave coils of the ordinary plug-in type it is quite a simple matter to dispense with a separate aerial coil, because the method of construction is such that a clip can be connected conveniently and quickly to almost any part of the coil. In this case the set connections remain exactly as before, except that the aerial lead is joined directly to a crocodile clip, which is tapped to the required point of the grid coil.

The exact position for the clip on the coil will have to be determined by experiment, but as a start we suggest that you tap it on about the middle of the grid coil.

### VALUE OF THE GRID CONDENSER.

H. R. (Letchworth, Herts).—“When I built the set I was a little hard up and, consequently, I used the parts I had on hand,

thinking that anyhow it would be good enough to pass away the evenings with until I could get a more efficient set. To my surprise it has proved a winner in every respect, and, in fact, it goes so well that I think I shall leave it alone, and do without the other set until next winter.

“One thing, however, puzzles me a little, and that is the grid condenser. The diagram gave .0003 for this, but as I had a .0002 mfd. on hand at the time I used this instead, and certainly the results have been excellent. Do you think they would be better still if I now took this out and used a .0003 in place of it?”

It is impossible to lay down a law saying exactly which is the best value for the grid condenser because this will vary with different valves, and also with different values of H.T., conditions of reception, etc.

Usually anything of the order of .0003 or .0002 mfd. will give good results, and as you are at present getting perfectly good reception we should not, if we were in your place, trouble to get a new condenser in the hope of improving the circuit, for we think it extremely probable you would not notice any difference at all in reception as a result of the change over.

### “TITAN” THREE TRANSFORMERS.

T. T. (Richmond, Surrey).—“Is it a fact that the two transformers for the ‘Titan’ Three should be of different makes?”

It is a fact that different transformers should be used for the “Titan” Three, the reason being that unless this is done all sorts of trouble may arise which would never occur if the simple precaution were taken of using two different transformers instead of two of the same type.

### OUTPUT CHOKE CONNECTIONS.

L. T. (Prestwick).—“The output is a choke coupled one, using only one fixed condenser, the connections being from H.T. positive to one of the loud-speaker terminals, and to one of the choke terminals, the remaining loud-speaker terminal going to a fixed condenser, and the other side of this going to the other L.F. choke terminal, and to the plate of the valve (internally).

“I happened to mention to a friend that I had seen a spark in the house wiring when using this system, and he told me that my choke system could not be right. When I drew a sketch he said it was wrong, and suggested I used two condensers instead of one. Do you think my connections are wrong and if so, is it essential to use two condensers?”

Your connections are wrong, as you are not taking the full advantage of choke output by the system you have in operation. You do not state the value of your fixed condenser, but apparently this is giving good service, so we think that the best plan would be to modify the connections in the following way.

Disconnect that wire which goes from the loud speaker to the terminal which now carries one of the L.F. choke connections, leaving the H.T. connected to one end of the L.F. choke, and not to the loud speaker. Now run a wire from the vacant terminal on the loud speaker itself to H.T. and L.T. negatives, or to any point associated with these two in the wiring of the set. You will find that the loud speaker works just as well as formerly, but now there is no tendency to sparking or to anything of that kind owing to the fact that the loud speaker is properly insulated from the H.T. positive side of the receiver.

This method is perfectly sound so long as you have a really good fixed condenser, but if at any time you have cause to suspect the insulation of this, do not hesitate to disconnect it until you have put matters right, for the disadvantage of using only one condenser is that it must necessarily have the full voltage of the H.T. supply across it.

### A QUESTION OF COUPLING.

M. R. (Hull).—“On the ordinary wave-lengths I find that the larger the coil I put in the aerial the stronger the signals (generally speaking) on distant stations, but this does not work out the same on the short waves. If I put a fairly large aerial coil in on the short waves the set refuses to oscillate, and try as I do I cannot get over this difficulty. The only way to make it oscillate seems to use a small aerial coil. Why is this?”

The refusal to oscillate when a fairly large or when a comparatively large aerial coil is used for coupling

(Continued on next page.)

## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

a short-wave receiver is quite a common feature of this class of work.

The real cause of the trouble is that, comparatively speaking, the effect of the aerial load is very much greater in a short-wave set than in the case of a set working on the ordinary wave-lengths, and if the aerial is linked up too closely with the grid circuit the damping is sufficient to prevent self oscillation being obtained. As this is essential to the correct manipulation of a good long-distance, short-wave set, it follows that in all such receivers the aerial should be fairly loosely coupled, and it will often be found that a very short aerial, or what seems in effect "no aerial at all," will give results as good as a long, elevated wire which, although excellent for pick-up purposes, is "holding the set down" too much for it to show the required degree of liveliness.

### THE "TITAN" COIL.

C. G. F. (Newcastle).—"How is it that just by means of a switch the wave-length can be changed accurately, whereas formerly we required a complete set of coils for the short and a complete set of coils for the long wave-lengths. Are there no dead end losses?"

On pushing in the wave-change switch the standard loading coil immediately comes into circuit. This was previously shorted out, and has the effect of loading up the secondary circuit to the 5 X X wave-length band.

Also, by virtue of the tapping of the loading coil you now have the effect of an extra primary coupling winding in the aerial circuit, which further acts as an extra reaction winding to complete the arrangements necessary for successful operation on the long waves. Thus, on the lower band there are separate aerial and reaction windings, but on the long waves a combined extra primary and reaction winding is brought into action. Notice, too, that on the long waves the ordinary wave-length coils remain in circuit, the extra "loading" windings being brought in series with them. This has much to do with the high efficiency obtained, since so long as the windings are kept in circuit losses will not occur if they are properly arranged.

### A QUESTION OF TIME.

D. C. (Amersham, Bucks).—"I can now get a lot of foreign stations, and one thing interests me which perhaps you can explain. On several occasions when hearing a foreign station, particularly a German, I hear a clock striking the hour, but this clock is nearly always wrong, i.e. at seven o'clock to-night it was striking eight. Why is that?"

You have noticed an interesting fact which shows how quickly wireless travels. Germany is situated so far east of this country that they see the sun rise long before we do, and, consequently, it would be inconvenient to keep the same time as we do. Consequently, Germany keeps what is known as "Central European Time," which is one hour ahead of our time, and thus their clocks always strike eight when ours strike seven. Radio links us instantly.

Similarly, if you are fortunate enough to pick up an American station sending out a time signal you will notice that the American stations on the Atlantic seaboard, such as New York, etc., use what is called "American Eastern Standard Time," which is five hours slower than ours. Consequently, if you listened in at midnight and heard an American clock striking it would only be striking seven p.m.!

### "EVERYBODY'S" THREE.

E. T. C. (Maidenhead, Berks).—"With reference to 'Everybody's' Three, December 1st issue. I only want two valves to work on the local station, so will you kindly tell me where to make a contact so as to enable me to use only two valves?"

There are several ways in which one of the valves can be cut out, but as you probably know it is not usual nowadays to switch out valves, for now that so little current is required by the filament of the valve there is little gained on the score of economy by using only two, as compared to three. It is for this reason that switching schemes are not usually included, especially as such schemes invariably lose a certain amount of efficiency as compared to sets in which each stage retains its own characteristics of input and output during the whole time the set is in operation.

A volume control is the best method of regulating strength. If, however, you wish to convert the "Everybody's" Three into a two-valve without much trouble, we think that the easiest way would be to undo the joints from the H.F. choke to the grid of V2, and insert in its place a flexible lead from the H.F. choke terminating in a spade tag, which can

be inserted underneath the grid terminal of either the third or the second valve holder.

In the same way, undo the lead from the grid of V3 to the G terminal on the second L.F. transformer, fixing to this latter point another flexible lead, also terminating in a small spade tag, so that this can easily be clipped under V3 when required. Used as three-valve, each of the flexible leads goes from its point of connection to the grid terminal of the respective valve holder, so that in effect the connections are unaltered with these flexible leads in place of the stiff ones.

When it is desired to change over to two valves, undo the spade terminal on the grid of the V3, and leave this wire "in the air." Undo the flexible lead from the grid of V2, and, leaving the grid terminal of V2 unconnected, take the flexible lead from the H.F. choke to the grid terminal of V3.

This brings the output of the first L.F. transformer to the grid of the third valve, instead of the second, and the grid-bias negative one lead will require altering to a suitable position on the grid-bias battery to suit V3 instead of V2. This is the essential alteration; but in order to cut out V2 it can either be removed from its socket or a make-and-break switch can be fitted in its filament lead so as to cut off the current to this valve from the L.T. battery.

### CURING "THRESHOLD" HOWL.

W. O. T. (St. Albans).—"Not long ago I saw a useful list of the cures for threshold howl (I believe it was in answer to a correspondent in 'P.W.'). My own short-wave set not being troubled with this form of fault, I did not take very much notice of it except to observe that the cures were widely different ones and seemed to indicate that this particular fault arises from a number of various sources and not merely from one component.

Since then a friend has called me in to help him with his set, which has a most annoying threshold howl all the time, but unfortunately

condenser incorporated, this will, of course, occur, and in such cases an H.F. choke is necessary between the plate side of the transformer and the reaction coil.)

### THE "TITAN" THREE.

H. M. (Cirencester, Glos).—"In what number of POPULAR WIRELESS was the set called the 'Titan' Three described? (I am told it is very powerful and should like to order it.)

The "Titan" Three was described in the issue for February 2nd, 1929, POPULAR WIRELESS No. 348.

### A POWERFUL MAINS UNIT.

R. M. (Derby).—"For the small two-valve set the mains unit was perfectly satisfactory, but I am afraid that when I get the five-valve going it will be hopeless to expect it to stand up to such an output as that required. My mains have the reputation of being rather noisy and, in addition, as a screen-grid valve is required and its voltage is more or less critical, I believe, I shall want a unit which is capable of good variation here and of delivering a large and silent current.

"Can you let me have the sketch of such a unit, or, preferably, refer me to a description which will enable me to build such a unit. I should prefer a description because of the photographs, etc., which I find a great help in this class of work."

An excellent unit of this type is described in the March issue of MODERN WIRELESS, and as it seems to be exactly what you require, and there is a long and well illustrated description of it, we should certainly advise you to get this rather than purchase specially drawn up blue prints, which are necessarily less detailed than a published description of the kind

## ON SALE EVERYWHERE TO-DAY

The APRIL NUMBER of

## MODERN WIRELESS

Among the contents are:—

The "M.W." "Easy-Change"  
Crystal Set  
The "M.W." "Long Distance"  
Two  
The "M.W." "Portable" Three

The "Simple-Screen" Four  
Portable Set Problems  
By Percy W. Harris, M.I.R.E.  
A Wave-Change Wave-Meter  
Etc., Etc., Etc.

GET YOUR COPY NOW. PRICE 1/-

I have been unable to find the reference to the cures for this, and I should be glad if you could repeat it for me, as the set is quite useless for short-wave reception as it is."

Probably you have in mind the list of cures for threshold howl which were given in our short-wave notes by W. L. S. This was in answer to a correspondent's query and W. L. S. pointed out that in most cases one of the cures would be insufficient to stop bad threshold howling, and often four or five of them will have to be resorted to before the trouble disappears entirely. They are given below.

1. Reduce the filament voltage of the detector valve.
2. Change the value of the detector grid leak.
3. Connect the grid leak of 1 meg. or 2 meg. across the L.F. transformer secondary.
4. Change L.F. transformer (In general, a cheap make will be less likely to cause threshold howl than an expensive one).
5. Use filter output circuit for 'phones.
6. Connect condenser of '0005 mfd. or '001 mfd. across 'phones.
7. Connect an H.F. choke in each 'phone lead.
8. Use capacity control for aerial circuit, instead of loose inductive coupling. (When using throttle control for reaction you must be careful to see that the self capacity of the transformer primary is not so high that it passes sufficient H.F. energy to keep the set in an oscillating state when the reaction condenser is set at zero. If this transformer has a

named. In this unit four separate positive H.T. terminals are provided, and three of these are adjustable in steps, the voltage available on each running from quite a low figure up to one only a very little below that of the mains themselves.

The first H.T. positive terminal is for the purpose of providing a continuously variable supply by means of a series variable resistance, and it is specifically intended for supplying accurately adjustable voltage for the screen of an S.G. valve, for the detector in a short-wave set or for any other case where close and accurate variation is needed. The unit, which is called the "Ripple Free Mains Unit," can safely give much larger currents than any normal set will take at moderate voltages which are obtainable when working from D.C. mains.

Moreover, it will give large currents without any sacrifice of smoothness in the output which is, of course, a most important feature. (The March double number of "Modern Wireless" is still on sale, price 1s. 6d.)

### BACK NUMBERS OF "P.W."

S. F. (Chichester).—"Where can I get back numbers of 'P.W.' describing the 'Titan' Tuner?"

Back numbers of POPULAR WIRELESS can be obtained from The Amalgamated Press, Back Number Dept., Bear Alley, Farringdon Street, London, E.C.4. Price 4d. per copy.

# FERRANTI

## SCREENED GRID

*Full-size charts are NOW READY.  
Ask your dealer or write direct.*

The Ferranti Screened Grid 3 is a receiver for both long and medium wave stations, possessing inherently good selectivity and capable of excellent reproduction.

Besides the local station, 5XX and 5GB, the performance includes good reception of a fair number of Continental programmes, according to the situation of the listener.

**SIMPLE TO CONSTRUCT AND CONTROL  
NO SOLDERING—NO COIL CHANGING.**



FERRANTI, LTP.

HOLLINWOOD

LANCASHIRE

# WEARITE

## COMPONENTS

### TITAN SETS

"Titan 3," "Titan 2," "Titan Tuner," "Radiano"

"TITAN" COIL UNIT (immediate delivery from stock)	15 0
H.F. CHOKE	6 6
L.T. WAVE-CHANGE SWITCH, G 23	1 6
L.T. SWITCH, G 22	1 0
10 x 7 COPPER SCREEN	4 6
PAXOLIN PANEL, MAHOGANY OR BLACK, DRILLED	6 6
PAXOLIN STRIP, MAHOGANY OR BLACK, DRILLED	1 9
STANDARD LOADING COIL	7 6

GRID BIAS BATTERY CLIPS. PER PAIR 6

METAL SCREENS FOR ALL CIRCUITS

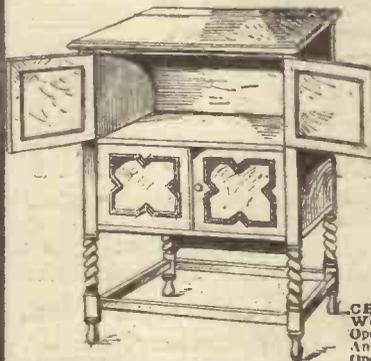
WAVETRAP, as recommended by Mr. Kendall in February 9th issue - each 10 6

WRITE FOR LISTS.

**WRIGHT & WEAIRE, LTD.,**

Telephone: 740, High Rd., Tottenham, N.17  
Tottenham 3847-3848

### MAKE YOUR WIRELESS CABINET THE OSBORN WAY—MACHINED READY TO ASSEMBLE.



No. 191. A JACOBAN WIRELESS CABINET of a very neat design, with panelled doors and panelled ends, and a large space at the bottom for accumulators, 3 ft. high, 2 ft. wide, and 1 ft. 4 ins. deep. Opening at the front and the top to take a panel 21 ins. x 7 ins. or 8 ins. A wooden frame is supplied free should the size of your panel be smaller.

Machined ready to assemble in Oak ... £1 15 0  
Assembled in Oak, ready to polish ... £2 7 6  
Assembled and polished in Oak ... £3 0 0  
CARRIAGE PAID.

Call and see the actual article.  
52-Page Catalogue sent Post Free on receipt of 3d. in stamps to DEPT. B.

CHAS. A. OSBORN, The Regent Works, Arlington St., London, N.1.  
Open to 7.30 p.m. Saturdays, 4.30 p.m.  
And at 21, Essex Road, Islington, N.1.  
Open to 8 p.m. Saturdays, 9 p.m.

### TO HOME CONSTRUCTORS! Build the Peerless "Resonic 2"

Anyone can build this set in 60 minutes. No drilling. No soldering. All Wires cut and bent. JUST ASSEMBLE and then immediately enjoy the radio entertainment which is of splendid tone and comes in at good loudspeaker volume. Circuit allows use of standard valves (1 H.F. & 1 Power). Blue Print and easily followed Diagram of Connections included with every set. Cabinet and full Kit supplied in Carton.



**£3:15:0**

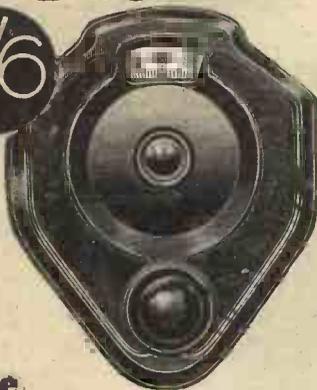
Obtainable from all dealers or

THE BEDFORD ELECTRICAL & RADIO CO., LTD., 22, Campbell Rd., BEDFORD.

Regd. No. 456002.

# Brownie

3/6



## the 'DOMINION' Slow Motion Dial

A VERNIER Dial at 3/6! Bring your set up-to-date by fitting this slow-motion dial. The mechanism is of special non-backlash construction which makes very fine tuning easy. Finished in smooth black or beautifully grained mahogany bakelite, this unique dial gives high-class finish to every set in which it is included.

# Brownie

wireless

Nelson Street Works, London, N.W.1.

## TECHNICAL NOTES.

(Continued from page 88.)

interesting from the scientific point of view and undoubtedly adds to the interest and novelty of radio-picture receiving in general.

### Valve Design.

The great improvement in the design of valves has had a very important influence upon the simplifying of modern adio-receiver design, one of the most noticeable features obtainable with modern alves being a uniform response over practically the whole of the audio range.

As regards selectivity, since the introduction of mechanically-coupled condensers it is possible to employ whatever number of tuned circuits may be required, and this way sufficient selectivity is readily obtainable.

Of course an expert may be able by using an extra number of controls to obtain any particular results with the minimum number of valves, whereas if the controls are to be reduced in order to make the set more easily operated by an unskilled user, it means as a rule increasing the cost in valves and other components.

### DX Reception.

For long-distance reception it is in some ways advantageous to use an efficient outdoor aerial, but the advantages to be obtained are to some extent offset by the fact that this efficient aerial also picks up interference and various atmospheric disturbances.

It is possible to a certain extent to overcome this difficulty by employing an under-

ground aerial, but here again what you gain in one way you lose in another, since the reduction in the interference is accompanied by a reduction in DX efficiency.

### Frame Aerials.

One solution of the difficulty is to employ a frame aerial and to make up for its comparative inefficiency by using extra amplification in the receiver. The frame aerial has the advantage that it is much less liable to pick up interference, and moreover it can often be rotated to a position which, whilst still receiving the desired signals, cuts out the interference or most of it.

In these days of screen-grid H.F. amplifiers the frame aerial looks like coming back into its own again, since such wonderful amplification (H.F.) can be obtained by only a couple of these valves. Screen-grid valves have, in fact, revolutionised high-frequency amplification, and therefore you can avail yourselves of the unique advantages of the frame aerial without worrying so much about efficiency.

### Saving Filament Current.

A correspondent sends me a very simple arrangement of valves (which, by the way, is not original) whereby he is able to save his low-tension battery current to some extent. He has two valves drawing .1 of an amp. at 2 volts and one power valve drawing 2.5 amps. at 4 volts. If the three valves are connected together in parallel it means introducing a resistance in series with each of the 2-volt valves and therefore the .1 amp. is drawn at a voltage of 4 volts and represents a consumption

(Continued on page 104.)

**PAREX**

**"TITAN"**

**COIL 15/- UNIT**

As specified and used in original Titan Sets.

"PAREX" TITAN SCREENS .. 4/6

All orders executed by return of post.

**E. PAROUSSI** 10, Featherstone Bldgs., High Holborn, W.C.1

Phone: Chancery 7010.

**NOW READY**

**AND IN STOCK**

A really practical and commonsense cabinet with turned legs and beautifully finished for the **COSSOR MELODY MAKER**—a really handsome piece of furniture needing nothing more than to just drop your set inside it, with ample space for batteries and accessories. Fitted with hinged lid and detachable front and back in solid Oak and French Polished.

**Price each £3 5s.**



Packing Case for above, returnable, 5/- extra. Carriage forward.

**Use the EFFICIENT PANEL**



Registered Trade Mark

**For the "HOLIDAY" TWO "Titan" Sets and all other popular circuits.**

The original BECOL Low Loss Former, made in sizes 1 in. up to 4 in. outside diameter, in lengths up to 36 in.

Write for BECOL Handbook on Wireless Circuits, giving full data on windings and illustrations. Price 4d. post free.

**DO NOT BE PUT OFF WITH AN IMITATION. LOOK FOR TRADE MARK**

Sole Makers:

**THE BRITISH EBONITE CO., LTD., HANWELL, LONDON, W.7**

PORTABLE CABINETS.

A special line of portable cabinets covered in Leatherette

Various Colours. Each ..	30/-
Finished in Oak or Walnut, Hand Polished. Each ..	35/-

Carriage on one 3/-; or two 4/6 extra.

**For the Best in Radio**

**WILL DAY LTD.**

(THE BEST IN THE WEST)

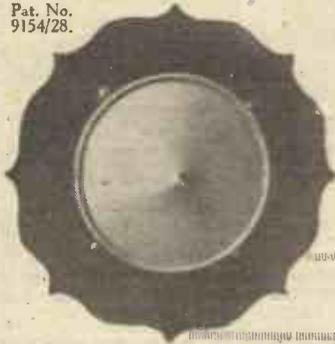
19 LISLE STREET, LEICESTER SQUARE, LONDON, W.C.2.

Telephone: (2 Lines) Regent 0921 and 0922      Telegrams: Willday, London

# The "OBLICUT" PLAQUE

"SELLING LIKE WILD FIRE"

Pat. No. 9154/28.



BLUE SPOT or TRIOTRON UNIT FITTED IN 3 MINS.

"PRICE and FINISH Remarkable" says a user.

No Chassis, No Cabinet and No Unsightly Baffle required.

8/6 POSTAGE 9d. EXTRA

**THE FINEST VALUE YET OFFERED!**



The "OBLICUT" PLAQUE is a baffle in itself. It hangs on the wall and is of handsome appearance. It is supplied in Oak or Mahogany finish. A coupling device is included and full instructions for fitting unit. The Cone is already fixed with edge floating on suede-like material and is specially impregnated to give the finest possible results.

The combination of an "OBLICUT" PLAQUE with a good Unit, is guaranteed to give results equal to the most expensive loud speaker yet made. Diameter of Plaque, 16 in.

IMMEDIATE DELIVERY. TRADE ENQUIRIES INVITED.

**CALYX MANUFACTURING CO.**  
945, ROMFORD ROAD, LONDON, E.12

**NOW ON SALE**

## WIRELESS CONSTRUCTOR ENVELOPES

Envelope No. 1.—THE "RADIO" THREE. (Recently reprinted). A famous loud-speaker set which you can build in an hour or two—no soldering and a wide range of components to choose from.

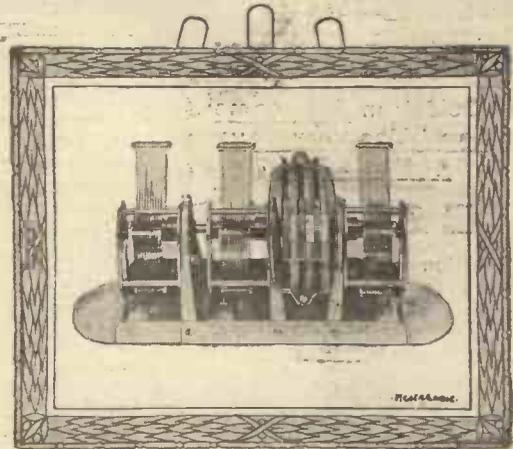
Envelope No. 2.—THE "CONCERT" FOUR. Made of standard parts, all easily obtainable, this is a highly-sensitive long-distance set, giving powerful reproduction of wonderful quality on 3 or 4 valves.

In these envelopes you will find every detail of the set simply explained, photographic reproductions and diagrams are included as well as a full-size Blue Print.

**AT ALL BOOKSTALLS Price 1/6**

By post, 1/9, from Wireless Constructor Envelopes, the Amalgamated Press, Ltd., Bear Alley, Farringdon Street, London, E.C.4.

### MODERN MASTERPIECES No 9



"The Drum Major."

WITH the same precision that the Drum Major controls the movements of the Band, so does the K.C. Drum Control function.

There are two models—one, the K.C. Single Condenser, is actuated by two drums for either coarse or fine adjustment; capacity '0003 (max.) or '0005 (max.). The other, the K.C. Triple Condenser, is controlled by three drums, but has no slow-motion device. The drums are sufficiently close together to make either simultaneous or independent control of the three condensers possible. Normally, each condenser is of the same capacity, '0003 (max.), or '0005 (max.), but combinations of these two capacities can be supplied for a slight extra charge.

## Dubilier K.C. DRUM CONTROL CONDENSERS

### PRICES

With Drum Control and slow-motion device '0003 or '0005	Triple K.C., each Condenser, '0003 or '0005	Triple K.C. Combination of '0003 and '0005
15/6	38/6	40/-

If unobtainable from your dealer, write direct to us giving his name and address.

### "TOREADOR SCREEN-GRID FOUR."

This set incorporates the latest developments in Receiver design—full constructional details free on request.



Advt. of Dubilier Condenser Co. (1925), Ltd., Ducon Works, Victoria Road, N. Acton, London, W.3.

**TECHNICAL NOTES.**

(Continued from page 102.)

of 4 watt; the two .1 valves therefore consume together 0.8 watt and the 2.5 consumes 1 watt, making a total of 1.8 watt.

**Wattages.**

If, however, the two 0.1 2-volt valves are connected together in series they consume their 0.1 at 2 volts each instead of 4 volts and the total wattage consumption for the two of them is 0.1 multiplied by 4, that is 0.4 watt. Add to this the 1 watt which is consumed by the power-valve and you have a total wattage consumption of 1.4 watt instead of 1.8 as previously. The gain in this case is comparatively small, but you will easily be able to think of cases using rather higher voltages and different arrangements of valves in which a scheme of this sort might effect quite an appreciable saving.

**Centre-Tapping.**

A reader asks me a question with regard to the use of centre-tapped coils. He required to use a centre-tapped coil, but not having one available he tied two ordinary coils together and took the centre-tapping from them. Finding the arrangement

**WIRELESS  
CONSTRUCTOR  
ENVELOPES**

are known everywhere as reliable and comprehensive guides to set builders.

The "Radiano" Three  
The "Concert" Four

Obtainable at all Booksellers, price 1/6, or by post price 1/9, from Wireless Constructor Envelopes, The Amalgamated Press Ltd., Bear Alley, Farringdon St., E.C.4

worked quite satisfactorily he wishes to know whether this is an accident, or whether it is a result which might be expected.

The problem is a very simple one, and it is clearly obvious that two coils very close together amount practically to the same thing as a single coil provided, of course, that the windings of the two coils are in the same direction. The only possibilities of going wrong are if the one coil is turned so that its windings run in the opposite direction to the other one or if the coils are not symmetrically placed or sufficiently close together. If, owing to their shape or size, it is impossible to get them very close together, then the result will probably be rather different from what you would obtain with a single centre-tapped coil.

**For Test Purposes.**

Generally speaking, however, there should be no difficulty whatever in using two single coils mounted together in this way as a centre-tapped coil, and this is a dodge which is often employed by experimenters for temporary or test purposes.

As a matter of fact, even if the two coils are not close together this will in some cases (though not in all) make little or no difference to the arrangement.



**OF RADIO ON  
EASY TERMS**

In addition to their own extensive range, PETO SCOTT offer YOU Every Known make of Receiver or Component, all on EASY TERMS!

Here is a selection, but please fill in the coupon below and state your requirements.

The "TITAN" THREE. Send only 10/- balance in 11 monthly instalments of 8/1.

The "TITAN" TWO. Send only 10/- balance in 11 monthly instalments of 6/7.

LEADING MAKES OF H.T. ELIMINATORS from 4/7 down. Balance in 11 monthly payments of 4/7.

COSSOR MELODY MAKER. Send only 10/- balance in 11 monthly payments of 14/7.

LEADING MAKES OF PORTABLE SETS from 21/- down.

CELESTION C.12 LOUD SPEAKER. Send only 13/9, balance in 11 monthly payments of 13/9.

Build your own set the Easy Way NOW. Mail Coupon in unsealed envelope under id. stamp.

**PETO SCOTT CO. LTD.**

Please send me your big Illustrated Lists of all leading makes.

NAME.....  
ADDRESS.....  
.....PW/30/3

Free Demonstrations and Advice by Qualified Engineers at all our Shops.

77, CITY ROAD, LONDON, E.C.1.  
62, High Holborn, London, W.C.1.  
4, Manchester Street, Liverpool.  
33, Whitelaw Rd., Chorlton-cum-Hardy, Manchester.

**PETO SCOTT CO. LTD.**

**REPAIRS**

Any make of L.F. Transformer, Loudspeaker or Headphones repaired and despatched within 48 HOURS—TWELVE MONTHS' GUARANTEE with each repair. 4/- Post Free.

Terms to Trade.

**TRANSFORMER REPAIR CO.,**  
"Repairs" Dept.,  
214, High Street, Colliers Wood, London, S.W.19.

**EASY PAYMENTS**

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

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

H. W. HOLMES, 29, FOLEY STREET,  
Phone: Museum 1414. Gt. Portland St., W.1

**ZAMPA  
THE ORIGINAL  
CONE CHASSIS**

Completely assembled with washers and chack, in Bakelite frame. Speaker can be completed in two minutes.



**The ZAMPA-First-Best-Cheapest**  
Can be supplied fitted with any unit if desired.

From your local Dealer, or

**MIC WIRELESS CO.,**  
White Horse Place, Market St., Wellingborough.

**THERE MUST  
BE A REASON**

Why Celestion has come to mean "The Very Soul of Music."

**REALISM**

Celestion possesses the most exclusive feature that it is possible for any reproducing instrument to possess: **REALISM.**

**CELESTION**

THE VERY SOUL OF MUSIC

The only sure proof of our Statement is to hear Celestion yourself. You can do so without obligation at any good Wireless Dealer, or at our Showrooms. Models range from £5.10.0 in oak or mahogany, British throughout. Made under licence.

The new Celestion Booklets is free and gives you briefly and interestingly all particulars. Mail the coupon below for your copy now!

CELESTION LTD. (DEPT. B),  
KINGSTON - ON - THAMES.

Showrooms:  
108, VICTORIA STREET,  
LONDON, S.W.1



Model C.12

WHEN A BETTER LOUD SPEAKER IS MADE—CELESTION WILL MAKE IT

**FREE!** Please send me a copy of the New Celestion Booklet! Post to Celestion, Ltd., Kingston-on-Thames.

NAME.....  
ADDRESS.....

DEPT. B

# THERE IS A REASON

Why The Lewcos H.F. Choke Stands Alone For Efficiency—  
and the reason is not far to seek.

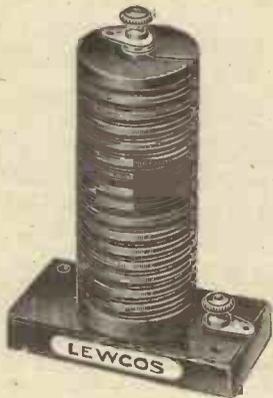
The finest quality materials and the high-class workmanship used in the manufacture of the LEWCOS H.F. CHOKE make it supreme.

The terminals are arranged one at the top and the other at the base of the coil to eliminate the risk of additional self-capacity in the wiring of the receiver.

Equip your set with a LEWCOS H.F. CHOKE and be confident of perfect reception.

The LEWCOS H.F. CHOKE is obtainable at all Radio Dealers.

A Chart showing its performance and full particulars will be sent on application.



H.F. CHOKE  
Price . 9/-

## LEWCOS

(REGD.)  
HIGH FREQUENCY CHOKE

OBTAINABLE FROM STOCK  
OF ALL RADIO DEALERS

All Lewcos medium-wave coils have a range of 235/550 metres and can thus be used for any station in the British Isles.



Lewcos Radio Products  
For Better Reception!

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED, CHURCH ROAD, LEYTON, LONDON, E.10. Trade Counter and Cable Sales: 7, Playhouse Yard, Golden Lane, E.C.1

## INVALUABLE TO EVERY AMATEUR & CONSTRUCTOR

### "POPULAR WIRELESS" BLUE PRINTS

#### of Tested Circuits

The following is a list of the "P.W." 6d. Blue Prints for Constructors in stock, showing the different circuits available.

P.W. BLUE PRINT Number.

1. DETECTOR VALVE WITH REACTION.
2. OUT OF PRINT.
3. 1-VALVE L.F. AMPLIFIER.
4. CRYSTAL DETECTOR WITH L.F. AMPLIFIER.
5. H.F. (Tuned Anode) AND CRYSTAL WITH REACTION.
6. H.F. & CRYSTAL (Transformer Coupled, without Reaction).
7. 1-VALVE REFLEX WITH CRYSTAL DETECTOR (Tuned Anode).
8. 1-VALVE REFLEX AND CRYSTAL DETECTOR (Employing H.F. Transformer, without Reaction).
9. H.F. AND DETECTOR (Tuned Anode Coupling, with Reaction on Anode).
10. H.F. & DETECTOR (Transformer Coupled, with Reaction).
11. DETECTOR AND L.F. (With Switch to Cut Out L.F. Valve).
12. OUT OF PRINT.
13. 2-VALVE REFLEX (Employing Valve Detector).
14. OUT OF PRINT.
15. OUT OF PRINT.
16. H.F. (Tuned Anode), CRYSTAL DETECTOR AND L.F. (With Switch for Last Valve).
17. CRYSTAL DETECTOR WITH TWO L.F. AMPLIFIERS (With Switching).
18. 1-VALVE REFLEX AND CRYSTAL DETECTOR, with 1-VALVE L.F. AMPLIFIER, Controlled by Switch.
19. OUT OF PRINT.
20. OUT OF PRINT.
21. THE 2-VALVE LODGE "N."
22. "THE GUARANTEED REFLEX."
23. THE 1-VALVE "CHITOS."
24. THE "SPANSACE THREE." Three-Valve Receiver employing 1 Neutralised H.F. Valve, Detector with Non-radiating Reaction Control, and 1 L.F. Valve.

P.W. BLUE PRINT Number

25. OUT OF PRINT.
26. A "STRAIGHT" 4-VALVER (H.F., Det. and 2 L.F. with Switching).
27. OUT OF PRINT.
28. A "MODERN WIRELESS" 5-VALVER (H.F., Det. and 3 L.F.).
29. AN H.T. UNIT FOR DIRECT-CURRENT MAINS.
30. A REINARTZ ONE-VALVER.
31. A STANDARD TWO-VALVER (Detector and L.F.).
32. THE "CUBE SCREEN" THREE (H.F., Det. and L.F.).
33. A "KNIFE EDGE" CRYSTAL SET.
34. AN H.F. AND DETECTOR TWO-VALVER.
35. THE "UNIVERSAL THREE" (Det. and 2 L.F. stages resistance-coupled).
36. THE "SPANSACE FOUR" (H.F., Det. and 2 L.F.).
37. THE "LONG SHORT" CRYSTAL SET.
38. A TWO-VALVE L.F. AMPLIFIER.
39. THE "SYDNEY" TWO.
40. THE "SUPER SCREEN" THREE.
41. THIS YEAR'S "CHITOS" ONE-VALVER.
42. THE "Q AND A" THREE. A simple set (Det. and 2 L.F.).
43. THE "INEXPENSIVE FOUR."
44. THE "ECONOMY FIVE." For long-range loud-speaker work.
45. A SIMPLE A.C. H.T. UNIT.
46. THE "REGIONAL" THREE.
47. THE "WAVE-CHANGE" ONE.
48. THE "REGIONAL" CRYSTAL SET.
49. THE "ANTIPODES ADAPTOR."
50. THE "ANY MAINS" TWO.
51. OUT OF PRINT.
52. THE "BANDMASTER."

### ALL "POPULAR WIRELESS" BLUE PRINTS 6d. EACH

All orders for these Blue Prints should be sent direct to the "Popular Wireless" Queries Department, Fleetway House, Farringdon Street, London E.C.4, enclosing a stamped addressed envelope and a postal order for 6d. for each Blue Print ordered.

# K. RAYMOND

27 & 28a, LISLE ST., LONDON, W.C.2

Come to LEICESTER SQUARE TUBE

This address is at the back of Daly's Theatre  
Phonics: Gerrard 4637 and 2821

**HOURS OF BUSINESS** EVERY DAY 9 to 8  
SATURDAY 9 to 9  
SUN. MORN 11 to 1

## EASTER ARRANGEMENTS

GOOD FRIDAY 10 a.m. to 1 p.m. SAT. all day  
as usual. SUNDAY 11 a.m. to 1 p.m. MONDAY  
10 a.m. to 1 p.m. WHOLESALE & RETAIL.

## TRADERS

Send Us Your Enquiries.

**DON'T FORGET OUR WHOLESALE DEPT. (27).**

All usual lines (subject).

Wholesale Dept. open every day 9 to 8.  
Saturdays 9 to 9. Sundays 11 a.m. to 1 p.m.

## WE STOCK WHOLESALE & RETAIL

Bulgin, Ferranti, Ekco, Amplion, Celestion, Igranac, Lissen, M.P.A., Ediswan, Oosor, Six-Sixty, Colvern, Oylidon, McMichael, Walmel, Lewcos, Polar, Gilma, Ormond, J.B. Pye, Polymet, T.G.C., Dubilier, Lotus, W.B., Phillips, Mullard, and all standard components, valves, etc.

## Lewcos Q Coils

Q.A. 15/- Q.A.M. 21/-  
Q.A.R. 21/- Q.S.P. 21/-  
Q.S.G. 21/-

## OSRAM MUSIC MAGNET

Kit of Parts & Valves.  
£8 : 12 : 6.  
BOOKLET FREE.

# "TITAN" 3

P.W. 2/2/29.

This Kit of Parts is officially approved by EDITOR, "Popular Wireless."

'0005 Variable with S.M. Dial (LOTUS, ORMOND or POLAR), Micro '0005, LISSEN L.F. 8/6 (any other L.F., add balance), Wave-change Switch, L.T. do. "TITAN" COIL UNIT. 3 Sprung V.H., R.I. VARLEY or LEWCOS H.F. Choke, one '0002 and two of '0003 fixed, 2 meg. Leak and Holder, 2 DUBILIER Mansbridge (or LISSEN). Standard THE LOT Screen, 2 H.T. Fuses, Terminal Strip, 11 Terminals (engraved), Wire, Screws, Flex, Plugs, and 14 x 7 Grade A Ebonite Panel. Post Free, U.K. **72/-**

## VALVES 2v.

Mullard or Six Sixty  
S.G. 22/6 Det. 10/6  
Power 12/6  
(Pentode 25/-)

## OAK CABINETS

14 x 7 x 10, 15/- 20/-  
Cheaper Oak, Polished, 10/- (this one with parts only.) Carr. 1/-

## "TITAN" H.F. UNIT

(P.W. 2/3/29.)

'0005 Lotus variable, 3-pt. switch, o/o ditto, '0005 P. neut., P.W. Titan Coil, S.M. Dial, sprung V.H., '0003, '001, '0002 fixed, 2 Mansbridge Condensers, Igranac H.F. Choke; 5/- (add bal. any other), screen, strip 7 x 2, sockets, wire, plugs, spades, screws, panel 9 x 7, baseboard.  
Post Free 47/6 Lot.

## TITAN COILS

15/- TRADE SUPPLIED.

## S.G. VALVES

MULLARD 22/6  
SIX-SIXTY 22/6  
COSSOR 22/6  
OSRAM 22/6

ALL VALVES STOCKED

## CLEARTRON VALVES

SCREEN GRID  
2 volt - - 12/6  
Usual types 4/-  
R.C. or Power 6/-  
Post 3d.

## BLUE SPOT

66K (101)  
25/-  
Adjustable Model, 4 Pole  
Balanced Armature.

Eveready, Siemens, Lissen Batteries.  
Squire Cone Outfits.  
Bulgin All-wave Tuner 15/6  
British General 18/6  
Wates' 3 in 1 Test Meter 8/6  
Lotus Condensers:  
'0005, 5/9; '0003 5/6  
Colvern Master 5 Star Dual Coil 17/6  
Wearite Dual Wave Tuner 15/-  
Wearite Standard Loading Coil 7/6  
Dubilier K.C. Condensers, Friction Control, '0005 & '0003, each 12/-  
Thumb control, ditto 15/6  
Telsen Radio grand L.F. 12/6  
Telsen Ace L.F. 8/6  
Brown H.Q. Speaker, £3/5/0  
Amplion A.C.2, 39/6  
Model for M.P.A. Popular Plaque Speaker 29/6  
Ormond Turn-table for Portables 6/-

## COUPON 58.

For every 25/- you spend Retail you can buy one of following for 3d. each extra ON THIS COUPON.  
9-volt G. Bais, 60x Coil, S.M. Dial, 12 yds. Flex, 12 yds. rubber Lead-in, 3pt. Switch, 100 ft. Silk Frame - Aerial Wire, Reaction '0001.

# DISEMBODIED VOICES.

From A CORRESPONDENT.

EVER since the inception of broadcasting from time to time the B.B.C. has issued "proclamations" concerning its policy, many of which have had the effect (on critics of broadcasting) which a red rag has on a bull. Why so much excitement, so much anger, and so much hysterical condemnation should be called forth is a matter for small wonder; but that some of the B.B.C.'s rulings should call forth sarcastic criticisms, mingled with a good deal of laughter, is understandable.

One of the latest "proclamations" made from Savoy Hill was to the effect that actors and actresses taking part in broadcast plays should be anonymous. For some extraordinary reason, Mr. Val Gielgud, the Director of Dramatic Productions at Savoy Hill, hit upon the idea that broadcast plays should only be carried out with the aid of "disembodied" voices.

## Some "Exceptions."

The fatuity and general stupidity of this idea became at once apparent when it was suggested that if Miss Sybil Thorndike, for instance, was to honour the B.B.C. by acting the part of "St. Joan" in the forthcoming broadcast version of the play, her name would not be announced to the public.

This, of course, called forth another "proclamation" to the effect that "exceptions" would be made.

If, instead of thinking out these unimportant details, Mr. Gielgud were to concentrate more on improving the radio drama and in finding more plays suitable for broadcasting, we feel sure he would be fulfilling his functions as Dramatic Director much more satisfactorily and much more to the liking of the public.

No doubt many people found this story about "disembodied" actors and actresses very amusing, but it is not the sort of story which enhances the B.B.C.'s reputation, nor is it the sort of story, despite the space it might occupy in the daily newspapers, which is going to make people take radio drama as a serious form of art; and, finally, it is not going to do Mr. Gielgud any good.

## Closer Scrutiny Required.

We sincerely hope that this will be the last of a long series of stupid little incidents which have arisen through lack of a strict control at Savoy Hill. These "proclamations" to the Press need very careful scrutiny, and we feel convinced that if Sir John Reith had known fully about Mr. Gielgud's new idea, it would have been squashed very severely, and nothing more would have been heard about it in public.

If this "disembodied" voice theory were carried to its logical conclusion, it would, of course, mean that every singer, for example, would have to be anonymous. It is bad enough, according to some people, who remember the early days of broadcasting, that the ban of anonymity should have been placed upon announcers, because by doing so a good deal of the human touch

(Continued on page 108.)



# EVERY VALVE SET USER NEEDS A WATES "three in one" VOLT-AMP RADIO TEST METER

You may have a baseboard full of components—BUT you cannot hope to obtain really perfect QUALITY in reception unless you have that perfect set control ensured by accurate Volt and Amp readings! All you want is a Wates Meter. With its three readings on one dial feature it has an immensely wider range of usefulness—yet it costs no more than single purpose instruments. Obtain one now and let it reveal what a world of difference lies in the expert handling of your set. Obtainable from your dealer or direct, complete with explanatory leaflet. Stocked by Halford's Stores, Curry's Stores, and all Radio Dealers.



**READINGS.**  
0—150 VOLTS.  
0—6 VOLTS.  
0—30 MILLIAMPS.  
Res. 5,000 ohms.  
Can be used as a Pole Finder.

PRICE

# 8/6

Crystallised black finish.

THE STANDARD WET BATTERY Co., Dept. P.W., 184-188, Shaftesbury Avenue, London, W.C.2.

Three in One

M.B.

Make The DAILY SKETCH YOUR Picture Paper

5/- DOWN brings you the



## ULTRA LOUD SPEAKER

Reproduces perfectly over the whole range of frequencies. Automatically segregates high and low notes.

Balance in eleven monthly payments of 8/6.

Everything Radio on Easy Terms. Write for list "E."

New Times Sales Company, 56, Ludgate Hill, London, E.C.4

# GOODMANS

## CHASSIS CONE ASSEMBLY

WITH THIS COMPLETE ASSEMBLY YOU CAN CONSTRUCT IN A FEW MINUTES, a Loud-Speaker surpassing all your expectations! ANY GOOD UNIT YOU MAY HAVE—"BLUE SPOT," "TRIOTRON," "BULLEN," or GOODMANS can be used. TWO MINUTES only—and the Unit is fixed in place, by the unique Cleat and Wing-nuts. The complete Assembly is then ready for fixing inside your Cabinet, or to a Baffle Board, with three screws. Lugs are provided on the outer Ring. SIMPLICITY OF CONSTRUCTION AND ASTOUNDING RESULTS are assured.



Overall Diameter 10½ in.

Price **16/6** Complete  
(Ready for Mounting Unit.)

This assembly is definitely ahead of all others. It is fitted with a fully licensed GOODMANS Seamless Cone, made and treated by entirely new and absolutely exclusive doping processes, rendering it remarkably sensitive, and capable of reproduction of a fidelity and brilliance usually associated with the Moving-coil type Speaker.

Alternatively, supplied with Cone Kit (cut out Kraft Cone, suspension Leather, Cone Bush and Mounting Ring). **14/9** inclusive.  
As exclusively used in P.W. Purity Cone, Dec. 22nd, 1928, issue.

Illustrated descriptive Leaflet on request.

# GOODMANS

27 FARRINGDON ST. LONDON, E.C.4

Telephone—CITY 4472.

## "POPULAR WIRELESS" ADVERTISEMENT RATES

Whole Page £40      Quarter Page £10  
Half Page £20      Eighth Page £5  
Narrow Column Advt. (3 cols. to page) per inch 30/-  
Minimum Space accepted      half inch 15/-

NO SERIES DISCOUNTS. ALL ADVERTISEMENT COPY SUBJECT TO EDITORIAL APPROVAL

COPY AND BLOCKS MUST BE IN HAND 11 DAYS BEFORE DATE OF ISSUE TO ENSURE PROOFS

ALL communications respecting advertising must be made to:—

JOHN H. LILE, Ltd., 4, Ludgate Circus, London, E.C.4

Phone: CITY 7261.

## DX Short-wave COILS

For short-wave work specify the famous DX Coils. Experts use them wherever Radio is known.

Wound 3 in. diameter; fit standard coil holders. Tinned copper, 16 gauge; open core; can be tapped anywhere by alligator clips.  
3, 5, 7 and 9 turns.



**7/6**  
The Set of four.

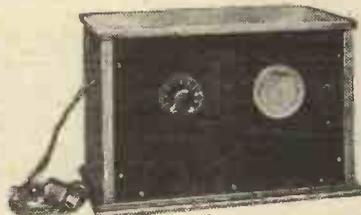
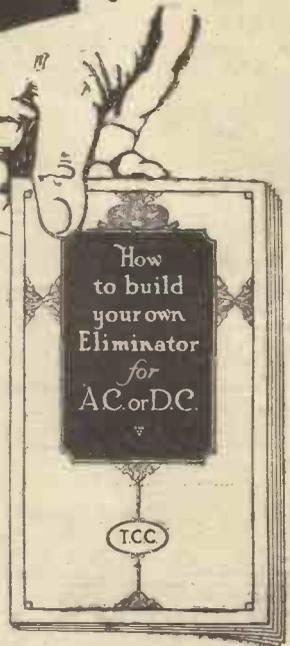
DX COILS, LTD., LONDON, E.8.

# FREE!

—from the Makers of T.C.C. Condensers—

# THIS BOOK

which shows you how to build



# THIS L.T. ELIMINATOR

If you have electric light (A.C. current), this book will save you money. In simple language and by clear diagrams it shows you how to build an L.T. Eliminator that will give you constant current from your mains. It's amazingly easy. There are only 6 components and 12 wires. First cost is last cost. You can build it in an evening and start saving money right away. Take the step now—sign the coupon below.

## AND GET POWER FROM YOUR MAINS!

**FILL IN COUPON NOW! 1 Minute's Work & 1d. Stamp**

To TELEGRAPH CONDENSER Co., Ltd., Wales Farm Rd., North Acton, London, W.3.

I enclose 1d. stamp for your free Eliminator Book (H.T. as well as L.T.).

Name.....

Address.....

P.W. 30/3/29

# 5/- DOWN SECURES The Famous PHILIPS CONE LOUD SPEAKER



Balance in 6 monthly payments of 8/-.

An attractive loud speaker with a special Electro-magnetic movement of the balanced armature type.

EVERYTHING RADIO ON EASY TERMS.  
Write for List "H."

**New Times Sales Co.,**  
56, LUDGATE HILL, LONDON, E.C.4.

I enclose 5/-. Please send me Philips Cone Loud Speaker, for which I agree to pay further instalments set out in the above advertisement.

NAME.....  
ADDRESS.....  
..... H/30/3

**EBONITE PANELS.**  
Special Offer at greatly reduced prices in Mahogany and Polished Black. Guaranteed. 12 x 3, 1/7; 12 x 6, 3/2; 12 x 8, 4/2; 14 x 7, 4/3; 18 x 7, 5/6; 16 x 8, 5/8; 21 x 7, 6/4. Post Free. Trade invited.—BANNISTER & FITTON, 27, MILNROW ROAD, ROCHDALE.

**AGENTS WANTED.** Live wires required to sell components for "P.W." sets and all radio goods. Smart men with selling ability are invited to write. Liberal commission offered. Districts allotted.  
**NEW AUTO SUPPLY CO.,** 241, Park Road, Aston, BIRMINGHAM.

**Insure your Valves for 6d**

•06  
•15  
•2  
AMP

BUT BE SURE THEY ARE "COMPETA" FUSES OR L.C. BULBS. IT IS ONLY A MOMENT'S CARELESSNESS TO RUIN A SET OF EXPENSIVE VALVES. EACH FUSE IS PACKED IN A SEPARATE CARTON WITH THIS TRADE MARK.

**TRADE COMPETA MARK**  
[THE WORLD'S SELECTED]

Advt. of A. F. BULGIN & CO.  
9, 10, 11, CURSITOR STREET, LONDON, E.C.4.

The Picture Paper with the MOST News  
—SUNDAY GRAPHIC—

**WET H.T. BATTERIES**  
Solve all H.T. Troubles

SELF-CHARGING, SILENT, ECONOMICAL.

JARS (waxed) 2 1/2" x 1 1/2" sq. 1/3 doz.  
ZINCS, new type 103. doz. SACS 1/2 doz.

Sample doz. (15 volts), complete with bands and electrolyte, 4/1. post 9d.  
Sample unit 6d. illus. booklet free.

Bargain list free.

AMPLIFIERS 30/- 2-VALVE SET 25.

P. TAYLOR, 57, Studley Road, STOCKWELL LONDON

**EVERYTHING RADIO ON EASY TERMS**

Write to WOOLDRIDGES, 20 and 22, Lisle Street, LONDON, W.C.2.

## DISEMBODIED VOICES.

(Continued from page 106.)

has been lost, and consequently the machine element has seemed more pronounced than usual.

There are far too many high falutin' and fantastic theories tied on to the apron-strings of broadcasting. One can understand that a certain amount of experimentation is necessary in developing this new form of art, but care must be taken that the experiments should not be conducted by irresponsible people, otherwise the B.B.C. will find itself ridiculed more and more. And there is nothing like ridicule to kill a serious intention.

It is interesting to note the remarks made by an official of the B.B.C. in connection with broadcast drama. Unfortunately, although this interview appeared in the "Daily Telegraph," the name of the person interviewed is not given.

Anyway, this B.B.C. official said: "The success of stage drama depends upon the portrayal of characters, whereas the radio drama is impersonal and relies upon the creation of an atmosphere for its effect, thus making it undesirable to call too much attention to its dramatis personae. Moreover, there are as yet no epic parts in radio drama comparable to Hamlet, Macbeth or St. Joan.

"When a stage play is broadcast, the actors and actresses are drawn from the theatre itself, but casts of radio dramas are drawn from a body of artistes trained to the microphone who have made studio work their

**FOR THE CONSTRUCTOR**

The Latest  
**"BESTWAY"**  
**WIRELESS BOOKS**

form exceptional value for the home constructor.

Each book contains full details of  
**FOUR COMPLETE SETS**

Ask for "Bestway" Wireless Books Nos. 328 & 329.

On Sale Everywhere. Price 6d. each.

profession. Radio drama is a new art with its own technique. Its effect is attained through a series of sound flashes, or short scenes, and its object is to create an atmosphere of illusion which must be maintained as far as possible at the conclusion of the piece.

"The art of radio drama is," concludes the official, "at present better understood and further developed in this country than in any other, and it is the policy of the B.B.C. to make every effort for the maintenance of our superiority in this field."

One could sum up this exposition of radio drama as superficial, for a stage drama does not only depend upon the portrayal of characters. There is as much necessity for atmosphere on the stage as anywhere else, and certainly radio drama is not the only form of dramatic art which is dependent upon atmosphere.

If there are no epic parts in radio drama to-day compared with Hamlet, Macbeth or St. Joan, petty restrictions and the inventions of rules in connection with radio drama will certainly not hurry forward the development of radio drama, and help produce a cycle of epic plays.

## THE NEW CROXSONIA RADIO PANEL SENSATION

ASTOUNDINGLY LOW PRICES ANY SIZE CUT

POSTAGE FREE

WRITE FOR NEW FOLDER

Size	Matt.	Gloss Black	Mahog. Finish
10 ins. x 8 ins.	1/8	2/6	3/4
12 ins. x 8 ins.	2/-	3/-	4/-
14 ins. x 7 ins.	2/1	3/1	4/1
16 ins. x 8 ins.	2/8	4/-	5/4
21 ins. x 7 ins.	3/1	4/6	6/2

Other Sizes 1d. sq. in. 1d. sq. in. 1d. sq. in.

Above prices post free. 1/8 in. thick. Free from surface leakage. Will not fade.

WRITE, CALL, OR PHONE CLERKENWELL 783.

Agents' Addresses: JOHN HENRY SMITH, 139, Abney Rl. HULL. A. STREDWICK & CO., 27, The Mkt. CHATHAM. BOYNTON & CO., LTD., 73, Stafford St., B'HAM.

Samples and Prices to Trade. DEPT. P.

## CROXSONIA

10 SOUTH STREET MOORGATE EC2

Buy "THE ALL EUROPE THREE" 6d.  
A book of clear instructions for making this efficient 3-valve set. From a bookseller, or net. PITMANS, Parker Street, W.C.2.

**KAY'S CABINETS**

This Cabinet soundly constructed of Oak and equipped with Baseboard Runners, Fall Front, Hinged Top. Polished rich Jacobean, 36" high. For panels up to 18" wide. .... 45/-

Also made to accommodate any Popular Set. Quotations for Specials by return. Illustrated Lists Free.

H. KAY, Cabinet Manufacturer, Mount Pleasant Road, London, N.15. Phone: WALTHAMSTOW 1626

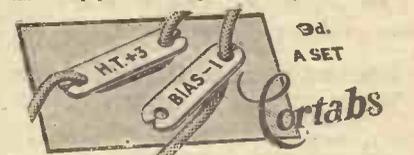
**EASTER IS COMING**

ORDER YOUR PORTABLE NOW AND BE READY, prices from £15. Titan coil, 15/- Chakophone de luxe tuner, 10/6.

W. WILLANDE & CO., 22 and 23, Howard Street, COVENTRY.

## SAVE YOUR VALVES!

Very few valves live to die a natural death. Buy CORTABS to-day and save the lives of your valves. Metal labels are corrosive and conducting. CORTABS (made of ivory) are non-corrosive and non-conducting. A carton of thirteen popular wordings costs only 9d.



Don't be put off with substitutes. See the special slots illustrated above. These enable CORTABS to slip on to battery cords without having to undo plugs and terminals. But they will not slip off! CORTABS can be obtained of all good dealers or (15d. post extra) from—

**MONEY HICKS, LTD.,**  
Largest Makers of Radio Labels in the World.  
54-58, Britannia Road, London, S.W.6.

**HEADPHONES REPAIRED 4/-**

Transformers 5/-. Loudspeakers 4/-. All repairs remagnetised free. Tested, guaranteed and ready for delivery in 24 hours.

Discount for Trade. Clerkenwell 9069.

E. MASON, 44, East Rd., City Rd., N.1.

**PERFECT RECEPTION**

depends on the efficiency of your L.F. Transformers. Make sure they are obtaining the very best results by specifying EUREKA. Concert Grand No. 1, 10/6; No. 2, 9/6. Baby Grand, No. 1 or No. 2, 8/6. Smoothing Chokes Model "A", 10/6. All post paid. P.O. to-day—Goods to-morrow. Money back if not satisfied in 7 days. Sole Manufacturers:

L. PERSON & SON (Dept. 2), 63, Shaftesbury Street, London, N.1. Estab. 1872. Trade supplied. Phone: Clerk. 7139.

**BATE'S MILLION** 1/6 EA. A REAL EARTH TUBE

EARTH TUBE 24" LONG X 1" DIA. ALL DEALERS SUPPLY.

**JABEZ BATE & CO**  
VERONA WORKS BIRMINGHAM

# THE P.W. "HOLIDAY" TWO.

(Continued from page 98.)

the end to the E terminal to act as a counterpoise. By the way, between the batteries and the layer of accessories on top of them it is desirable to put a sheet of insulating material, such as empire cloth, waxed paper, cardboard, or thin oilcloth, to prevent "shorts."

The set itself is a simple type of two-valve Reinartz, with plug-in coils for tuning and reaction and one stage of L.F. Now, about coil sizes. For the ordinary broadcast wave-lengths the combined aerial and reaction coil ( $L_1$ ) will be a No. 35 or 40 for most aeriels, and the secondary ( $L_2$ ) a No. 60.

### How to Connect the Aerial.

For the long waves  $L_1$  should be a No. 75 or 100 and the secondary a No. 250.

Next, note that there are two aerial terminals. One of these (the right-hand one) gives a direct-coupled circuit, and is best for very small aeriels (up to, say, 30 ft.); and the other gives the true

## OUT TO-DAY

THE  
APRIL NUMBER  
OF

## MODERN WIRELESS

Contains full details of  
**FOUR FINE SETS**  
and a wealth of articles of the utmost value to the home constructor and listener.

GET YOUR COPY NOW

Price 1/-

ON SALE EVERYWHERE

Reinartz circuit. This is intended for use on normal aeriels, and gives then the necessary selectivity.

As to valves: for the detector one of the H.F. or R.C. type is advised (the latter is generally slightly better), while in the second socket you want one of the L.F. type (a small power will do at a pinch, but the other is really best for headphone work). Two-volters are, of course, the standard type for portables.

Now, one final point, and the present writer can leave you to go into the cabinet details which follow. Note that there is not much space wasted anywhere in this set, and to change the coils you must slip the set back out of its case.

### Making the Cabinet.

This is easily done if you see that the battery leads are of adequate length, and in any case can be done before you go out, since you will almost always know in advance on which wave-length you will want to work.

The cabinet was originally constructed from small straight-grained oak boards, to allow screws to be employed rather than complicated wood joints. Mahogany can

(Continued on next page.)

# YOU HAVEN'T HEARD THE BEST YOUR SET CAN DO IF YOU HAVEN'T TRIED

# TRIORON

## DARK EMITTER VALVES



**SUPER  
POWER  
VALVE**

# 7'6

## DISPOSAL SALE

of High Grade Electrical and Wireless Apparatus by the R.A.F. and G.P.O.

**METERS.** Milli-ammeters, all ranges, 15/- to 22/6. 0 to 500 volts, 45/-. Weston Meters, all ranges to 1,600 volts. Elliott, etc., Testing Sets, E.108, 4 ranges, amps; and volts, 45/-. A.C. Hot Wire, 1/2 amp., 4/-. Frequency meters, various ranges.

Capacity Meters, £8; Wheatstone Recorders, £12; Multi-Micro Galvos, 60/-; Res. Boxes, 17/6; Hydrometers, 1/6; Relays, 6/6; Remote Switches, 15/-; 12" Spark Coils, £10; Anode Converters from A.C. or D.C. Mains for outputs of 400 to 800 volts. H.T. Generators in stock, 50 watts to 2 kw. Weston 60 - Micro Ammeters for Grid Bias testing, 35/- only.

**TRANSMITTERS.** R.A.F. 1 in. Spark with A.T.I. and all fittings, in polished mahogany case. Cost £15. Sale, 15/- each; 100 watts, 25/-; 250 watts, 50/-. 2-Valve Aircraft ditto, with Osram valves, Speech or Morse, 40/- each. No. 1 Tapping Keys, open type, with massive contacts, 6/- each. Transmitting No. 51 KD with aluminium cover, double contact, 7/6 each. Morse Practice Sets with Buzzer and Key on Mahogany panel, 8/6 each. Morse Recorders, for making picture machines, 35/- each. Spark Gaps, 2/-.

Artillery Electric Torches and Battery, 2/6.

**TRANSMITTING VALVES.** 6 volt 40, 100, 200 and 250 watts, from 4/6.

**WAVEMETERS** by Townsend, Paul, Silvertown, Gambrell and Marconi, from 15/-.

**LOUD-SPEAKERS.** R.K. Cones fitted B.T.H. Moving Coil, 100 surplus at only 7/6 each. Marconi L.S. Magnets, 6 v. for moving coil cones, 20/- Gramo. Motors. Genuine Panatone Motors, run direct off mains supply, fitted Turntable, etc. Few only, 37/6 each. Worth £4 10s. Chokes. Round's Output L.F. Chokes by Marconi, for feed from power amplifiers. Latest model, 7/6. Condensers. New Sterling, 2 mid., genuine Mansbridge Condensers to 440 volts, at reduced price of 2/10 only.

**L.I. ACCUMULATORS.** Celluloid, 2 volt 20 amp., 3/-; 4 volt 20 amp., in case, 6/3; H.T., in Ebonite 1,000 m/a hours: 60-volt, 19/6; 90-volt, 29/-; 120-volt, 39/-; 3-v. Inert Dura, 1/3. Cell Fillers, 1/6. Hydrometers, 1/- Petrol Testers, 2/6.

**NEW CINEMA ARC LAMPS,** 50/-. Leitz La's. Arc Lamps, 5 a. 55/-.

**INSULATORS.** H.T. in porcelain and ebonite, from 6d. each. Empire Insulating Cloth for Coils, Chokes, etc., 1/- roll of 100 sq. in. 4-Pin Plug and Sockets, 8d. pair. 2-Pin do., Wall Plug and Base, 5 amp., 10d.

**MARCONI AERIAL ADJUSTERS,** 30 to 300 Microhenrys, 4/6.

Heavy Rubber Insulated Lead-in Wire, copper strand coil, 2/- doz. yards. 3/22 V.I.R. Cable, 50 ft. coils, 1/-. Silk Flex, 1/6 doz. yards.

**50 PETROL-ELECTRIC GENERATING SETS.** Air Force Portable, 1 kw. 50/70 volts 20 amps., from £20. 150 Electric Bench and Portable, 110 and 220 v. Drills, from £3 10s. Electric Hand blowers, 220 v., 17/6. Immersion Heaters, 110 and 250 v., 3/6. Electric Saucepans, 5/- 12 v. Carbuuretor Heaters, 2/6.

**RECEIVERS.** New R.A.F. Aircraft 3-Valve semi-portable. 1 Det., 2 L.F., 3 anti-ping Holders, Remote Control, Variable Condensers, and Rheostat. All tested on Broadcast, 27/6. R.A.F. 5-valve ditto, with Valves, £4. Or fitted in polished Mahogany Cabinet with S.M. Dials, £6 10s. Burndept 6-valve Super-Het. with valves and 2 frame aerials. New and O.K., £18 10s. List £45. 3-valve L.F. Amplifiers, 30/- Twin Loud Speaker Wire, per 100 yds., 3/- 2-Pin Wall Plugs and Sockets, 10d. Remote Tuning Controls, fitted 2 varia. condensers and rheo., 2/- each.

**ELECTRIC POCKET TORCHES** with new "Ever-Ready" Battery, 2/6. Hand Lanterns, ditto, 4/6. Airship Safety Lamps, 2 volts., 7/6. 25 volts Candle Lamps, 6d. each. Radiator 250 watt 110 volt Lamps for Charging, 2/6.

**ELECTRIC BELLS.** G.P.O. Circular, 2/- Outdoor, 1/6. Sounders, 10/-. Ironclad Bells, 5/-. Pushes, 6d.; Multiple Pushes, 2/6; A.C. Bell Transformers, 12/6.

**SWITCHGEAR.** Every description of radio and electric power switch and fuse gear at lowest prices: 6-way switch boxes by Lucas, 3/6; 2-pin wall plug and base, 250 v., 10d.; 10 amp. porcelain switch fuses, with base and handle, 12 pair: small 250 v. 3 amp. porcelain fuses, 3d.; twin bell wire, 1/8 per 50 yard run; 1-18 V.I.R. cable, 5/6 per 100 yds.; test thermometers, 1/6; petrol gravity testers, 2/6; battery acid testers, 1/6; Morse recorders, minus ink-well and wood base, make fine auto units for home-made picture machines, 35/-.

Final Edition of our Surplus Bargains in Radio and Electrical Goods ready. Send stamped addressed envelope. SAVES RADIO USERS POUNDS.

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

Blackfriars Stn., Underground Rly. City 0191.

## THE P.W. "HOLIDAY" TWO.

(Continued from previous page.)

be usefully employed if oak is not procurable, but constructors are advised to see that it is well seasoned and straight-grained.

A complete list of the pieces of wood required, together with the necessary screws, hinges, handle, etc., accompanies this article, and it should be understood that the dimensions given are for the finished boards.

### Forming the Framework.

Construction is best commenced by marking with a pencil on the top and bottom boards C and D, the thicknesses of the side pieces A and B, so that the positions of the  $\frac{3}{8}$ -in. countersunk screws may be determined, the screws occupying the centre of the space between the edge of the boards and the pencil lines.

The boards may now be screwed together, and should the screws tend to become very tight in the wood, drill into the thickness of the wood to about a quarter of the depth of the screws, to assist their passage. The reason is that unless care is taken, the heads of the screws might break off owing to the force required to screw them into the hard wood.

Now clean up the edges of the "box," planing and sandpapering where required. Carefully mark the position of the bottom edges of the baseboard of the set on the inside surfaces of A and B and screw the wood fillets K and L in position with the  $\frac{3}{8}$ -in. countersunk screws.

Insert the set to ensure a good fit, and if O.K., screw in position the cross wood piece J in the position indicated on the diagram, afterwards fitting the small strip of plywood I, the top edge of the latter being "flush" with the top surface of J.

### Attaching the Fittings.

Mark the positions of the hinges on each edge as shown in the diagram, about 1 in. from each side, and countersink the wood so that the hinges, when closed, make a "flush" fit with the edges of the top and bottom boards.

Use the  $\frac{1}{2}$ -in. No. 1 countersunk screws for the hinges, and if they project from the front surfaces of the doors their points can be filed off. Three-sixteenth-inch screws are preferable, if procurable.

When the three doors are fitted and make a good fit with the fixed pieces of plywood I and H, then they may be finally cleaned up with sandpaper to lie parallel with the outside surfaces of the cabinet, though they must not be removed during the process, as alignment will be lost.

The cabinet can now be stained and when dry, polished, but whatever stain is employed, use one made with spirit which does not cause the wood to swell and become rough. To complete the assembly, the various fittings can be added, and these include a leather handle (obtainable from various trunk and case stores), four small rubber feet to fit the bottom of the cabinet, and three (or six) brass catches for the three doors.

Two holes about  $\frac{3}{8}$ -in. diameter can be drilled through the strip of wood J, to its right, to pass the 'phone leads through, so that the latter may be left permanently in position, without affecting the actions of the doors F and G.



## Burndept radio receivers

### THE LITTLE CELLS THAT SATISFY

Leyton Primary H.T. Battery, P1 Porous Pot Cells S1 & S2 Sac Cells. All complete for assembly

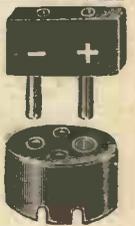
1-cell.	6-cell.	12-cell.	30-cell.
P1 6d.	3/3	5/9	14/-
S1 6d.	3/-	5/3	12/-

"Easeful" Filter, 1 pint 1/-, pint 1/6. Post Free 3d. ex. Send 1/2 stamp for booklet giving full particulars to

**THE LEYTON BATTERY CO.,**  
305, CHURCH ROAD, LEYTON, E.10

## "RED DIAMOND" WALL PLUG No. RD 29

Solid Ebonite. Highly Finished. Perfect Insulation. Two size plugs and sockets so that it is impossible to insert plugs in reverse. Or by insured post 2/3.



Of all high-class Radio Dealers, or Sole Makers:

**JEWEL PEN CO., LTD.,**  
Radio Dept. 46,  
21/2, Great Sutton St., London, E.C.1



5/6	<b>CABINETS</b>	7/6
	<p>American, 16 1/2 x 7 1/2 x 11; oval front, size 10 1/2 x 6 1/2 optional. Slot for leads, warp proof lid, usually 16/-. Facelboard 6d. extra. Limited number, cannot repeat. A few portables, polished mahogany colour, 16 1/2 x 16 1/2 body, 5 1/2 lid, 2" inside frame and fret complete, fitted 2 lever plated lock, £1. Carriage paid. G.O.D. F. W. RAMSBY, 63, Shaftesbury St., London, N.1. Clerk: 2159</p>	
UN-POLISHED WHITE-WOOD		HAND POLISHED MAHOGANY COLOUR

## COSSOR CONVERSION KIT MODERNISE YOUR 1927 MELODY MAKER IN AN EVENING

**5!** DOWN

Secures an official conversion kit in sealed carton as advertised by Messrs. A. C. Cossor, Ltd. Balance in 8 monthly payments of 7/2. Everything radio on Easy Terms. Write for list "B."

**The New Times Sales Co.**  
56, Ludgate Hill, London, E.C.4

PLEASE be sure to mention "POPULAR WIRELESS" when communicating with Advertisers. THANKS!

WHEN the pentode valve first came on the market it was often stated it would enable us to get as much amplification from a single stage as from two ordinary ones. Actual experience with the valve soon showed us that this had been a rather optimistic estimate; but, all the same, a single-stage pentode amplifier is a decidedly useful instrument.

It gives an amount of amplification quite sufficient to lift good headphone strength signals up to loud-speaker volume. Consequently it makes a very simple and compact unit for adding to a small set in order to obtain loud-speaking, and is very handy in general experimental work for that reason.

**The Cost Question.**

Such an amplifier is not necessarily much cheaper than the conventional two-stage type, a fact of which the reader must in fairness be warned. The reason is, of course, that the valve itself is at present rather expensive, and it requires a special output transformer.

There is usually only a small advantage in cost in favour of the pentode unit, but, of course, there is a saving in filament current. H.T. consumption is usually about the same, because the first valve of a two-stage amplifier generally takes very little, while the pentode is a rather greedy valve.

The great attraction of a pentode amplifier seems rather to be a matter of the fascination of a single L.F. stage with such extraordinary capabilities. Even when one is quite familiar with the pentode and its powers, it remains extremely impressive, and there is, too, the solid advantage of neatness and compactness.

There are several special points requiring attention in a pentode unit if the valve is to be used to the best advantage, so we propose to go through the design which forms this week's "White Print" in some detail.

**Where to Use It.**

First of all as to its general uses. It is meant to follow immediately after a valve or crystal detector, and it is not advised that you should try and work it on the end of a set already incorporating one L.F. stage.

The reason for this latter recommendation is simply that the output from such a set is almost always too strong to apply to a pentode. Since it is so strong, all that would really be needed is an ordinary extra L.F. stage.

A pentode would give far more magnification than is necessary to bring

**THE "P.W." "WHITE PRINTS."**  
A UNIQUE SERVICE FOR OUR READERS.

White Print No. 17 :: :: :: A Pentode Amplifier.

This week we publish the seventeenth of our White Prints. This page may be easily and safely torn out—along the dotted line overleaf—and the "White Print" filed. In due course you will thus have available an encyclopaedic collection of the best circuits used in modern radio practice. A "White Print" will be published on the last page every week in "P.W." until further notice.—THE EDITOR.

the signals up to full speaker strength, and would be over-loaded by the strong input, unless a volume control were in use all the time, in which case there would be no point in providing the pentode.

This question of strength of input is a very important one with the pentode, since this valve is rather easily over-loaded. It must be remembered that it gives a very powerful output by virtue of its very high amplification, even when

to the detector which precedes it by a transformer, since we are aiming at the highest possible magnification from our single stage. Next, you will probably observe a fuse in a rather unconventional position.

This device is connected in series with the lead to the "priming grid" of the pentode, and is intended to prevent damage to the H.T. battery if an internal short takes place in the valve.

A volume control is indicated in the design, and this is rather a convenience with the pentode, although not essential (other methods, such as de-tuning, can generally be used). It consists of just the usual high-resistance potentiometer, of any resistance from  $\frac{1}{2}$  to 2 megohms.

Now about the output transformer. This is a rather important point, since without it a pentode makes many types of loud speaker sound somewhat shrill.

**Excellent Quality.**

With it the quality can be extremely good, given proper attention to grid bias and H.T. Several of these special pentode output transformers are now on the market, and, as a rule, there is a scheme for getting various ratios and suiting different loud speakers, so you should be guided by the instruction slip.

With the one illustrated, for example (the Marconiphone "Universal" output model), there are three terminals on the primary side, and for use with a pentode you should connect up to the two outer ones (P<sub>1</sub> and P<sub>2</sub>). On the secondary are three more terminals, and with these you can get three different sizes of secondary. You should therefore try connecting the flex leads from the output terminals on the panel to S<sub>1</sub> and S<sub>2</sub>, to S<sub>1</sub> and S<sub>3</sub>, and to S<sub>2</sub> and S<sub>3</sub> until you find the best arrangement for your own particular loud speaker.

Two H.T. positives are provided, H.T. + 2 being the true anode of the valve

(100 to 150 volts) and H.T. + 1 the "priming" electrode (terminal on base of valve). This requires the same H.T. as the plate, and a separate terminal is provided for use with mains units. With batteries the two positives can be joined together, but with mains H.T. it helps to prevent motor-boating if they are run from separate taps on the uni-

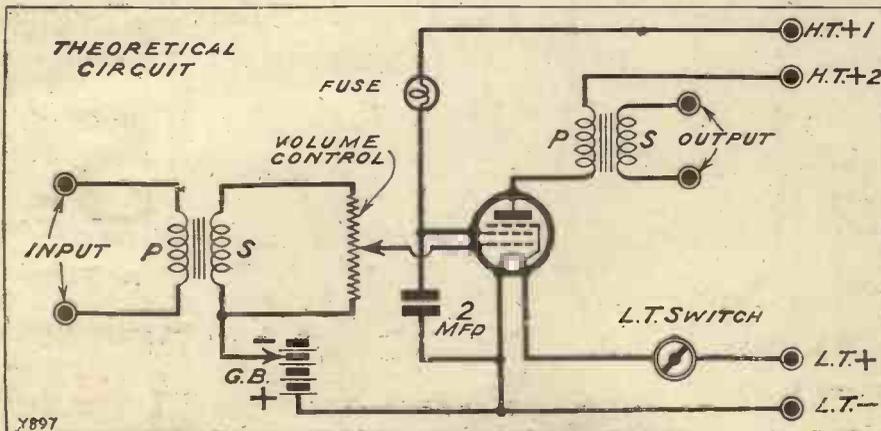
**COMPONENTS.**

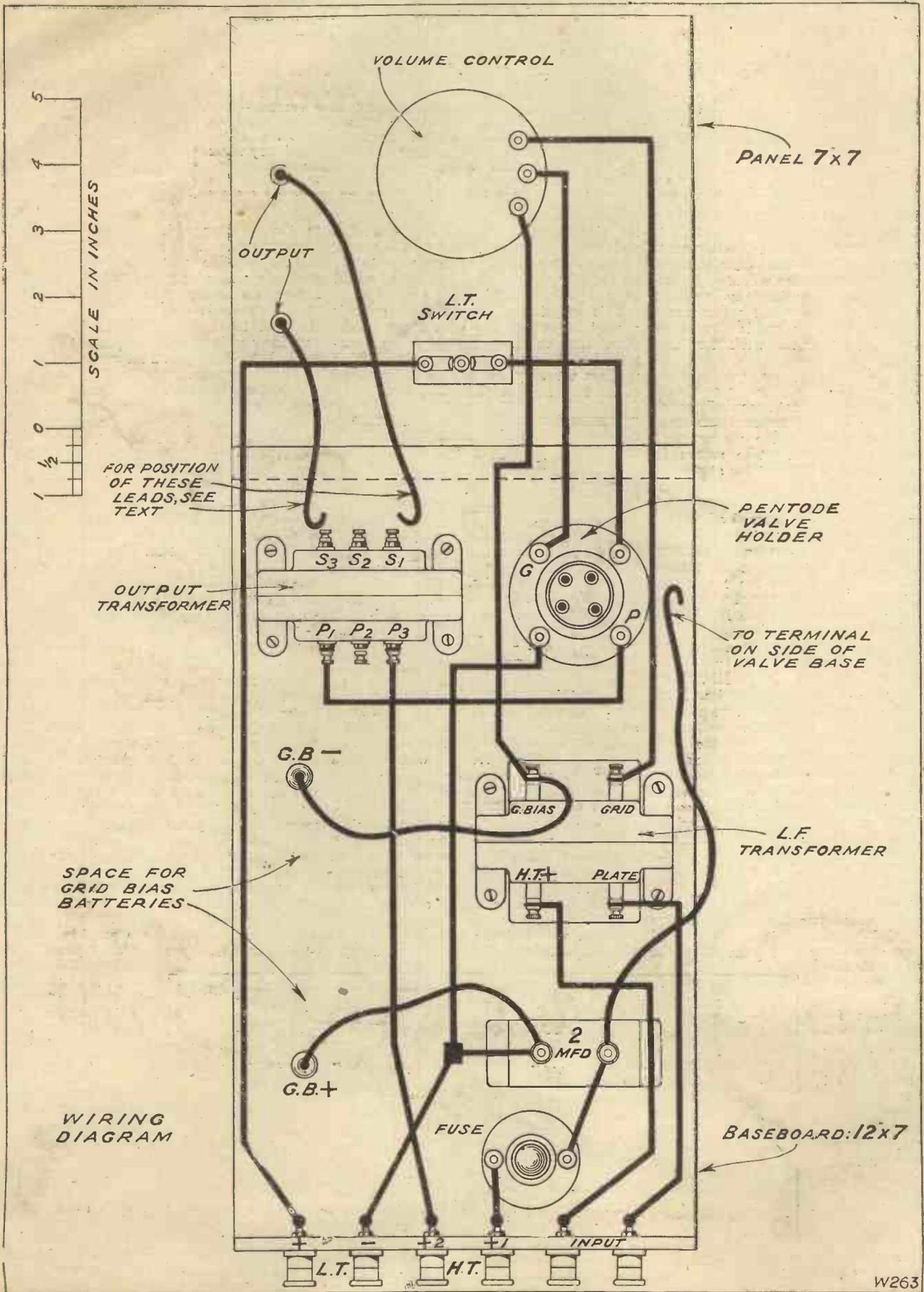
- 1 Panel, 7 in. x 7 in. x  $\frac{1}{8}$  in. or  $\frac{3}{16}$  in.
- 1 Cabinet to fit and baseboard 10 in. deep.
- 1 Low ratio L.F. transformer.
- 1 Volume control (see text).
- 1 Pentode output transformer.
- 1 2-mfd. condenser.
- 1 H.T. fuse.
- 1 Sprung valve holder.
- 1 L.T. switch.
- 1 Terminal strip, 7 in. x 2 in. x  $\frac{1}{8}$  in.
- 8 Terminals.
- Wire, screws, flex, G.B. plugs, etc.

the input is quite small; but it will not take a strong input. It will give as large an undistorted output as quite a good-sized super-power valve, but to get this you only need to feed it with quite a moderate input.

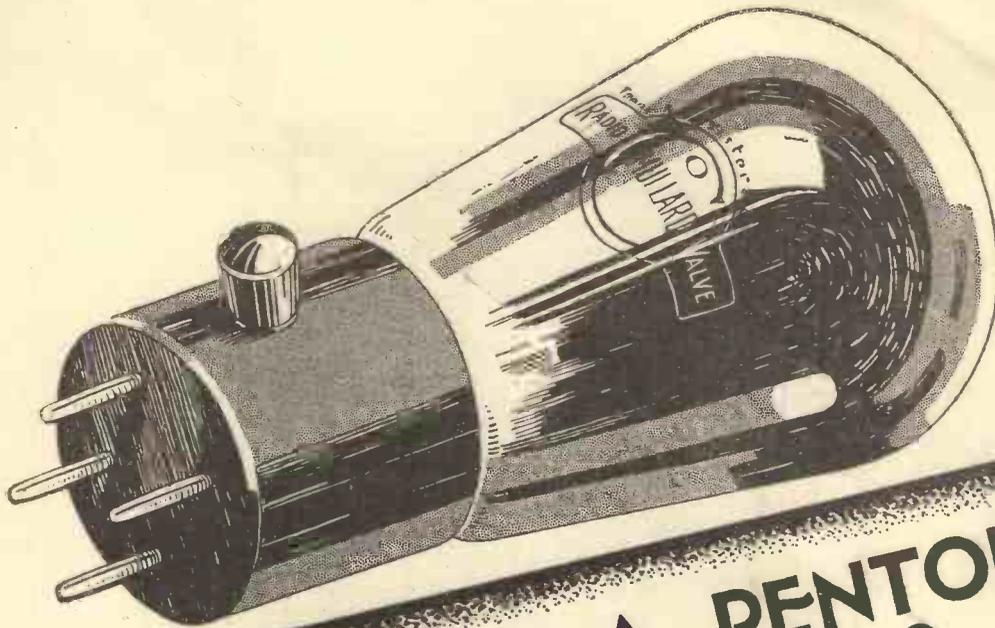
**Beware of Overloading.**

If you try to give it more bad quality is pretty sure to result from over-loading. This does not often happen when the pentode follows straight after a detector valve, but even then the point just requires watching, especially if you are very near to the local. It is quite obvious, then, that it is not wise in the ordinary way to try to use a pentode after an ordinary L.F. stage.





CUT ALONG THIS DOTTED LINE



## WHEN IS A PENTODE A PENTONE ?

You might think that there is only a difference of name between a Pentode valve and a Pentone. Actually there is all the difference in the world, for the Pentone is a perfected valve, made only by Mullard, with the whole Mullard tradition and reputation behind it.

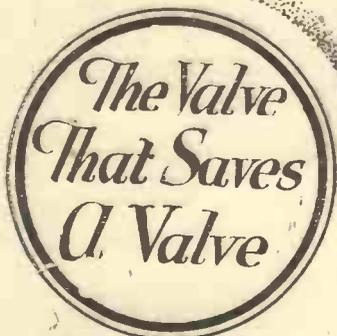
Theory and practise are one in the Mullard Pentone: its use in the output stage of a receiver results in an increase in volume equal to that obtained by adding a further stage of L.F. amplification employing a super-power valve.

Incidentally we didn't call it the Pentone just to be different, but because of its superior performance. After all a valve that is in a class by itself does deserve a name of its own.

N.B. The Mullard Pentone is no snob, but for the very best results it prefers to work hand in hand with its Mullard P.M. brothers.

# Mullard

THE · MASTER · VALVE



# Up-to-date Transformers for Up-to-date Sets



Bi-duplex L.F. Intervalve Transformer. 27/6



Universal Power Transformer. £2 : 7 : 6



H.T. Metal Rectifier Transformer. £1 : 8 : 6

No firm in this country is better equipped to produce really efficient up-to-date Transformers than R.I. & Varley. Years of research have enabled us to perfect these famous components, and to give you the advantages of every modern development of radio science.

Whether it be for Eliminators, where efficient, reliable transformers are required to stand up to the heavy strains imposed, or for ordinary L.F. Intervalve Coupling, R.I. & Varley Transformers are unsurpassed.

You have only to turn up the pages of the leading wireless publications of the day to see the extent to which our components are used. Rarely indeed does a Star circuit appear on the market which does not include one of these famous products—the success of the G.P. Transformer in the original Mullard Master 3 was one of the big radio achievements of last year.

*The range of Transformers illustrated here does not include all types manufactured by us, but full particulars of these will be found in Sections D and E of our Catalogue (free on application).*



General Purpose Transformer 15/-



Double Ratio Push-Pull Output Transformer. £1 : 3 : 6 (Royalty 1/6)



4-Terminal Straight Line Transformer. 22/6



Heavy Duty Power Transformer. £3 : 10 : 0



**THE MARK OF BETTER RADIO**

Kingsway House, 103, Kingsway, London, W.C.2. Telephone: Holborn, 5303.