

FAMOUS RADIO STARS AT HOME (See Page 485)

Popular Wireless

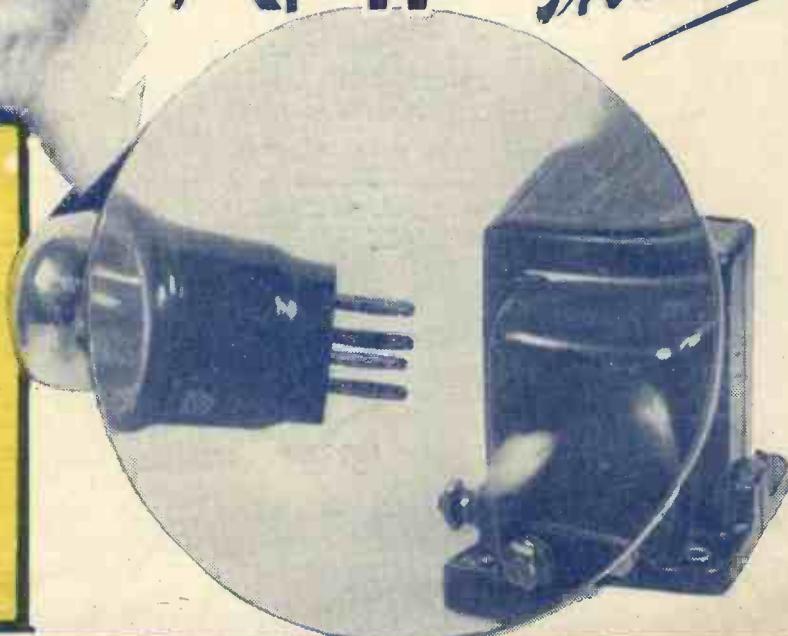
No. 441. Vol. XVIII.

INCORPORATING "WIRELESS"

November 15th, 1930.

Every Thursday
PRICE
3d.

FULL DETAILS OF THE
"NEW COIL"
TWO
AND THE
P.W. MONO-
AMP" *Inside*



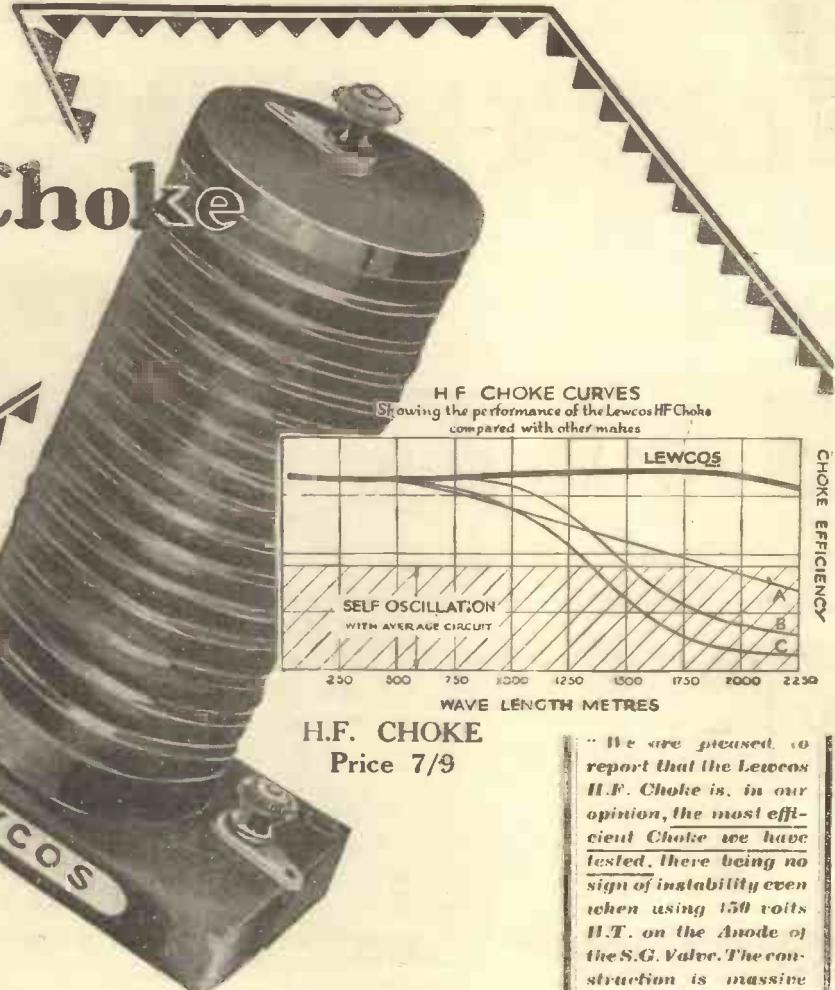
FURTHER SPECIAL FEATURES

CONCERNING
VALVE AMPLIFIERS
By Capt. P. P. Eckersley, M.I.E.E.

DOWN
AMONG THE TUBAS
By G. V. Dowding, Associate I.E.E.

HANDS OFF
THE LICENCE MONEY

"The Most Efficient Choke We Have Tested"



The above letter is a further appreciation of the unique qualities of the Lewcos H.F. Choke. The fine materials and high-class workmanship used in its manufacture 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.

The H.F. Choke curves illustrated above show the astonishing performance and advantages of the Lewcos Choke over other makes.

Full particulars of the Choke Ref. R.39, will be sent on request.

THE H.F. CHOKE IS SPECIFIED FOR THE
"NEW COIL" TWO RECEIVER DESCRIBED
IN THIS ISSUE.

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RADIO PRODUCTS FOR BETTER
RECEPTION

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

"We are pleased to report that the Lewcos H.F. Choke is, in our opinion, the most efficient Choke we have tested, there being no sign of instability even when using 150 volts H.T. on the Anode of the S.G. Valve. The construction is massive and well-finished, and its design places it in the front rank of high-class components."

An appreciation from Industrial Progress (International), Ltd., Bristol

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CARDIFF
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MANCHESTER
NOTTINGHAM

have you met the **P.M.14**



Have you met the Mullard Screened Grid Valve. It amplifies the signals transmitted from the radio station before they are rectified by the detector. The magnifying power of the Screened Grid Valve is so great that the original signals, weakened by travelling great distances from the transmitter, are enormously amplified before they are passed on to the detector valve. The design of the Mullard Screened Grid Valve is such that its internal capacity is almost negligible—a fact that ensures stable and efficient high frequency amplification.

CHARACTERISTICS OF THE P.M.14.

Max. Filament Voltage 4.0 Filament Current (amps.) 0.075

Max. Anode Voltage - 150 Positive Screen Voltage - 75

★Anode Impedance (ohms) 230,000 ★Amplification Factor 200

★Mutual Conductance 0.87

★At anode volts 100 ; Screen Volts 75 ; Grid Volts Zero.

2-volt : P.M.12. 4-volt : P.M.14. 6-volt : P.M.16.

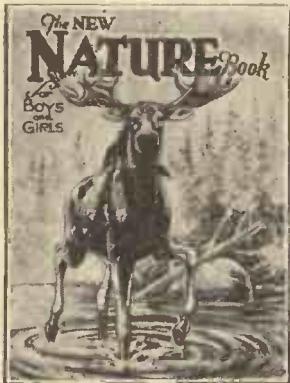
PRICE 20/- each.

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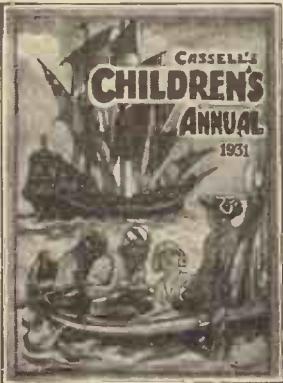
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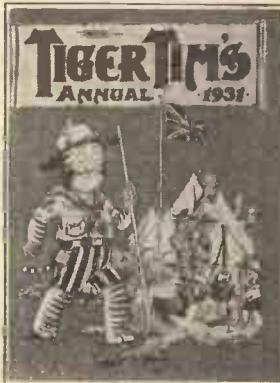
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If you want a present that cannot fail to please any boy or girl, you cannot do better than to choose one of these famous Annuals. They are packed with the jolliest stories and pictures, and in addition to beautiful coloured plates most of them contain pages printed in colour. These books are strongly bound in brightly-coloured covers and are cheaper than the average toy and more durable. Books are the best gifts—easy to pack—cheap to post—and certain to please. Your newsagent or bookseller will be pleased to show you these famous Annuals.



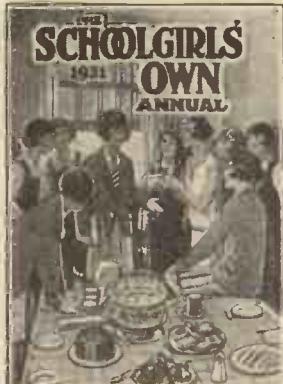
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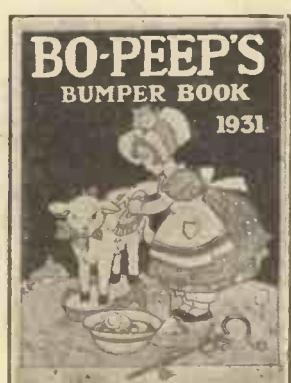


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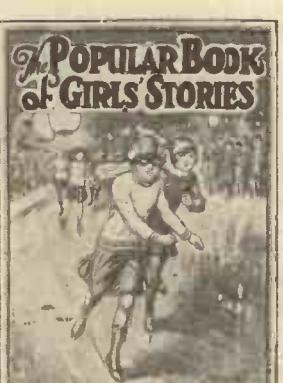


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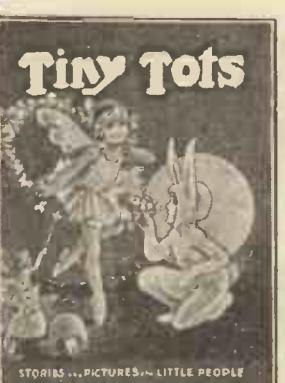
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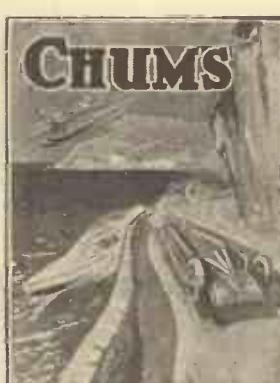
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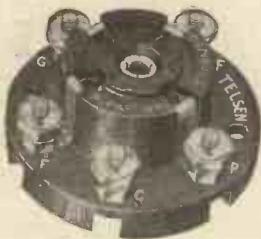
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for the 1931 SET

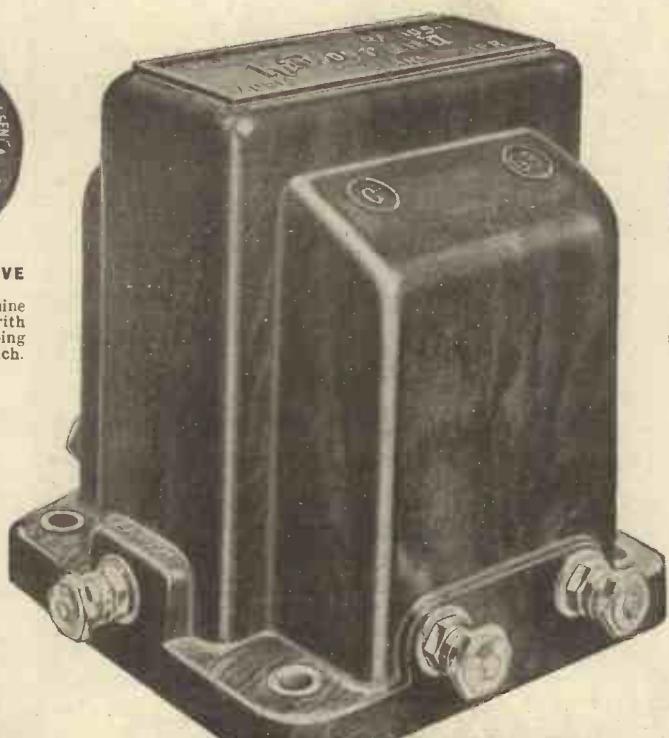
**incorporate components giving
100% unfailing efficiency throughout their long life**

The last word in modern radio is—TELSEN! Why build your set of out-of-date components when TELSEN, up-to-the-minute in design and of superlative quality throughout, are far more efficient for every purpose?



TELSEN FIVE-PIN VALVE HOLDER.

Pro. Pat. No. 20286/30. Genuine Bakelite Mouldings fitted with Nickel-Silver shock-absorbing contacts. Price 1/3 each.



TELSEN "RADIOPRINT" TRANSFORMER.
New Model, shrouded in Genuine Bakelite, with new windings and core, fitted with earth terminal. Made in ratios 3-1 and 5-1. Price 12/6 each.

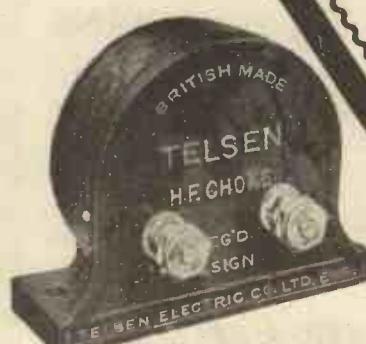
TELSEN "ACE" TRANSFORMER.
The ideal model for all Portable Sets and where space is limited. Made in ratios 3-1 and 5-1. Price 8/6 each.

TELSEN 7-1 SUPER RATIO "RADIOPRINT" TRANSFORMER.

Giving enormous amplification with perfect reproduction, shrouded in Genuine Bakelite with new windings and core, fitted with earth terminal. Price 17/6 each.



TELSEN VALVE HOLDERS.
Low capacity, self-locating, supplied with patent soldering tags and hexagon terminal nuts. Price 1/- each.



TELSEN H.F. CHOKE.

Designed to cover the whole wave-band range, from 18 to 4,000 metres. Extremely low self-capacity, shrouded in Genuine Bakelite. Inductance 150,000 microhenries, resistance 400 ohms. Price 2/6 each.



TELSEN FIXED (MICA) CONDENSERS.
Shrouded in genuine Bakelite, made in capacities up to .002 u.F. Pro. Pat. No. 20287/30. .0003 supplied complete with Patent Grid Leak Clips to facilitate series or parallel connection. Can be mounted upright or flat. Tested on 500 volts. Price 1/- each.

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Don't miss your chance of getting this

GREAT GIFT BOOK

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 Etc., etc.,
 etc.



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WITH THE
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OF THE
**WIRELESS
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OUT NOV. 15th.

SIXPENCE

USUAL PRICE

The man who likes to "make his own" will find this book

PACKED WITH FACTS!

It is Unique,
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HOW TO BUILD:
 THE "STABILISER"
 THE "SIMPLICITY" CONE
 A SHORT-WAVE ADAPTOR
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 Etc., etc., etc.

Take your H.T. L.T. and G.B. from the electric light with an “EKCO” ‘BUILD-IN’ ALL-POWER UNIT

**“EKCO” MODEL ACV.
(For A.C. Valves)**

A compact Unit which, when built in as a component part of the receiver, makes it All-Electric.

SPECIFICATION:

OUTPUT: L.T.: (Raw A.C.)
4 Volts at from 2 to 4 amperes for Indirectly heated valves.

6 Volts at .25 to 1 ampere for Directly heated power valves.

H.T.: (Smoothed).

150 Volts at 30 milliamperes.

80 Volts for screened grid valves .5 to 1.5 mA.

G.B. 1½, 3, 6, 9 and 15 Volts.

Westinghouse Metal Rectification is utilised on the voltage doubling principle. L.T. windings are connected to common centre tapping, and facilities are provided for using a potentiometer if necessary. Size 9½" x 7½" x 4½".

Price £6 or by Easy Payments.

“EKCO” CONTROL UNIT.

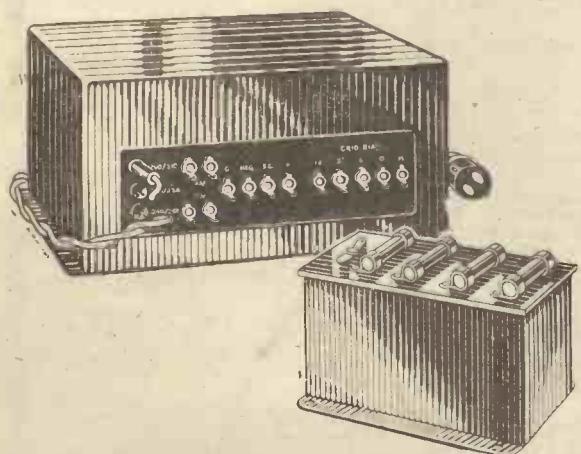
A standard auxiliary to the Model ACV. embodying all resistances and condensers to give two lower values of H.T.—approximately 120 volts and 80 volts—and two G.B. tappings. Size 4½" x 2½" x 2½".

Price £1 : 5 : 0

Here is the ideal All-Power Unit for set constructors. It is complete in itself and supplies H.T., L.T. and G.B. for A.C. Valves. There is no need for you to experience any difficulties in the construction or performance of an all-mains set. Having built the receiver, just connect the “EKCO” All-Power Unit and PLUG IN—THAT’S ALL. When you want to alter your receiver or build a new one there is no need to worry about the power supply portion—just transfer the “EKCO” Unit to the new set. Or, you can bring your present set right up-to-date and increase its sensitivity, volume and all-round performance by changing to A.C. Valves and using an “EKCO” Build-In All-Power Unit in place of the batteries and accumulator.

Save Time, Trouble, Worry and Money and enjoy better radio. See your dealer now or send for illustrated “EKCO” literature on Units of all types, Sets and Speakers and TERMS OF EASY PAYMENTS.

E. K. Cole Ltd., Dept. A, “Ekco” Works,
Southend-on-Sea.

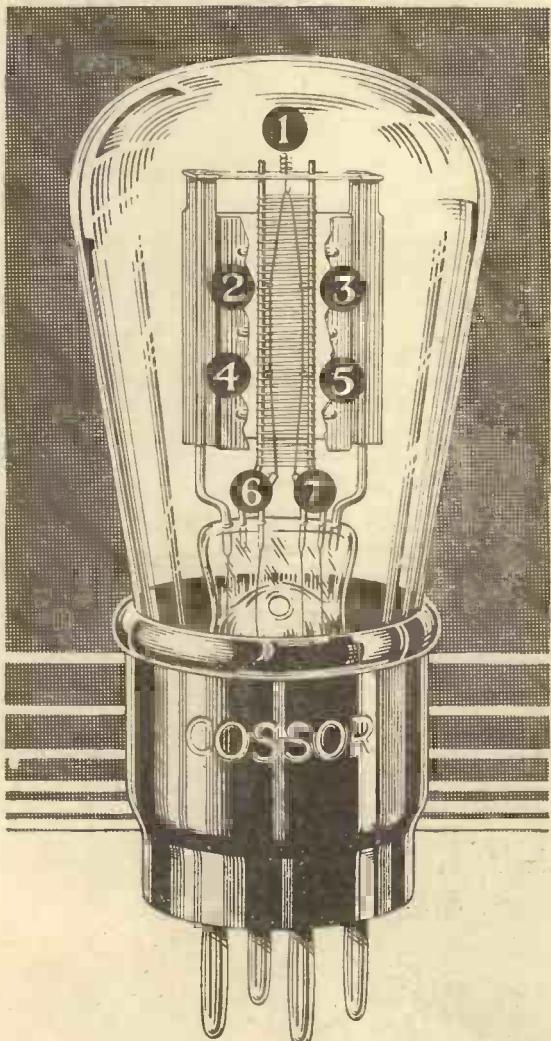


Have you heard the “EKCO” 2-valve and 3-valve All-Electric Receivers—the 1931 Radio Sensations? Ask your dealer to demonstrate. Prices: 2-valve £14 : 10 : 0. 3-valve £22 : 10 : 0 or by Easy Payments spread over TWO years.



POWER SUPPLY UNITS **Plug in-That's all!**

Seven point suspension definitely prevents microphonic noises



Cossor 210 DET., 2 volts, .1 amp.
Impedance 13,000. Amplification Factor 15. Mutual Conductance 1.15 m.a./v.
Normal working Anode Voltage 90-150. Price **8/6**

*—by eliminating
filament vibration*

Microphonic noises in a Receiving Set are usually traceable to the Detector Valve. Nine times out of ten the cause is filament vibration. Look at the illustration alongside. This shows the internal construction of the new Cossor Detector Valve. See how the filament is held—not only top and bottom—but also by four insulated hooks spaced at intervals throughout its length. The purpose of these hooks is to damp out any tendency for filament vibration. Therefore by using this "steep slope" Cossor Detector Valve in your Receiver the possibility of microphonic noises is definitely eliminated and you are assured of greater volume with absolute tonal purity.

We have just issued a novel circular Station Chart which gives identification details of nearly 50 stations, and space is provided for entering your own dial readings. Price 2d. each, they are obtainable from any Wireless Shop. In case of difficulty write us, enclose 2d. stamp and head your letter "Station Chart P.W."

**THE NEW
COSSOR
DETECTOR VALVE**

DEFINITELY FREE FROM MICROPHONIC NOISES
A. C. Cossor Ltd., Highbury Grove, London, N.5.

Popular Wireless

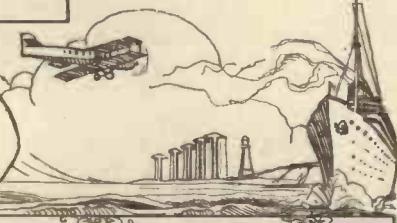
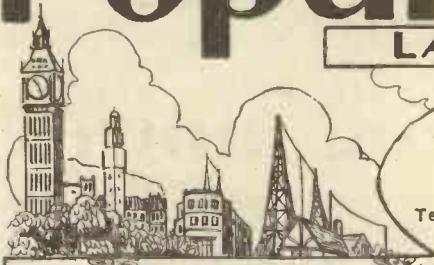
LARGEST NET SALES

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Sir OLIVER LODGE, F.R.S.

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THE PLAIN VAN.
A NEW AERIAL.
FOR THE DEAF.
MARS AGAIN!

RADIO NOTES & NEWS

"In a Plain Van."

SPEAKING as a householder I should say that the trend of radio is fast becoming Sheraton! The project of a new domestic receiver has given rise to all manner of doubts and discussions, most of them fairly wide of the mark. "How will the shape of it hit it off with the angle which the whatnot makes with the fender?" "How will the colour of the wood harmonise with the lino and paint?" More and more ornate grow the "consoles" year by year; less and less is said about the set. The drawing-room suites will before long consist of settee, chairs and radio cabinet; the valves will be in pink or blue-frosted glass!

"E.L.; H. and C.; Screened Grids."

THAT is another glimpse into the future—an extract from a house-agents' advertisement. Radio may be diverted from the cabinet-maker and handed over to the builder, who will leave recesses and holes in the walls and ceilings, bury wires, sink "earth"-plates, provide aerials and poles and, if business is tight, throw in the set, the licence and a twelve months' "service" guarantee! And not long after that, the then existing generation will wonder how we managed to live without listening; as I often wonder how humanity could live without smoking tobacco.

New Type of Aerial.

FROM American sources I learn that a new type of aerial is planned for the WABC transmitter (50 kw.) which the Columbia Broadcasting System is to

build at Wayne Township, N.J. There will be a 700-ft. steel tower, and the aerial wire will hang down inside its lattice-work. (Query: Won't the mast "screen" the aerial?) Of course, a vertical aerial is no novelty, but I do not recall any instance of the use of such by a broadcasting station. The novelty consists mainly of putting the aerial wire inside a steel construction.

B.B.C.'s BUILDING BEATEN BY BERLIN?



While the B.B.C. is going ahead with a big building in Portland Place, London, W., to replace the Savoy Hill headquarters, the Berlin radio authorities have finished their move to larger premises. Shaped like the bows of a ship, the building has the necessary office and studio room, a museum and extensive research laboratories. The photograph above was taken from the top of the Berlin Radio Tower.

Society Note.

THE Hon. Sec. of the Golders Green and Hendon Radio Society informs me that the Society has moved its headquarters to Woodstock School, Golders Green Road, where its meetings will be held on the second and fourth Thursday of each month, at 8.15 p.m. The season's programme includes visits to Brookmans Park, the National Physical Laboratory, Croydon Air Port, and the Gramophone Co.'s factory at Hayes, and a series of dances will be held, the first of which is to take

place on Nov. 21st. A few vacancies for membership exist, for which application should be made to the Hon. Sec. of the Society, 60, Pattison Road, N.W.2.

In Memoriam.

IN passing I should like to record with regret the sudden and unexpected death last month of Mr. R. B. Weaver, aged 55, Manager of the G.E.C. Wireless Department. Mr.

Weaver must have been known to hundreds of people connected with radio, and he was undoubtedly an outstanding figure in "the trade," for which he did much useful work.

A Tip For the Deaf.

IHAVE hit upon a story about a New Yorker who went to visit an old man whom he found to be so deaf that he could not hear his radio set unless it were worked at a deafening volume. Giving the ancient a small card made of celluloid, the visitor bade him take it between his teeth, turn the set down to a normal output, and listen again.

The old man obeyed—and heard! Has anybody here tried this dodge—and is it effective?

N.B. It won't work if the teeth are artificial, so perhaps that's the "catch."

Mars Again!

SO attractive to certain Americans is the thought of communicating with other planets that they have actually formed the American Interplanetary Society. What does the Society do? Dream of shooting rockets to the moon or sending

(Continued on next page.)

RADIO NOTES AND NEWS

(Continued from previous page.)

motor-equipped balloons into space? In a recent lecture to them, a Mr. Clyde Fitch, described as a wireless expert, is reported to have said that it is "theoretically possible" to communicate with Mars or other planets by means of infra red light rays, which could pass through the Heaviside Layer.

Has Your Battery Asthma?

THE "Christian Science Monitor" tells of a new kind of dry battery, perfected by the National Carbon Company. This battery is provided with lungs, or porous patches through which it can take oxygen from the air when its own oxygen-producing contents begin to fail. It is claimed that this type of battery has a "life" of 1,000 hours on a 7-valve set. Hurrah! Let's have a couple! It is said that they deliver L.T. supply at 2 volts and work well on certain 2-volt low consumption valves. Now that my little son is learning physics, I find that my dry cells have wings!

The Dog and the Dance.

THIS is a true story. A friend told me that a few weeks ago he was sitting by the fire with his wife, listening-in. The dog lay between them on the hearthrug, fast asleep with his legs stretched stiffly out, as is his custom. Jack Payne's dance band was tuned in, when presently it was noticed that the dog was twitching his legs in unison with the rhythm of the music. The symptoms intensified and so violent did the jerks of the legs become that my friend had to wake up the dog. What is the explanation?

A Short-Wave Club.

NOW, listen, boys! We are informed that an International Short-Wave Radio League has been constituted, with headquarters in Boston, Mass., U.S.A. It is represented as a non-commercial project, formed solely for the help of radio S.W. enthusiasts. A European branch exists at Westminster Chambers, 106, Lord Street, Southport, England, to whom you should address your enquiries, if any. Membership costs about 4s. per annum, and entitles members to the League's official bulletin. "International Short-Wave News."

Powers Compared.

PHILIPS have been working out the total amount of electrical power used for broadcasting in various countries of Europe. I don't see that the result is much more than a curio, but here it is. Germany comes first, very *über alles*, with 535 kw., followed by England with 470 kw.—I presume they mean all the B.B.C.'s stations including 5 S.W. Next comes Russia, with the surprisingly modest total of 222 kilovitch watts, followed by Sweden, 120 kw. and Czecho-Slovakia, 107 kw. France has only 64 kw., but I do not think she need worry too much about that.

Canadian Statistics.

THE responsible department of the Canadian Government reports that the number of radio receiving licences issued during the year ending March 31st,

1930, was 424,164, which compares happily with the 296,756 issued during the previous year. Moreover, during the first five months of the current year they have issued 349,676, a fine increase. Other points of interest in the report are that 12,089 transmitting stations were licensed, including 81 private commercial broadcasting stations and 610 amateur experimental stations.

A Drilling Tip.

KEEP your eye on the Sergeant-Major's!" No, I was forgetting.

I mean drilling with a drill—not with a man-eater. Mr. S. A. W. (Manchester) kindly passes on his method of drilling a hole down a spindle for a condenser bearing, without tears, etc. His diagram shows that first of all he puts on the spindle

SHORT WAVES.

"Listening-in to Icebergs," says a headline. Many of us are familiar with those broadcasters!—*"Pictorial Weekly."*

BRITAIN CALLING.

"To encourage a 'Come to Britain' movement, 250 talks on British beauty spots are to be broadcast in U.S.A. this winter," we read in the "News Chronicle."

Two hundred and fifty talks! Well, that should certainly encourage a "Leave the U.S.A." movement, anyway.

ONE VIRTUE.

It has been suggested that physical culture exercises should be broadcast each morning. This would probably give us a little more strength to stand the evening programmes.

... Then there was the Scotsman who asked the safest method of running his valve set off the electric street lamp outside his house. . . . "Daily Mail."

"Galsworthy Play, 'Strike,' adapted for the Microphone," runs a headline in the "Manchester Evening Chronicle."

We should have thought the B.B.C. have had more than enough of that already.

Brown: "Scientists say that in a hundred years people will be able to pick up the wireless programmes which are being broadcast now. Do you think they will?"

Smith: "They might once."—"Humorist."

A correspondent writes to say that he has recently built a set with three transformer-coupled L.F. stages; it squeaks continuously, and nothing he can do seems to have any effect.

Having seen the P.O. direction-finding van referred to in a daily paper as "the mouse trap," he wonders if those officials would help him eliminate the trouble!

a nut, which he screws down just so far as to permit a second and locking nut to come up to it and then leave the to-be-drilled surface of the spindle well in sight. This arrangement assists one to guide the drill. Do you get the idea? Very difficult to translate a drawing into prose!

More From Manchester.

ANOTHER reader from the London of the provinces, to wit, J. K., first tries to mesmerise me with nice words about Notes and News (he wants 12 pages of 'em, Heaven forbid!) and then calmly drops his bludgeon in the form of the question whether the stream of electrons from a filament could be controlled at its source. He thinks that it could be done by coupling the aerial to the filament through chokes. Well, isn't that roughly Mr. Dowding's Filadynne scheme—one of the hottest circuits ever invented, but one handicapped owing to the fact that only one or two types of valves will work in it.

Popular Wireless, November 15th, 1930.

Component Makers, Please Note.

ALL the Manchester men seem to have attained a full head of steam this week! A. J. W. (same place again) puts forward a suggestion which I deem to be worthy of consideration by makers of parts. He has found, when using plug-in coils, that if the reaction coil is too close to the grid coil, reaction may be too strong; or that if it is too far away the full reaction effect is hard to obtain. He wants a single-coil holder with one pin and socket part on a swivel, instead of being forced to use a two-coil holder which is bulky and has other disadvantages. What does the "trade" think about this?

Another "Plain Van."

OH, my Taffies, what is this the B.B.C. tells me? That the Post Office D.F. Van has been sleuthing in the Cardiff region and having a perfectly carboniferous time! Come, read "P.W." and never oscillate again, there's good chaps! By the way, that van is as awesomely plain as "Black Maria"—like a baker's van before the sign-writer has done his job on it. It looks as though it did the outside work for a mortuary! Why, oh why, do British Government departments take such a gloomy view of life? The French would have had an attractive chariot and heavily-uniformed attendants; other European countries I could name would have turned out a comic opera van. But the G.P.O.—"Bring out your dead!"

Welcome to London.

ONE notes with satisfaction that Mr. Joseph Lewis, who held the post of Music Director at Birmingham for seven years, has been transplanted to Savoy Hill where, in addition to being one of the conductors of the B.B.C. Orchestra, he will have a good deal to do with the programme building on the musical side. Ha! (said he, rubbing his hands together) this will compensate somewhat for the loss of John Ansell! As Mr. Lewis was formerly assistant conductor of the City of Birmingham Orchestra under Adrian Boult, who is now the B.B.C.'s Music Director, London is in luck's way.

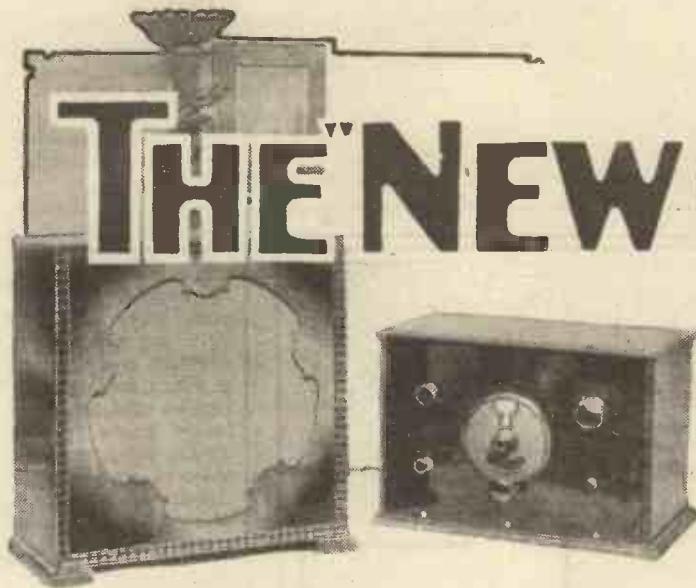
The U.I. de R.

THE Union Internationale de Radiodiffusion, which works at Geneva under the secretaryship of Mr. A. R. Burrows, the "Uncle Arthur" of yesterday, has recently concluded a Conference at Budapest. The two most interesting bits of news about all this is that the Union is doing its best to encourage international broadcasts during the coming winter, and is taking steps to facilitate the use abroad of tourists' receiving sets.

Applause Wanted.

I SEE that Leslie Henson complains that for the artiste "there is no satisfaction at all attached to broadcasting." Mm! Well, I'm not so sure: £ s. d. is fairly satisfactory stuff! And although we know that all great artistes live for their art alone (*sob*) we know also that a great many of them have to receive a lot of money to help them to live. Leslie thinks that a great blessing to broadcasters would be a "gadget which would record votes of success or failure." Alas! the thing is physically impossible.

ARIEL.



THE PARTS YOU NEED TO BUILD IT.

- 1 Panel, 12 in. x 7 or 8 in. (Red Seal, or Lissen, Goltone, Paxolin, etc.).
- 1 Cabinet, with baseboard 9 in. deep, to fit (Pickett, or Cameo, Osborn, Keystone, etc.).
- 1 .0005-mfd. variable condenser (Lotus, or Lissen, J.B., Igranic, Dubilier, Ready Radio, Formo, Polar, Ormond, etc.).
- 1 Slow-motion dial, if condenser not slow-motion type (Igranic, or Lissen, Ready Radio, J.B., Formo, etc.).
- 1 .00075 - mfd. "Brookmans" condenser (Ready Radio).
- 1 .0001-, .00013-, .00015-mfd. differential reaction condenser (J.B., or Lissen, Igranic, Ready Radio, Polar, Wearite, Lotus, Magnum, Parex, Ormond, Formo, etc.).
- 1 3-Contact Switch (Bulgin, or Red Diamond, Wearite, Ready Radio, Pioneer, Magnum, etc.).
- 1 L.T. switch (Junit, or Igranic, Lissen, Goltone, Lotus, Benjamin, Magnum, Bulgin, Wearite, Ready Radio, Red Diamond, Pioneer, etc.).
- 1 "P.W." Dual range coil (Wearite, or Magnum, Keystone, Ready Radio, Parex, Goltone, etc.).
- 1 .001-mfd. fixed condenser (T.C.C., or Dubilier, Lissen, Ediswan, Ready Radio, Ferranti, Mullard, Goltone, Igranic, etc.).
- 1 .0003-mfd. fixed condenser (Mullard, etc.).
- 1 2-meg leak and holder (Dubilier, or Ediswan, Lissen, Mullard, Ferranti, Igranic, etc.).
- 2 Sprung valve holders (Igranic, or W.B., Benjamin, Telsen, Lotus, Bulgin, Formo, Magnum, Wearite, Junit, Dario, etc.).
- 1 H.F. choke (R.I., or Telsen, Lewcos, Lissen, Lotus, Dubilier, Ready Radio, Keystone, Wearite, Parex, Magnum, Igranic, etc.).
- 1 L.F. transformer (Lissen, or Igranic Varley, Telsen, Ferranti, R.I., Mullard, Lewcos, Lotus, etc.).
- 9 Terminals (Eelex, or Igranic, Young and Lee, etc.).
- 1 Terminal strip, 12 in. x 2 in. (Keystone, or Paxolin, etc.).
- Flex, wire, plugs, screws, etc.

Using the new "P.W." wave-change coil device, this little set is capable of a wonderful performance. Surprising selectivity and staggering sensitivity enable you to get many distant stations on the loud speaker.

Designed and Described by the "P.W." RESEARCH AND CONSTRUCTION DEPT.

"WHEN you find a good thing, stick to it," may be a good enough motto in its way, but it doesn't appeal to the "P.W." Research Dept. Our idea is always to give away anything good as quickly as possible!

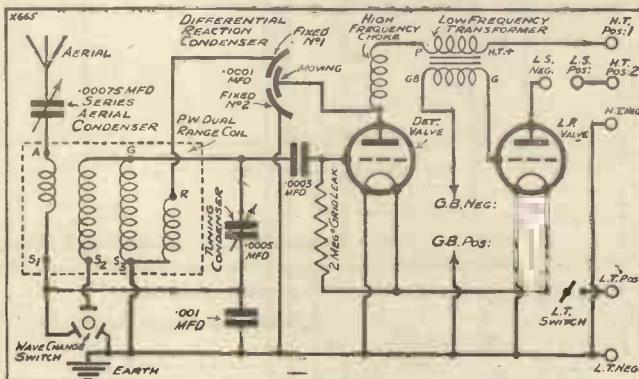
Our new high efficiency coil, for example. As fast as we work out a fresh use for it we embody it in a set design to suit, and pass it over to our readers. Even now we have not come to the end of its possible applications, and we've been working at them for nearly six months.

"Amazing"

That is one of the most fascinating things about the

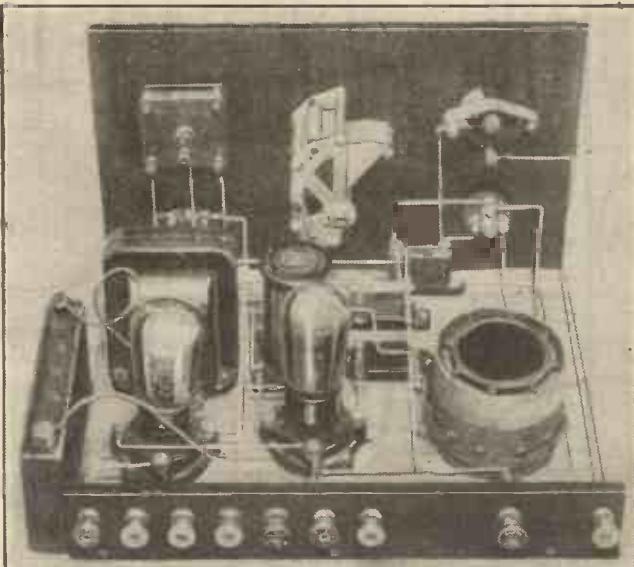
"P.W." dual-range coil unit. Not merely does it set a new standard of higher efficiency, but it has been so carefully worked out in its details that it can be applied to an amazing variety of different circuits.

IT SETS A HIGH STANDARD



The new "P.W." coil sets an entirely new standard in high efficiency, and enables wave-changing to be accomplished with no sacrifices in sensitivity.

AS NEAT AS IT IS NEW



The new coil also makes for neatness, and it simplifies construction, as a glance at the above photo reveals.

As a matter of fact it would be really difficult to pick out a circuit of modern type in which the coil could not be used! (What about a short-wave set, did somebody say? Have a heart! We are talking about broadcast circuits. Anyway, you wait and see what's coming out shortly in the way of a universal-wave set using the new coil!)

A Testimonial

You have already seen how nicely the coil lends itself to circuits of the "Contradyne" type, and that, in itself, is a fine testimonial to the unit, for the "Contradyne" had (Continued on next page.)

* THE "NEW-COIL" TWO.
(Continued from previous page.) *

not been thought of when the coil was designed.

This week we are presenting a design

which has been prepared specially to show how beautifully simple and easily built an ordinary standard set becomes when advantage is taken of the new coil.

"Most Pleasing to Handle"

For the purpose we have chosen the popular two-valve combination of detector

and one low-frequency stage. It doesn't sound very exciting put like that, perhaps, but with the aid of the new coil it becomes something pretty good, all the same.

Its general efficiency naturally goes up a lot, with a really substantial increase in selectivity and range, and it makes a thoroughly attractive little outfit in every way.

It is delightfully straightforward to assemble and wire, and it is most pleasing to handle. It gives you wave-change switching without the slightest complication of wiring, and with the highest efficiency; the losses many people used to think unavoidable in wave-change circuits are cut right down to vanishing point.

Versatility

On top of all that, it is a very economical set to build and run. Comparatively few parts are needed, and they are all of types you can be certain of using over and over again in future sets.

It begins to sound attractive, doesn't it?

A
TWO-VALVER
THAT IS
REALLY
SELECTIVE

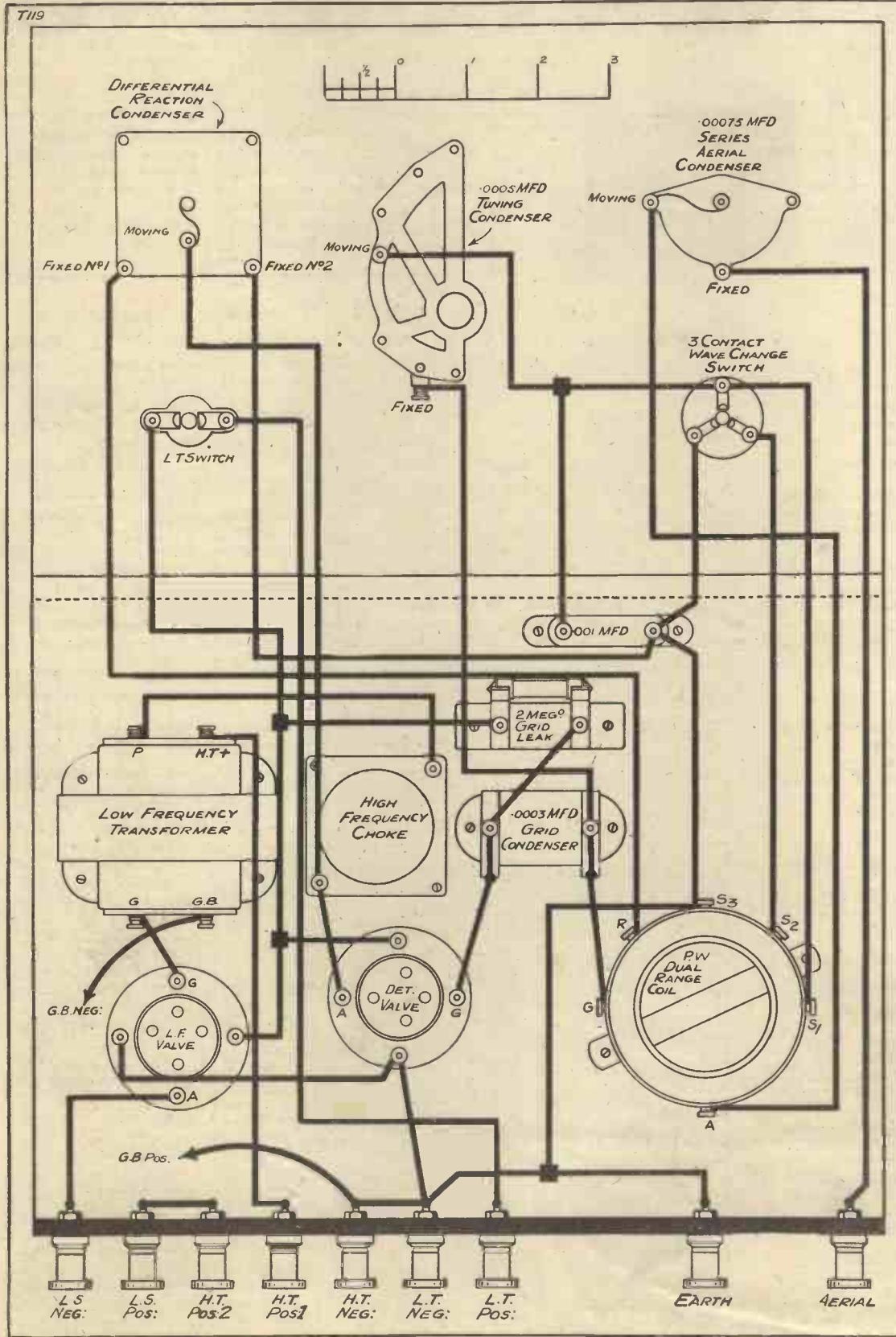
It will give very fine results, too, and even put quite a few foreigners on the loud speaker after dark so long as anything like a decent aerial is available. The local programme, of course, it will reproduce on the speaker with excellent volume and quality, without using reaction at all.

On Long Waves

Although we have spoken of it as a standard and simple type of set it has got quite a few nice little special features of its own. For example, it has a very handy and effective device for adjusting the selectivity, placed conveniently to hand on the panel.

It has a special form of aerial coupling on long waves, too, which has many

(Continued on next page.)



THE "NEW COIL" TWO.

(Continued from previous page.)

advantages. For one thing, it gives particularly good volume and selectivity (the set separates Radio Paris from 5 X X quite easily), and for another it greatly reduces the risk of interference from the local station on long waves.

This last is important. You will observe that we have not included the "Contradyne" device in the "New Coil" Two, because it is only needed with a set of this type when you are really close to the local station. The form of "Brookmans" coupling we have provided for long waves will prevent the trouble in all other situations.

Of course, if you want to use the set very near to a powerful local station and expect to have trouble from the local programme "breaking through" on long waves, the remedy is simple: Just add the "Contradyne" as a separate unit. (See POPULAR WIRELESS Nos. 434 and 438.)

The "Brookmans" Effect

Now suppose we run briefly over the circuit diagram, and see how this interesting little receiver is arranged. The general layout of the tuning and reaction circuits you will be able to follow out quite easily, for they are very simple. Note the way the windings on the dual-range coil unit which form the tuned circuit are switched in parallel for the lower wave-band, for much of the efficiency of the unit depends on this expedient.

These are the windings which are both joined at their upper ends to terminal "G," and go to S_2 and S_3 at their lower ends. The wave-change switch puts them in parallel when it is closed, and at the same time short-circuits the .001-mfd. fixed condenser.

This last provides the "Brookmans" aerial coupling effect, which of course is only wanted on long waves. Accordingly, it is cut out on low waves, where the necessary aerial coupling is given by the primary winding between terminals A and S_1 on the coil unit.

Easy Control of Selectivity

The selectivity control which we mentioned just now takes the form of a variable condenser of the inexpensive "solid dielectric" type in series in the aerial lead.

selectivity. By setting it to a comparatively small value and applying reaction judiciously you can get quite remarkable selectivity when required.

It is generally best, however, to keep it at rather larger settings if you can do so without getting too much interference from the local. Volume is usually best this way, and there is less need of an accurate setting of reaction to get sufficient strength.

The rest of the circuit is quite plain sailing, and you will note the differential reaction (now standardised for all "P.W." sets to which it can suitably be applied) and the transformer-coupled stage of L.F. amplification.

Since this is an eminently suitable design for the beginner as well as the more experienced set-builder perhaps a few constructional notes will be welcome.

Panel Drilling

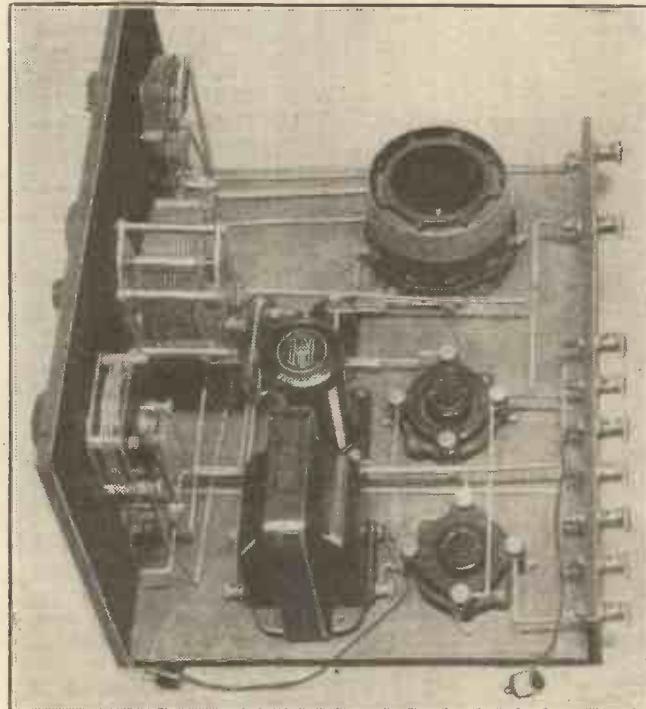
The first step is to mark out the panel for drilling, and here you should refer to the special diagram on this page. You will want a ruler and a sharp pointed

instrument, such as a "scriber," for the marking out process.

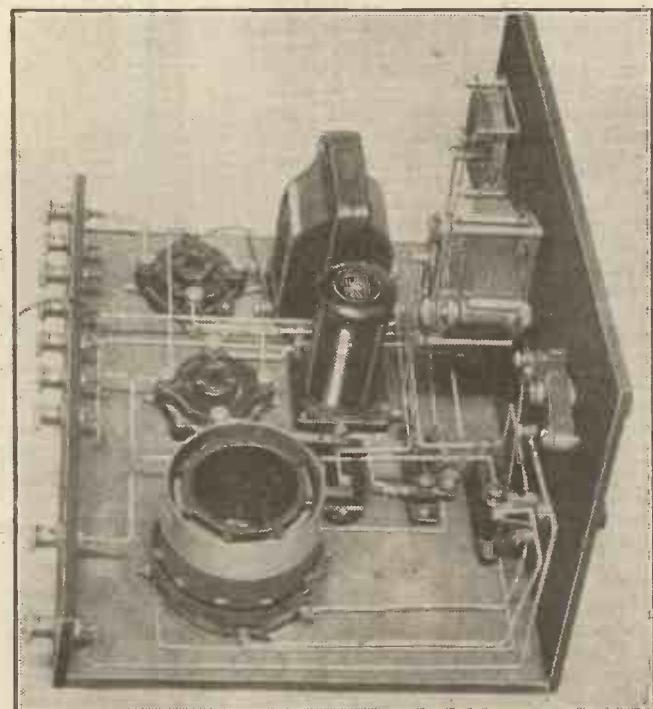
Since your various lines will be in the form of scratches on the surface of the panel the marks should be made on the back thereof. The diagram shows the panel from the front, but this need not affect the marking out,

(Continued on page 499.)

AND IT IS EASY AND INEXPENSIVE TO BUILD



We feel sure that this "New Coil" Two is just the very set many constructors have been waiting for — it is full of good points, and there are no "snags." Undoubtedly it is one of the very best receivers ever designed by the "P.W." Research Dept., and that is saying something!



HANDS OFF THE LICENCE MONEY!

The suggestion is being made that some of the B.B.C. profits should be allotted by the Government to establish a National Theatre.

By THE EDITOR.

THE huge revenue from listeners' licence fees—shared in part and a good part, too, by the Post Office and the Treasury—makes a tempting bait for certain kinds of enthusiasts who want various artistic enterprises backed by plenty of cash and the adjectival qualification of "National." The other day the suggestion that a portion of the profits made by the B.B.C. should be allotted by the Government for the purpose of establishing a national theatre was made by Mr. Harley Granville-Barker at the annual conference of the British Drama League at Exeter.

Mr. Granville-Barker, who is very well known as an author of dramatic plays, said such a grant from the B.B.C. funds might be allotted by the Government to be used, first, as a credit for the establishment of a national theatre, and after, as it might be needed, as a sufficient yearly endowment for its support.

Only a Million!

In other words, if the national theatre did not pay its way—and it probably wouldn't—it would be subsidised. The same idea has already occurred to promoters of "national" opera.

"I think there is much to be said in favour of such a scheme," said Mr. Barker. "A credit of about £1,000,000 would be needed to meet the cost of a national theatre, but I do not think it practicable to raise a credit of that amount by private subscription. I think that, in some form or another, we must use public money, and I want official approval for the scheme. Yet I do not see any Chancellor of the Exchequer of our time nakedly putting down in his Budget £1,000,000 for a national theatre."

Well! It takes one's breath away, doesn't it? What else is the money paid by listeners but privately subscribed money? The 10s. a year you pay as a licence fee is definitely a subscription; your share towards the maintenance of a British Broadcasting Corporation. Note the italics. Some people forget that the second "B" in B.B.C. stands for Broadcasting—not Subsidising. Mr. Barker considers the licence revenue public money—like taxes, etc.; but it isn't; it is subscribed for a definite service; there is no compulsion—if you don't want to use a wireless set, you don't pay 10s. a year. You have a choice. Public money, i.e. revenue from taxes, offers no choice. You have to pay, and the money is used (ostensibly!) for the public good in general.

Listeners' Union Required.

Listeners really ought to have a Union, or some protective organisation which would make it its business to see that the revenue from broadcasting licence fees was spent on broadcasting.

But Mr. Barker has his own ideas about broadcasting.

"The B.B.C. money is in a slightly different category," he says. "It is in the nature of a profit made by a corporation working under Government monopoly, and it is earned partly by exploiting the arts of the drama and music. It would be appropriate, naturally, that money earned in such a way should be used in support of the arts. There, at any rate, is a means of finance for a national theatre. At the moment, however, that is not practicable, but I do not see why all three political parties might not be asked to agree upon that scheme in principle here and now.

Let the Theatre Do It.

"There is ample precedent for allocating money earned in a particular way for a particular purpose. There is, for instance, the Road Fund. As soon as a Chancellor of the Exchequer is able to turn round and take breath, I think those B.B.C. profits might be ear-marked for the support of the

There is no "emergency" about a national theatre. The idea is chiefly backed by theatre people themselves. There has been no sign of a widespread desire on the part of the public to have a national theatre at all costs. If the theatre wants a national home, let it put up the money itself. It can afford it.

Luckily, Mr. Barker's scheme stands no chance; licence money from listeners will not be spent that way.

Mr. Barker's speech was followed by one made by another well-known personality in the theatre world—Mr. Alec L. Rea, of "ReandCo" fame. Mr. Rea has produced many fine plays, especially at the St. Martin's Theatre, London.

A Form of Robbery.

He asked why a poor person who contributed his 10s. a year for his wireless set should be robbed for a national theatre. The Road Fund was raised for the benefit of people who used the roads. The B.B.C. funds should be used for benefiting people who used the wireless.

Mr. Holford Knight, M.P., a member of the National Theatre Executive Committee, has stated that Mr. Harley Granville-Barker's suggestion is already before the Government.

"The suggestion of a grant from the B.B.C. surplus towards the maintenance of a national theatre," Mr. Holford Knight

is reported to have said, "was an integral part of the official scheme placed before the Government at the request of the Prime Minister some months ago. It was thought that such allocation might be fittingly made in respect of additional services the B.B.C. licence-holders would receive.

"Whiff of Audacity."

"The Trust Fund of £100,000, held by the National Theatre Executive, is also available. We are meeting to consider the position in the light of much public approval of the project of a national theatre. A national theatre would rally the thoughts, stimulate the will and cheer up the spirits. Any Government with a whiff of audacity would concentrate on its promotion."

It would be more than a "whiff of audacity." It would be intolerable. And Mr. Granville-Barker and Mr. Holford Knight are counting their chickens before they are hatched. Listeners' money will not be spent on these national theatre, opera, and what-not schemes, without there being such a dickens of a row that no "whiff of audacity" will overcome it. We may say with confidence that Members of Parliament would see to that. The listener is not entirely without good friends at Westminster.

FOR THOSE NOVEMBER FOGS!



This newly-invented "Navigation Compass" is for use by ships in fog, and is sensitive to sound waves and warning signals.

fine arts, and especially for those of music and the drama. The best means of assuring such a step being taken is to educate public opinion."

The argument is poor. The Road Fund was definitely "raided" and certainly not for some artistic scheme which could not pay its own way. The raid on the Road Fund, although outrageous enough, was at least for the benefit of all classes of the community. One might say with some justice that the raid was made because of a National Emergency. Whether that emergency ought to have arisen is beside the point.



DOWN AMONG THE TUBAS

BY G.V.DOWDING, ASSOCIATE, I.E.E.

WE think very much in frequencies these days. From the aerial, where the subject of side-band snipping is of interest, right through to the loud speaker, it is "high-note loss," "low note cut-off" and so on and so on, all the time.

Does it show that we are becoming musically minded? I don't think so. I feel that "frequencies" have us in their academic grip, and that there is a very real danger that we shall forget their real significance unless we start looking at the audio-frequency range in the proper way.

By this I mean that we ought to take stock of our frequencies every time we deal with them, and line them up with reality—the musical notes or partials they may stand for.

With this sort of idea vaguely floating in my mind, I recently spent an evening glancing through some modern textbooks on radio—some elementary, and some of a definitely advanced character.

"Frequency"

All were literally studded with the word "frequency," and that was only to be expected, for it stands for one of the most ubiquitous of electrical factors. But not in one instance did I see a "piano scale" or any reference to definite musical notes as produced by various instruments.

The desirability of making an amplifier that would deal with all audio-frequencies from, say, 30 to 5,000 cycles, was stressed "in extenso" by numerous authorities, and methods

Another very appropriate title for this article would be "Music and the Radio Amateur," for it constitutes an interesting and successful attempt to provide a link between the musical score and the technical desiderata of efficient radio-set design and operation.

of design were elaborately dealt with; but I am certain many others of their readers must also have been left with the impression that that sort of thing is a rather hazy ideal.

What Those "Cycles" Mean

With a view to making the matter a little clearer for at least some of my readers, I am going to devote this article to an

attempt to explain why it is desirable to aim at apparatus that will deal as well with 50, 60, or 70 cycles as with frequencies running into many thousands.

The pitch of a note is determined by its frequency, i.e. the number of vibrations per second. Thus, when you strike middle C on the piano it sends out 256 vibrations of air per second.

The next C above middle C has double the frequency (512), and at each succeeding octave the frequency is again doubled. The next C below middle C on the piano has a frequency of 128, which is exactly half. Each octave gives you double the frequency as you ascend the scale and half the frequency as you descend the scale.

From the point of view of radio reception, I am of the opinion that that area lying between the first and second C's below middle C comprises one of the most

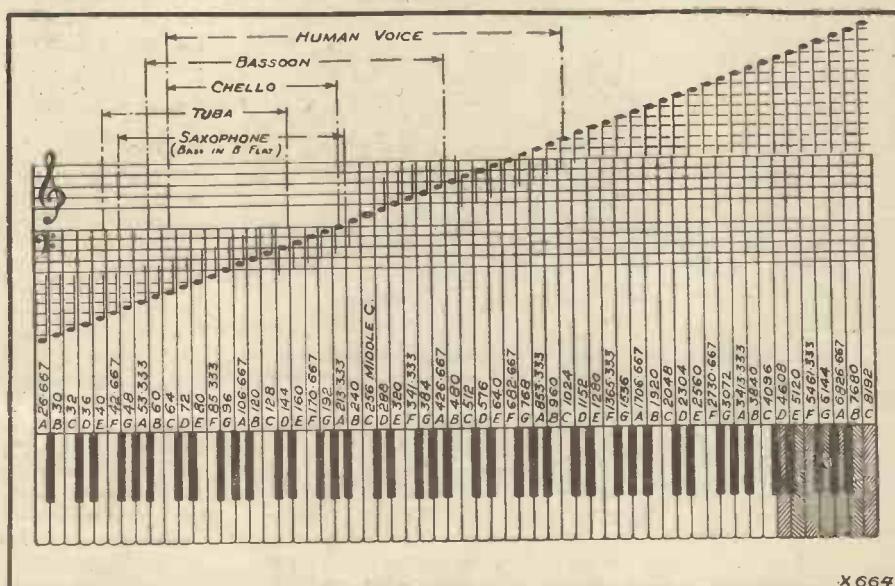
vital bunches of frequencies in the whole gamut. And, curiously enough, the technical term for the notes found in it is the Great Octave.

64 to 128

The actual frequencies run from 64 to 128. If you know anything at all of the deficiencies of radio gear you will realise that "cut-offs" abound in this neighbourhood. It is a good L.F. transformer that doesn't start to tail off badly before you reach 64 cycles, and it is a better loud speaker that doesn't fade right out at about 75.

And, in any case, as has been pointed (Continued on next page.)

THE MUSICAL SCALE AT A GLANCE



This useful and intriguing chart shows the frequencies of all the notes on the piano, together with the ranges covered by some of the string, wood and brass band instruments. It is a guide that you will find invaluable for future reference, so keep it by you.

X 664

DOWN AMONG THE TUBAS

(Continued from previous page.)

out on many previous occasions, you want considerable power to get these lower frequencies over. Tens of thousands as much electrical energy is needed to give the same proportion of loudness to a 64-cycle note as is necessary for one of two or three thousand.

A super-power valve properly used in conjunction with a first-class amplifier is essential to preserve a fairly decent balance of low notes.

But let us see what that 64-128 frequency band has to deal with, and then the figures will become more real to you, and you will see what you may miss if you don't give them their proper treatment.

Surprising Facts.

The piano continues down below the Great Octave for over a further octave, so that it touches frequencies in the neighbourhood of 27. Nevertheless, those very low notes do not figure very frequently in music. "Sonny Boy" may have struck the very lowest chords of cheap sentimentalism, but its piano score reveals that it seldom wanders below the Great Octave, and when it does, only to the extent of a cycle or two.

Given gear able to render a frequency of 60 moderately good treatment, and the piano accompaniment of "Sonny Boy" would get through admirably in regard to the bass. Most popular music for the piano stops short at the Great Octave.

The classics, on the other hand, delve far deeper. Chopin's Preludes frequently hit that C having a frequency of 32. Good job Chopin didn't have to listen to his stuff through the radio!

MORE POWER NEEDED FOR THE BASS



Double-basses are outsizes in notes. You can see two of them above at the extreme right, compare their dimensions with those of the ordinary violins. Low notes want much more power in order to retain their comparative strength.

Of course, Mendelssohn with his light and airy things, such as the "Bees' Wedding," wanders about rather higher up on the keyboard and in this particular case doesn't touch upon many notes having frequencies lower than about 100. However, with his famous "Spring Song," he flutters down to 63 and even a wee bit lower now and then.

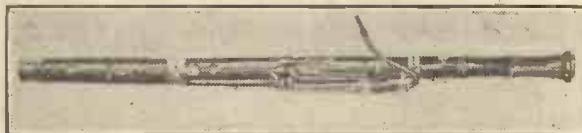
You can't always tell, without concentration and experience, exactly where the

"body" of a piano solo lies in terms of frequency. For you get composers who play on resounding chords within the Great Octave, such as Wagner with his "Pilgrims' Chorus" (Tannhäuser), and achieve what sounds like robust 40-cycle stuff without ever going below 64—which is higher than the lowest level of the delicate "Spring Song."

But if you know anything at all about the piano, you will realise that the player's left hand has plenty of work to do darting about the 64-128 band, whatever kind of music he is playing, from fox trots to "foundations of music."

Many organs have notes going down to as low as 16 cycles, but a whole horde of instruments leave off at about 120 and even higher than that. Nevertheless, almost any type of band would lose a very great deal indeed if it were cut off at any figure like that.

IT CAN DO SIXTY!



The bassoon is able to produce a mellow grunt having a frequency of 60 cycles.

The 'cello takes in the whole of the Great Octave (64 to 128 cycles) and, among the woodwind, so does the jolly old bassoon. But it is in the brass that you get the real bass stuff. For instance, the French horn, which is widely used both in orchestras and bands, rumbles happily away four or five tones below that 64 cycle C.

And what about the euphonium? That goes pretty low, but there are other tubas, as this tribe of growlers is known, that shiver the floor at even 32 cycles and lower.

The above-mentioned double bassoon plays notes a whole octave lower than the notes written for it—these forming ordinary bassoon scoring. The saxophones are all of a transposing character, and the "bass in B flat" actually gives you two octaves and a tone below the written notes—reaching a frequency of about 48.

"Transposing" the Parts.

It is interesting to note the reason why instruments should be made to play notes of frequencies other than those written for them. An orchestration shows the saxophone parts, or clarinet parts for that matter, written in the ordinary clef.

It is obvious that by the use of transposing instruments the scores can be greatly compacted. Thus the "Bass in B flat Sax." is often "doubled" by the "Tenor in B flat," and the "Baritone in E flat" by the "Alto in E flat." Such pairs follow exactly the same written notes, but the actual notes from each are separated by exactly one octave.

In the percussion class of instrument you find the grand old bass drum, and this is the thing you see the "crockery merchants" in dance bands playing partly by means of foot pedals. But everybody does at least know that drums call for pretty low frequencies—at least, drums of the above class.

Finally, and most important of all, it must not be forgotten that the human voice can range down to 60 cycles, and is often to be found wandering in the Great Octave, especially when deep-voiced announcers are at work.

If you "cut right off" at 120 cycles, it doesn't mean that you do not hear any of these instruments I have been talking about. Many of their notes will be higher than that, while those that are lower will get through as thin harmonic ghosts of their original selves.

You see, I have been talking about the fundamental frequencies of notes. You must remember that no musical note from any instrument is composed of only the one frequency. It will be made up of the main frequency, or fundamental, and a family of higher frequencies, which are known as harmonics, and it is these that give it individual character.

"A Mere Travesty."

Sometimes the harmonics, or at least some of them, are more powerful than the fundamentals in the ordinary course of events. But if you nip off the fundamental from any note you still have the harmonics to carry on with. The practical result is that you change the character of the notes.

Instead of hearing the complete full-toned structure, you get a thin, reedy, higher pitched travesty of it. A loud speaker that is styled "high-pitched" is a thing that tends to mangle the music in this way. For a satisfying, wall-shaking rumble of a big bass drum, or a pedal organ note, you are handed a nasty little rattle that sounds like a cocoa-tin being tapped.

But now I must stop, although I could continue this very interesting topic for a long time. Perhaps on a future occasion I shall be able to take the other end of the scale and discuss the high notes and harmonics in the same sort of way.

And, of course, there are special instruments like the "contra fagotto," or double bassoon, which can rival the organ for really low notes. By the way, many such devices do not show up in their true lights on musical scores owing to the fact that they are of a "transposing character." That is to say, they sound different notes from those that are written in the music for them.

CONCERNING VALVE AMPLIFIERS

By
Capt. P.P. Eckersley
M.I.E.E.



ONE of the most interesting jobs of work that has come my way since I resigned from the B.B.C. is the answering of technical queries in POPULAR WIRELESS. Recently I got a query which deserves an article or two to explain the full answer.

So I hope to appeal to those who design their own sets by a series of articles which attempt to outline and explain the general theory of the valve.

It's such a pity that, for want of a little guidance, so many "amateurs" make just that boss shot which ever afterwards leaves them dissatisfied and "fiddling." They get things right in the end and they may have great fun testing, and sometimes the results achieved surpass those obtained by the theoretician, who forgets that some theory fails to go deep enough.

The "Touch" of Genius.

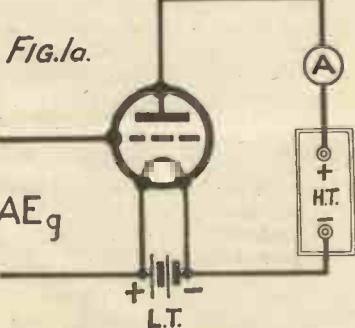
I want to appeal to those whose theory may not be very sound but who have a great and often unsurpassed "touch." People sometimes just know that 50,000 ohms ought to go there. But such people sometimes go astray. I should like to help them to combine "touch" and simple calculation.

I shall deal particularly with "low"-frequency amplification, because it is here that most people go wrong in some degree or another.

I was recently asked by one who was acting for those who wanted to commercialise my reputation to write something about valves for the general buying public.

IT JUST CHANGES !

A1967



Grid changes vary the anode current, but the voltage is unaltered when no impedance is used.

Our Radio Consultant-in-Chief is going to outline the general theory of the valve in an exclusive series of "P.W." articles. Read this first one, and we are sure you will make a special point of ordering "P.W." so that you do not miss the others.

(1.) THE VALVE'S MAIN TASK.

This is about what I wrote It was not published.

I said, in effect, that when a valve manufacturer indicates by his advertisement that the replacing of an existing valve by one that he wishes to sell will immediately change everything and bring the purest quality, the knife-edge selectivity, the wincing sensitivity, that all of us so much desire, he is, shall we say, guilty of the revelation of a half truth. Because something may change, something may not.

Dealers often find when replacing a "detector" valve of 1,000-ohms impedance and a mag. factor 1.01 which happened to be handy, by one meant to work as a detector, that there is a considerable improvement! But even then swapping the power output valve with the first H.F. is never a satisfactory solution to any particular difficulty.

The Valve for the Job.

No, it's the valve for the purpose which counts; and, more, it's the circuits round the valve; and, more, it's designing the quantities of those circuits to suit both the quantities of the valve and the functions of the circuit in which that valve and circuit are contained.

So that one valve is better than or worse than another not on a casual comparison on any old circuit which suits one better than another, but on qualities such as straightness of characteristic, consistency to the specification, continued stability of performance, long life, reasonable first cost, and economy in consumption (for battery sets).

But I do seriously try and reinforce this point—that it's not just a valve, it's the valve for a job. And it's not only just a valve for a job, it's a valve and associated circuit for a job.

The way to look at a valve, in my opinion, is to consider it always as a generator like any A.C. generator at a power station but

having the peculiarities of a high internal resistance and a relatively small power output compared with Turbo Alternators, but a flexibility which allows an output at any frequency.

This generator is not, mark you, a magnifier; really, it's a converter. Thus all the so-called magnification, voltage or power, is really only conversion of the high- and low-tension energy into another form. The valve does not magnify energy because—like taking one pill three times a day, you can't do that.

Impedance Importance.

Consider the valve of Fig. 1 (a). Suppose we change the grid potential. More or less current flows from the high tension. But in Fig. 1 (a) we can't get hold of this current change to do anything about it. The current just changes, that is all, but assuming a good high-tension supply no volts change is manifest in the anode circuit.

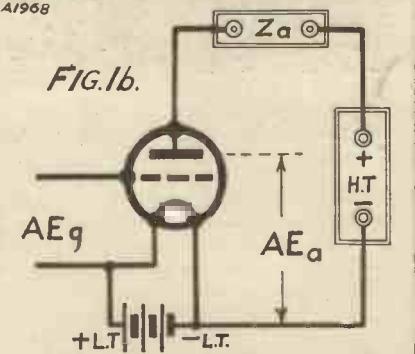
It's only when we include some form of impedance in the anode that changes of grid volts are appreciable as changes of anode volts.

It is not difficult, by applying Ohm's Law and the general principles of the valve, to work out what voltage change occurs at the anode, given the mag. factor of the valve, the impedance of the valve (so sometimes called), and the impedance of Z_a . Fig 1 (b).

Next week we go on to study the simple diagram which anyone with a little trouble can understand and which should be of immeasurable value to those who will understand it.

WHAT REALLY MATTERS

A1968



"It is the design of the circuits round the valve for a purpose that counts."

LATEST BROADCASTING NEWS.

NEW VAUDEVILLE FEATURES
—MAYORAL IDEAS—OPERATIC
DEVELOPMENTS—A “K.K.K.”
CLUB PROGRAMME—BLIND
FUND APPEAL SUCCEEDS—
B.B.C. ACTIVITY IN SCOTLAND.

THE experiment, which it is hoped will strengthen the Vaudeville programmes from London, namely the inclusion of four regular artistes, for whom special material will be written for each performance, is to be put into operation earlier than was originally intended.

Instead of waiting for the New Year, it will now be started for the National Vaudeville programme on Monday, November 24th, when these “Repertory” artistes, who are to be known as “The Foursome,” will link up the performances of other artistes (engaged in the ordinary way for single shows), by singing choruses, announcing the “turns” and will attempt in various other ways to get “pep” and continuity into the entertainment.

An Interesting Experiment.

Listeners will watch this experiment with considerable interest, especially as the “star” artistes engaged for the opening “bill” include Clapham and Dwyer (after a long absence from microphone work), Teddy Brown, Ronald Frankan, and Ross and Sargent.

Relays from the stage of the Palladium, which have been somewhat few of late, will also be included more frequently in the Vaudeville programmes this winter. One is down for Thursday, November 20th.

Vaudeville entertainments from the studio are fixed for Monday, November 17th (National), and Saturday, November 22nd (London Regional), in each of which a series of “cartoons” of well-known actors and actresses will be introduced by Elizabeth Pollock, one of the microphone discoveries of the year. These “cartoons” will seek to portray the stage and private lives of their subjects.

Mayoral Ideas.

The Lord Mayor of Bristol and the Mayors of Bath, Gloucester, Wells, Taunton and Bridgewater, have been invited to select their favourite musical numbers for a programme of “Old Favourites” which Cardiff is broadcasting for West Regional listeners on Thursday, November 27th.

A similar concert was organised last year, when among those invited to select a song was the oldest inhabitant of Bristol, a lady in her 104th year. Her choice was “The Cottage by the Sea,” the music for which could not, unfortunately, be obtained, so that in the end her second choice, “Sweet Belle Mahone” was broadcast.

Operatic Developments.

The present series of studio operas, which has been going since September, 1929, during which time operas have been broadcast at the rate of about one a month, comes to an end with a performance of “Pelléas and Melisande,” on November 18th and 19th, for London Regional and National listeners respectively.

It will not be long before a very interesting announcement is made by the B.B.C. on the subject of how opera in future is to be obtained. There is reason to believe that Savoy Hill is now completing a real and permanent amalgamation of all the big operatic enterprises of the country.

A “K.K.K.” Club Programme.

The Cardiff “K.K.K.” (Kardomah Koffe Klub), the President of which is the new Lord Mayor (Alderman R. G. H. Snook), and whose members include an M.P., several city councillors, clergymen, magistrates and journalists, are arranging a programme for West Regional listeners on Tuesday, November 25th.

The “K.K.K.” meets every morning at eleven o’clock for “Koffee,” and every member’s birthday and such events as silver weddings are celebrated by permitting him to pay for the coffee of all present. The club also entertains distinguished visitors to Cardiff and assists charitable institutions.

Blind Fund Appeal Succeeds.

Broadcast charity appeals still bring in good results, although, of course, the extent of public generosity varies considerably between one cause and another. The recent concert on behalf of the Wireless for the Blind Fund, introduced by Captain Ian Fraser, and in which several blind artistes took part, brought well over twenty thousand letters to Savoy Hill, and something over £5,000 for the Fund.

Individual donations varied from a few stamps to several pounds. Another recent appeal brought a tin box, sent anonymously, containing gold and silver watches and other articles of jewellery, which the B.B.C. was asked to dispose of on behalf of the “League of Mercy.”

B.B.C. Activity in Scotland.

Scottish Broadcasting House, the new Regional headquarters of the B.B.C. in Edinburgh, will be formally opened with a great flourish of trumpets on the Eve of St. Andrew’s Day, Saturday, November 29th.

Mr. David Cleghorn Thomson, the Scottish Regional Director, and those associated with him, naturally regard the event as of supreme importance, first, because it marks the completion of a stage in the reorganisation and development of Scottish broadcasting which is to culminate in the building of the new twin-transmitters—to be completed, it is hoped, some time next year—and secondly because of the incentive it will give to their efforts to ensure that broadcasting shall take its proper place in the cultural and artistic life of the country.

COMING SHORTLY

The “New-Coil” Five
A magnificent “all-stations” set for quality loudspeaker results.

NEXT WEEK

The “INTERCHANGE” THREE
and full details of another
Inexpensive Brookmans Rejector

FOR THE LISTENER.

By “PHILEMON.”

A critical survey of some of the recent programmes, with frank comments on the fare provided and the way it is served up.

Einstein.

“HEALTH, length of days, to the greatest of our contemporaries—Einstein!”

In these words, and after a brilliantly witty speech, Bernard Shaw proposed the health of the famous German scientist. Einstein replied in German. It was afterwards translated.

It didn’t seem to matter much then. We had heard his voice. It was a quiet, warm pleasant voice; modest and business-like; with neither the colour nor the range of Shaw’s; but clear and measured and responsible.

As he spoke, his voice was recorded for the gramophone. I thought, “If only there had been gramophones in Aristotle’s day!

Translation.

A few days earlier the speech of the Japanese Prime Minister speaking from Tokio had likewise been translated. I do not quite see why the B.B.C. will take the trouble to translate for us the words of the Japanese Prime Minister, and yet refuses to render for us into our own tongue the gist at least of the songs of the Spanish Superbia, for example, or the foreign operas.

It seems to me just as important that we should have some idea of what foreign singers and composers are saying, as what a foreign politician is saying.

Russia.

The gentleman from the Soviet Embassy, whose name I regret I did not hear clearly

(Continued on page 500.)

ALL-BRITISH



LISSEN TOREX

The

5/6

TRANSFORMER

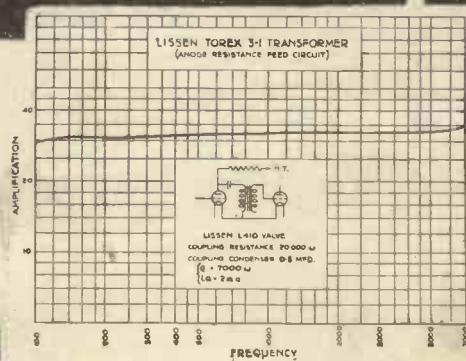
SEE the curve of this new Lissen Torex Transformer. Notice the remarkably even amplification it reveals—almost a straight line over the whole band of audible frequencies. This is the sort of curve you expect from an expensive transformer—yet Lissen have achieved it in a transformer to sell at 5/6.

This Lissen Torex Transformer is a neat, compact component, in a moulded bakelite case which is hermetically sealed and completely insulates the windings. It is proof against shorting, leakage and moisture.

The ratio is 3 to 1. So the Lissen Torex is a general-purpose Transformer which you can use in many different circuits. It is particularly suitable for use in an anode resistance feed circuit and gives splendid results. Test it out in your next "hook-up"—get a Lissen Torex Transformer from your dealer. Price 5/6.

LISSEN LIMITED, WORPLE ROAD,
ISLEWORTH, Middlesex.

**WITH AN
EXCELLENT
CURVE!**



GREATEST RADIO SENSATION

NEW 3-VALVE SET OBTAINS OVER 50 STATIONS ON LOUD SPEAKER WITH DAVENTRY 5 GB WORKING

This is the new Northampton Plating Co. Super Selective 3-Valve Loud Speaker set, which is now offered to the public. After months of careful research a circuit has been designed superior in selectivity to a screen grid set, and yet remarkably simple. It can be used, not only for cutting out the local station, but for other disturbances such as Morse. It is the simplest, cheapest, and most selective in the world. No soldering required or coil changing. Experts have declared it absolutely unique. Over fifty stations have been obtained on loud speaker with aerial 20 feet high, using cheap valves, including Cardiff, Paris, Madrid, Manchester, Stuttgart, Toulouse, Hamburg, Glasgow, Frankfurt, Rome, Langenberg, Berlin, Brussels, Hilversum, Kalundborg, Konigswusterhausen, Radio Paris. These were obtained 3 miles from Daventry while 5 G B was working. Thousands of novices with no knowledge of wireless have built the old Northampton Plating Co. Super 2 and 3 in all parts of the world, and have been astounded by the results even with cheap components, but the new Super Selective 3 makes other sets old fashioned, and marks the greatest improvement in valve sets for years. Orders have poured in from all parts of the world, including America, Turkey, Gold Coast, and Nigeria. In order to give everyone the opportunity of testing out the new circuit, two 6d. Blue Prints, one for new Super Selective 2 and one for Super Selective 3 Valve, will be supplied for 3d. each.

NEW SUPER 4-VALVE PORTABLE SEPARATES TWO BROOKMANS PARK STATIONS UNDER THE AERIALS

This is the latest model circuit by the Northampton Plating Co., offered to the public for the first time. It has been specially designed to satisfy the requirements of the new regional stations. Owing to its wonderful selectivity, it requires no wave trap and obtains under favourable conditions a large number of Continental Stations at loud speaker strength, including Toulouse, Hilversum, Eiffel Tower, Konigswusterhausen, and Radio Paris. At less than half the price of a high-class portable set, it is acknowledged under severe technical tests to be far superior. In order to show what marvellous results can be obtained the set was placed between two aerials at the entrance to Brookmans Park, and the two programmes were easily separated. The set was also taken on 1,000-mile motor-tour over England and Wales. On the South coast and East coast many stations were easily obtained on loud speaker at good strength. Even in Wales, where reception is difficult, excellent results were also obtained. In order that everyone may be able to construct this unique portable set, a full size shilling Blue Print, with details and instructions, can be obtained from Northampton Plating Co. for 6d. Letters must be fully stamped. NAME AND ADDRESS IN BLOCK LETTERS.

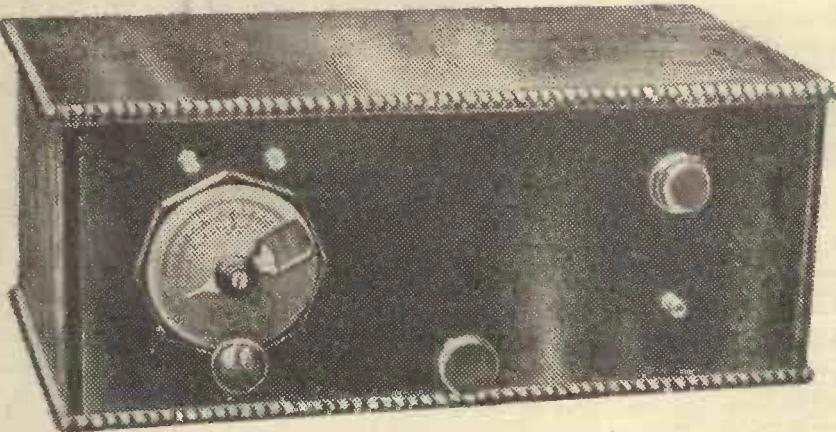
TRADE SERVICE AGENTS WANTED.

THE NORTHAMPTON PLATING CO., SUPER A.C. ELIMINATOR.



SPECIAL OFFER. 7 days approval to test. This A.C. eliminator value £4 will be sent to any address on payment of

59/- cash or C.O.D. with the guarantee that if it is not superior to any other eliminator on the market and not giving complete satisfaction the money will be instantly refunded if returned in good condition and undamaged. It is guaranteed to be most silent in operation giving over 20 milliamperes, and suitable for all 2, 3 and 4 valve sets. Test it for yourself. Trade enquiries invited.



SPECIAL WIRELESS AND CYCLE BARGAINS.

Usual Price.	Sale Price.	Usual Price.	Sale Price.	Usual Price.	Sale Price.	Usual Price.	Sale Price.
10/- Latest Type Cabinet	12 x 8 ..	4/11	New Cossor Type Long Wave Coils, pair	9/6	12/6 Mullard Type Cabinet	120 Volt H.T. Battery	8/11
5/- Ebonite for same, 12 x 8 ..	3/-	7/6 Volume Control	3/11	5/6 2 Volt Accumulator	3/6	5/6	11d.
5/11 Tranformer ..	3/6	7/8 H.F. Choke	3/11	7/6 Aluminium Panel 18 x 7 ..	2/-	Accumulator Carr.	11d.
4/6 .0005 Variable Condenser	2/11	2/8 Daventry 5 G B Coil	1/3	17/6 Dual Coil for M.M.3 ..	12/6	Neutralising Condenser	2/11
2/- .002 Condenser ..	1/3	10/0 6 Volt Ampion Valve	3/11	Triotron Dull Emitter	4/-	Reaction Condenser	2/6
1/6 .0003	10d.	12/6 Cone Unit	6/11	Valve ..	4/11	Diff. Reaction	2/11
1/- Grid leak 2 meg ..	10d.	12/0 Cone Speaker Cabinets	7/11	5/- Cycle Tyre ..	2/6	Loud Speaker Cord	11d.
1/- Anti-Mic. Valve Holder ..	9d.	2/- 12in. Cone Speaker Frets	11d.	2/6 Cycle Tube ..	1/3	'Phone Cord	11d.
2/3 Rheostat ..	9d.	3/- 15in. Cone Speaker Frets	1/11	6d. Panel Transfer	3d.	S.L.F. Condenser ..	3/11
2/- Indoor Aerial ..	9d.	7/6 Old Cossor Type Coils	3/11	6/8 Double Reading Voltmeter	3/11	D.C. Eliminator, 15 M.amp.	17/6
5/- Earth Tube ..	1/6	15/- Old Cossor Type Cabinets,	21 x 7 ..	Triotron Super Power	£4	A.C. .. 20 Millamps.	59/-
10/- Guaranteed Phones ..	4/11	21 x 7 ..	7/11	Valve ..	6/6	Electric Iron. Weight 5 lbs.	7/11
3/6 S.M. Dial ..	1/11	Ebonite for same ..	3/11	15/- Titan Coil ..	9/11	Cone Speaker ..	9/11
				9/- 60 Volt H.T. Battery	4/11	Phones Repaired ..	2/8

New Cycles, Guaranteed, 59/11; with 3-speed, 79/11; with Dunlop Tyres, 10/- extra. Parts supplied for all sets at Reduced Prices. Send now to avoid disappointment. Cash with order or C.O.D. Special terms to those making sets. All goods guaranteed and exchanged if not satisfactory. Enquire for anything you want. Trade supplied. Send for our wonderful Bargain Price List P.W.

Owing to the enormous number of enquiries and orders, write clearly Name and Address in Block letters to the firm that made Radio popular. Letters must be fully stamped.

NORTHAMPTON PLATING CO. (RADIO and Cycle Manufacturers), NORTHAMPTON

READ THE LATEST REPORTS BY THE LEADING RADIO EXPERTS OF THE DAY:-

I refer to the receiver marketed by the Northampton Plating Co. as a kit set at a price that is more than reasonable. I had a pleasant surprise when I first operated it. I found there were 12 or 13 stations easily brought in at loud speaker strength on the medium wave in addition to 5 G B. The set has remarkable qualities of selectivity and sensitivity, two characteristics rarely coupled in any one receiver. It must be set down as a definite advance.

("NOTTINGHAM JOURNAL," December 21st, 1929.)

Those who are too far from a station to use a crystal and are deterred from wireless by the present high cost of valves, will find it best to make a set from the Northampton Co.'s blue prints for two or three valves, price 3d. each. If they cannot afford a Mullard, the same company supply excellent valves at 4s. 11d. which give admirable reception, though so cheap. A thoroughly good two valve set ought not to cost more than 6/- 10s., including everything, and a three valve about 11s. more.

("REYNOLDS' NEWS," January 22nd, 1930.)

READ THESE TESTIMONIALS.

I have had your Super 3 since Sept. 1929, and have had wonderful results, about 50 stations at full loud speaker strength, and can get most of them. Best of the week, chief among them being Paris, Eiffel Tower, Budapest, Prague, Belgrade, Stockholm, Madrid, Toulouse, Stuttgart, Barcelona, Turin, Maravista-Ostrava, Rome, Algiers, Lausanne, Oslo, Lahti and Kaunas. Wishing you every success.—W. T. Emerson, Hants, 17/1/30.

I must write and tell you I am more than pleased with your three valve set I have just made.

It is the most wonderful bargain I have ever known in wireless, and it is all that you claim of it. I wish to recommend it to my friend who is a keen wireless enthusiast.

W. P. T., Derby, 16/1/30.

I have now built up your Super Three Valve set, and, independent of price, I have never heard or seen a set to beat it. We are still getting fresh stations, and up to the present have logged 20 at full loud speaker strength. As I am writing we are hearing an Aria from Rome. My last set cost me about £25. Your Super Three has cost me less than £5, including accumulators.

W. A. P., Norwich, 3/2/30.

Referring to the 3-valve set recently supplied, I have pleasure in informing you how satisfied I am with it. I recently put up an expensive 4-valver, and had such bad results. I may say I have had many circuits in use up to 5 valves with very good results—that means quality of reception, volume and distance. I purchased your Super 3 really for local use. As you will see, I am on top of the Brookmans Park Transmitter. The results I am getting are equal to my best with 4 and 5 valves. I can still have my Continentals on the loud speaker, and with perfect quality. Wishing you every success.—Yours faithfully, V. M., Cheshunt, Herts.

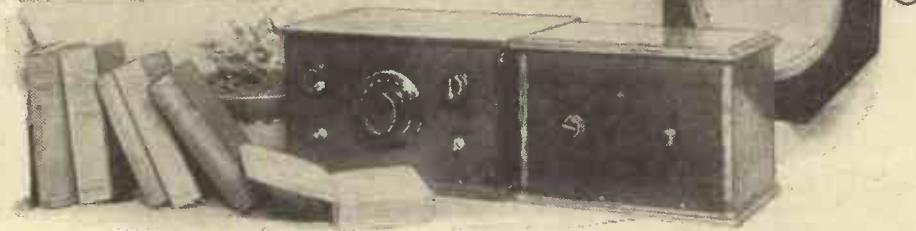
I feel I must write and congratulate you on a wonderful circuit. I have now had you Super 3, "on the strength of which I have in those two nights had 10 stations, and myself I have the poorest of poor indoor aerials, and have had 10 minutes logged 16 stations on the Loud Speaker. I have had to insert a volume control because of the power of the local station (Bournemouth, 70 miles away) and 5GB. I have just received Oslo, Paris (2), Hamburg, Berlin, Budapest and many others. Your "3" gives 90 per cent better results than you specify. Wishing your sets the best of luck in the future.—Yours very satisfied, O. D. N.

I have examined the above testimonial, and am satisfied that these are genuine communications.—Advertisement Manager, "News-Chronicle."

The P.W. "MONO-AMP"

In response to many requests from readers we are giving below the details of a really first-class one-valve amplifier. It can use the same batteries as your set, is easy to make, and will boost up your programme strength for real loud-speaker reception. Designed and Described by

The "P.W." RESEARCH AND CONSTRUCTION DEPARTMENT.



IT'S not too easy nowadays to think out a design for anything so simple as a single valve low-frequency amplifier which shall be a bit novel and interesting.

All the same, there is at least one neat little idea which will be new to most in the amplifier you see on this page. Besides this, you will find it is an attractive little instrument in all sorts of ways, and it is based on the best modern practice in spite of its very simple nature.

What it will do.

Before we say any more about it let us just tell you what it is intended to do, so that you may decide whether it is the right unit for the job you have in mind. It is meant for use with sets which already have only one L.F. stage or none at all.

If you connect it up to such a receiver it will bring any signals which previously were fairly good 'phone strength right up to loud-speaker volume. Signals which before were just about good enough for the speaker will now be up to very full volume indeed, and will probably need to be toned down a bit.

The amplifier should not be used with sets which already have two L.F. valves at work : it would be better in such cases to add a stage of H.F. amplification, rather than yet another of low frequency.

The amplifier would not be of much use with a crystal set (you really want two

stages for that purpose), but in all other circumstances you will find it a most valuable little adjunct to an existing set. It provides a very easy method of enlarging

example, it provides a proper volume control to adjust the amount your power valve will handle without over-loading.

That is more important than many people realise, for over-loading is responsible for a great deal of the distortion for which loud speakers and sets get the blame. With reasonably powerful amplifying circuits it is perfectly easy to overload even a super-power valve on the local station, and so long (as that is happening) it is quite out of the question to expect good quality.

Another worth-while refinement which it gives you is an output filter for the loud speaker. This is always rather desirable when a super-power valve is used, and of course it is absolutely essential for safety reasons (among others) if you get your H.T. from the mains.

A Valuable Feature.

The special novel feature of the little instrument is the scheme which brings the control of both set and amplifier on to a single on-off switch.

As a rule, you know, when a separate amplifier is used it is necessary to operate the L.T. switches on both the receiver and the amplifier to turn the outfit on or off. With the "Mono-Amp" this is not so ; you keep the receiver L.T. switch permanently at "on" and turn everything on or off with the switch on the amplifier.

(Continued on next page.)



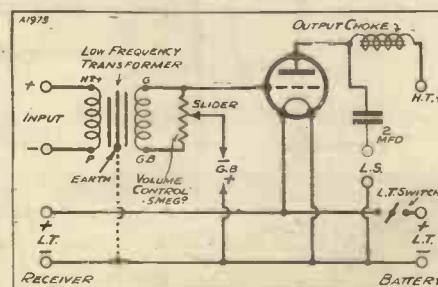
There are not many components in the "Mono-Amp," but it develops a tremendous punch and makes the loud speaker live right up to its name.

your present outfit in the most economical manner.

In making the enlargement, too, it adds some very useful little refinements. For

THE PARTS YOU NEED—

- 1 Panel, 10 in. × 7 in. (Lissen, or Goltone, Red Seal, Paxolin, etc.).
- 1 Cabinet, with baseboard 7 in. deep to fit (Cameo, or Pickett, Keystone, Osborn, etc.).
- 1 Volume control, $\frac{1}{2}$ or 1 meg. (Igranic, or Varley, Gambrell, Lissen, R.I., Wearite, Magnum, etc.).
- 1 L.T. switch (Bulgin, or Goltone, Igranic, Lissen, Lotus, Ready Radio, Magnum, Benjamin, Wearite, Keystone, Red Diamond, Junit, etc.).
- 1 L.F. transformer (Telsen, or Ferranti, Varley, Lissen, R.I., Igranic, Mullard, Lewcos, Lotus, etc.).



A filtered output and perfect control of volume are among the "Mono-Amp's" many advantages.

—TO MAKE THE "MONO-AMP."

- 1 Sprung valve holder (Lotus, or Igranic, Lissen, W.B., Telsen, Benjamin, Bulgin, Magnum, Dario, Wearite, Formo, Junit, etc.).
- 1 Output choke (Lissen, or Ferranti, Igranic, Wearite, Varley, Magnum, R.I., etc.).
- 1 2-mfd. fixed condenser (T.C.C., or Lissen, Dubilier, Igranic, Ferranti, Hydra, Filita, Mullard, etc.).
- 1 Terminal strip 10" × 2".
- 9 Terminals (Bell and Lee, or Elex, Igranic, etc.) Wire, Screws, etc.

THE
P.W. "MONO-AMP."
(Continued from previous page.)

It may seem a small point, but it is one of those little things which make all the difference to your convenience in using your outfit.

It is done in a very simple fashion, too. There are the usual L.T. battery terminals on the back-strip of the amplifier, and when the L.T. switch is turned on, current

flows from them to the amplifier valve in the normal way. It also goes on to another pair of terminals on the strip, and these are joined to the L.T. terminals of the receiver. Thus the latter only gets its L.T. current through the circuits of the amplifier, and is controlled by the switch on the latter.

Another point occurs to us about the output filter, and we should like to clear this up before we go any farther. It is just this: sometimes we provide a filter and sometimes we leave it out of our designs.

Why It's Done.

The reason is that an output filter is one of those optional affairs which depend on individual circumstances. If you are going to use an ordinary power valve with battery H.T. the filter is not really needed, although it confers just a slight advantage even then.

If, on the other hand, you are going to use a super-

SIMPLICITY IN WIRING.

There is no need for the article to describe the wiring, for this diagram—backed up by the photographs—tells the whole simple story.

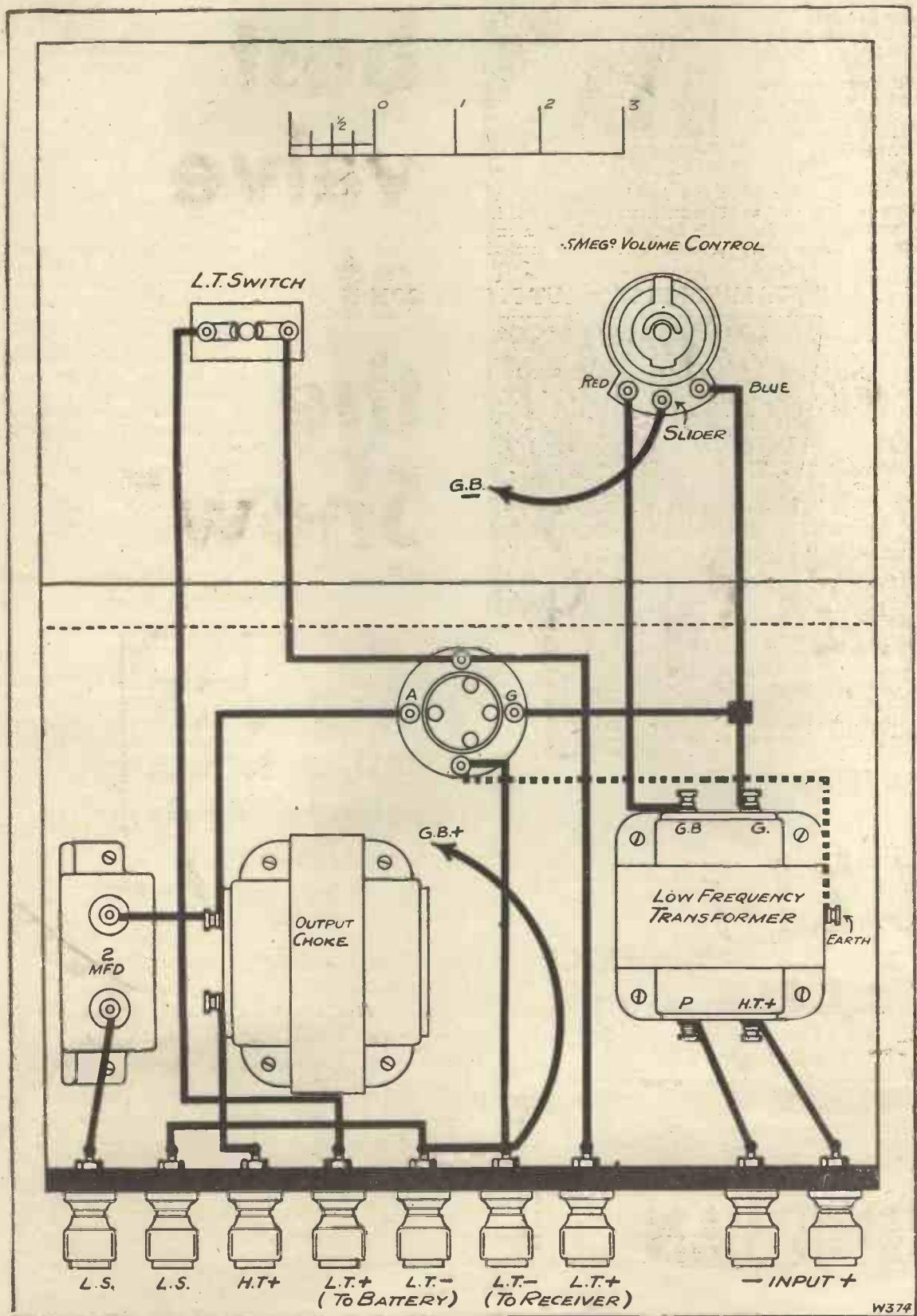
There is one dotted connection, which can be made if your transformer has an earthing terminal, but may be omitted altogether if it has not.

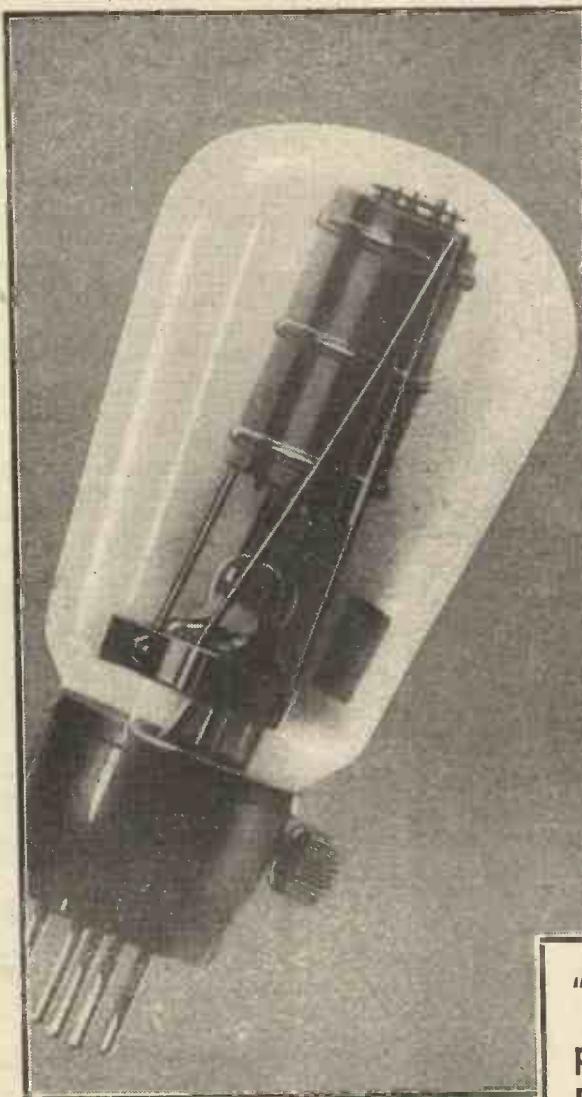
power valve it becomes extremely desirable, while with mains H.T. it is essential.

The Alternative.

We therefore make a practice of showing both fashions of connection for the loud speaker, and often indicate to the reader how he may include or omit the filter.

In the "Mono-Amp," for example, you could omit the filter i.e. leave out choke and condenser, wire one L.S. terminal to plate of valve, wire other L.S. to H.T.+.
(Continued on page 479).





"The best valve at the Show"

"Wireless World" readers place the Mazda A.C. Pen **FIRST** in the class for Valves in the Olympia Show Competition



THE AMAZING

MAZDA
A.C.PEN

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27/6



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Here is striking evidence of the excellence of the Mazda A.C.Pen—and to the value it offers! "Wireless World" readers—the most critical public—placed this Valve **FIRST** in the class for valves (section 6) in the Olympia Show Competition. There could be no better testimony than this to our slogan "The finest range of valves the world has ever known."

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C1. 1050 v. D.C. test ..	5/6
C2. 600 v. D.C. test ..	3/9
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C5. 1500 v. D.C. test ..	7/-
4 mfd.	
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NO BETTER CONDENSERS ARE
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FERRANTI FIXED CONDENSERS

ARMISTICE DAY

On Tuesday, November 11th, the twelfth anniversary of Armistice Day was commemorated in all parts of the Empire. This week's issue of ANSWERS is a special Armistice Number, containing many fine features, including an outspoken article—

"NEVER AGAIN"

By **BARONESS ORCZY**

The famous author of "The Scarlet Pimpernel" declares that the fact that war is still possible is the greatest blot on our civilisation.

A MILLION GARDEN GRAVES

is a story of which every Briton should be proud—the story of the English flowers that bloom over the graves of our loved ones in France. You mustn't miss this special issue of ANSWERS, which also contains a magnificent prize offer of

**£10 A WEEK for LIFE or
£3,000 CASH**

which MUST BE WON, and there's still time to win it!

ANSWERS

BRITAIN'S NATIONAL WEEKLY

Buy a Copy TO-DAY - - - - -

2d.

EASY TERMS

WE supply the following Radio Apparatus on deferred terms. We carry adequate stocks and can give prompt delivery.

NEW HEAYBERD ELIMINATOR KIT C.150. Complete kit of parts for building an H.T. Eliminator, including steel case. Output—25 M.A. 150 volts. 3 H.T. tappings. One variable. Cash Price £3 16 0
Or 7/6 with order and 11 monthly payments of 7/6.

NEW EPOCH PERMANENT MAGNET MOVING-COIL SPEAKER UNIT. P.M.60. Cash Price £5 15 0
Or 11/- deposit and 11 monthly payments of 10/6.

LISSEN 2-V. SET. Battery model including valves. A reliable Regional Receiver. Cash Price £3 10 0
Or 5/6 with order and 11 monthly payments of 6/6.

NEW OSRAM MUSIC MAGNET 4 KIT. A first-class long-distance receiver incorporating 2 H.F. stages, single dial tuning. Cash Price £11 15 0
Or 16/- with order and 11 monthly payments of 21/-.

NEW MULLARD ORGOLA 1931 3-V. KIT. High grade complete kit of parts including valves and cabinet. Cash Price £8 0 0
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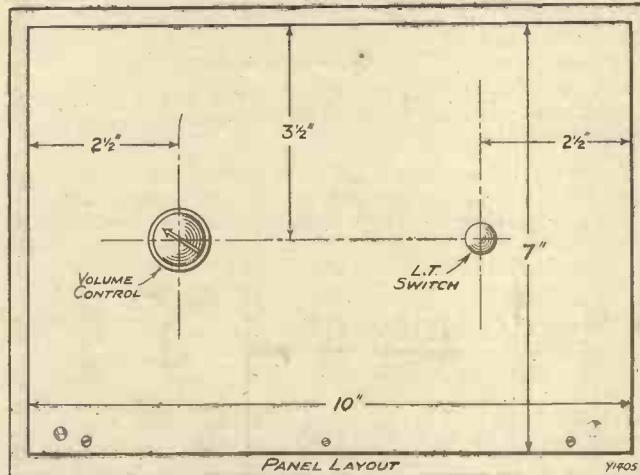
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Telephone: National 1977.

**THE
P.W. "MONO-AMP."**
(Continued from page 476)

A few seconds spent in running over the circuit diagram will tell you all you want to know about the theoretical arrangement of the "Mono-Amp." Just note the transformer which couples it to the preceding

VERY LITTLE ON THE PANEL



Apart from the on-off switch, there is only the volume control, which regulates the strength from a clear whisper to the full-power programme.

valve (in the receiver), the volume control, the output filter and the L.T. circuit arrangement, and then we can get on to more practical matters.

Now, it is really such a completely simple job to construct the "Mono-Amp" that we do not propose to insult the reader's intelligence by telling him how to make it in detail. Anyone who has any idea of how to drill a panel, lay out parts and wire them up should be able to do it with the greatest ease from the clear diagrams and photos on these pages.

The Output Filter.

We should just like to pause a moment to deal with one wiring point and a further matter concerning the output filter, however. First, the wiring matter: you will see that the particular L.F. transformer which we used has a fifth terminal in addition to the usual four, and this was not wired into circuit in the original "Mono-Amp."

This extra terminal is connected to the iron core of the transformer, and provides a means of earthing it if desired for stabilising purposes. We did not find it necessary to do this with any of the sets with which we tried the amplifier, but we mention the point for the benefit of those who may be less lucky.

It is unlikely, but with some particular set (and perhaps a mains H.T. unit) you may get signs of L.F. instability in the form of bad quality, motor-boating, or a whistle. In this case just wire the fifth transformer terminal to the L.T. circuit, as shown on the wiring diagram by a broken line.

Now about the filter: if you are going to use the amplifier with a D.C. mains H.T. unit, you must modify the output circuit a little for safety reasons.

This is how to set about it. Examine the wiring diagram and you will see that one loud-speaker terminal is wired to the L.T. negative circuit. Omit this lead for working on D.C. mains. Instead, wire this same loud-speaker terminal to one side of an extra 2-mfd. condenser. Wire the remaining side of this additional condenser to the L.T. — circuit and your little modification is complete.

The Valve to Use.

Now let us tell you how to connect up and use the "Mono-Amp," and then we have finished.

First, there is the question of valves, and here you must be a little careful if you want the best results. The correct type to use in the amplifier is the power or super power. For use with a single-valve receiver we suggest the ordinary power type, and a super power if the receiver has more than one valve.

With a set which has no L.F. stage, the detector valve feeds straight into the amplifier, and no change is needed

in the set proper. Where there is already a low-frequency stage in the receiver, however, a change may be required.

What was previously the output valve, i.e. the last valve in the set itself, may have been a power or super power. Transfer this to the "Mono-Amp," and put a new valve of the L.F. type in the socket thereby emptied.

The point you must remember is that the valve in the set which feeds into the "Mono-Amp" must be of the L.F. or H.F. type, not a power or super power.

Connecting Up.

Now the connections. Join the input terminals on the amplifier to the phone or loud-speaker terminals on the receiver. See that the "input—" terminal goes to the phone or L.S. terminal of the set which is wired internally to the plate of the valve therein.

Disconnect the accumulator from the set, and put it on the amplifier terminals

marked "L.T. (to battery)." Connect the other pair of amplifier L.T. terminals to the set L.T. terminals. Connect the amplifier H.T. + terminal to the maximum voltage point on your H.T. battery, hitch up the loud speaker to the amplifier, and you are ready to switch on.

When you do switch on, don't be surprised if you hear nothing at first! The volume control may be at minimum. A simple catch, but it sometimes happens even to old hands!

DIRECTIONAL SPEAKERS

Small Points Worth Considering.

THE majority of cone loud speakers are very decidedly directional, and not only do they sound loudest when you are directly facing them, but they also sound better.

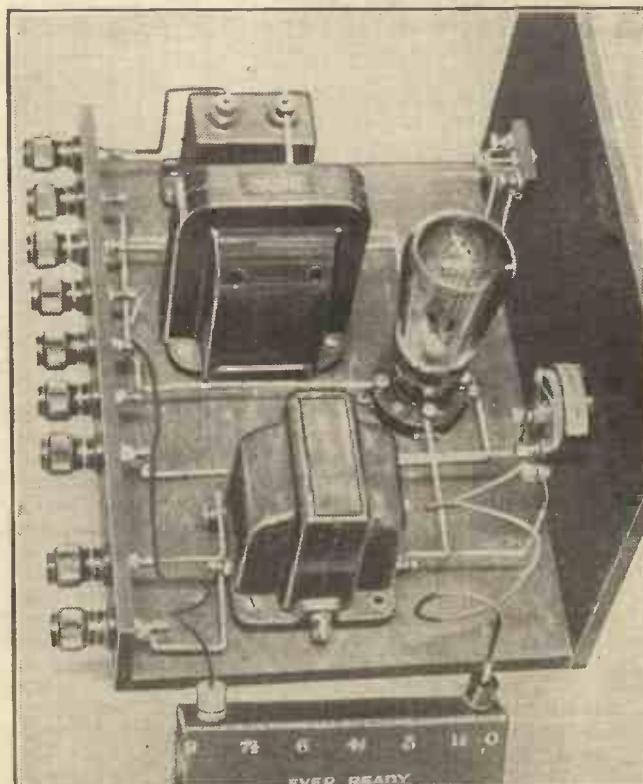
This is a point to bear in mind when you invite a friend round to listen to your results.

Do not arrange the loud speaker on the table alongside the set and let your visitor stand near the receiver.

Provide him with a chair which is so placed that he will look right into the cone, and have the speaker at about the same height from the floor as his head will be. Also, do not put him too near to the loudspeaker, but let him be at least two or three yards away.

These may be small points, but you have only to try listening in different relative positions to the loud speaker, yourself, to appreciate their importance. A.S.C.

FROM THE INPUT END



The L.F. transformer is in the foreground, and behind it is the L.F. choke which, with the large condenser, forms the output filter circuit. The grid-bias battery stands on the baseboard beside the transformer.

NOTES FROM THE NORTH.

Savoy Hill is to put the North of England on trial in the production of a North Regional programme, as an alternative to the National programme, when the new station at Moorside Edge comes into service. But is it fair to do so and at the same time to deprive the North of its Wireless Orchestra? This question is asked in a well-informed article by

OUR NORTHERN CORRESPONDENT.

SIR JOHN REITH'S reticence has been criticised at various times.

But his speech at the opening of the Manchester Radio Exhibition was an illustration both of the virtues of reticence and of the fact that, in spite of the critics, Sir John can take the public into his confidence when he feels so disposed.

After Sir Hamilton Harty's slashing attack on the B.B.C.'s music policy, Sir John Reith must have been tempted to attempt an equally stinging counter-assault. He was content to state that the B.B.C. has suggested to the leading North of England music organisations a scheme of musical development for which the B.B.C. will be largely responsible financially, and that the B.B.C. is waiting to discuss the matter with the other organisations.

Big Developments.

This was admirable reticence. It leaves the way open to big developments.

There have been many contradictory rumours in the North of England as to the constitution of the North Regional programme which is to be broadcast from the new station at Moorside Edge. Like Brookmans Park, this station will transmit two programmes.

One will be the National programme. Some part of the other—called the North Regional programme—will be produced in the North of England itself. But precisely how much?

It was on this question that Sir John took the public into his confidence at Manchester. Previously there had been no official statement on the subject, and some of us in the North were driven by various centralisation moves within the B.B.C.—notably the coming disbandment of the Northern Wireless Orchestra—to doubt whether our hopes for a genuine Northern programme would ever materialise.

Characteristic Programmes.

Now, on this point Sir John stated at the exhibition that Mr. E. G. D. Liveing, the North Regional Director, and his assistants would be able to exercise their own creative ingenuity in the North Regional programme, to put on features—musical and otherwise—characteristic of the region, and to express the life of the North in the programme, "to what extent," said Sir John (and this is the important point), "Mr. Liveing must himself be very largely the judge. There must always be consideration for quality."

In other words, I suppose this means that Savoy Hill is putting the North of England on trial. If Mr. Liveing and his staff can produce the goods they can have as much time on the Regional wave-length as they can fill with high-class quality material.

This is very satisfactory, and yet on at least one point one cannot help feeling some misgivings. Sir John Reith mentioned

centralisation in his speech, but all he said was that if he had the time to explain all the reasons for centralisation "to such extent as the B.B.C. is centralising, you would appreciate that the policy is for the best."

When are we going to hear these reasons?

Sir John said: "I think that Mr. Liveing is satisfied that, despite centralisation, he will have ample opportunity on the North Regional wave-length" (for the presentation of Regional programmes). But is it fair to Mr. Liveing to give him that opportunity, to put him and his staff on trial, and at the same time to deprive them

musical comedy programme. We have also been told that there will be an octet or a nonet to replace the orchestra, but a small combination could never do justice to most of the music played by the Northern Wireless Orchestra.

And surely the B.B.C. should be as careful, if it plays a musical comedy selection at all, to play it with as much concern for its proper presentation as it displays in producing a Mahler symphony at the Queen's Hall?

I may be asked why I am anxious that Mr. Liveing's staff should be responsible for the production of the main part of the North Regional programme? Why not relay both programmes from London?

Three Good Reasons.

The first reason is that there is a great quantity of talent and much activity of all sorts in the North of England, and the Northern staff of the B.B.C. are best able to exploit this material. The second reason is that the North is a country within a country, with its peculiar characteristics, likes, and dislikes, and the Northern staff are best able to understand the disposition of their audience. The third reason is that if the major portion of the North Regional programme is produced at Manchester, Leeds, and elsewhere in the North, it will be more likely that the programme will be a genuine alternative to the National programme.

If the London Regional programme was not produced largely at Savoy Hill, in the same atmosphere and probably by the same people as the National programme, it would, I submit, be a better alternative than it is to the National programme. The way to get satisfactory alternative programmes is to keep the makers of the two programmes apart.

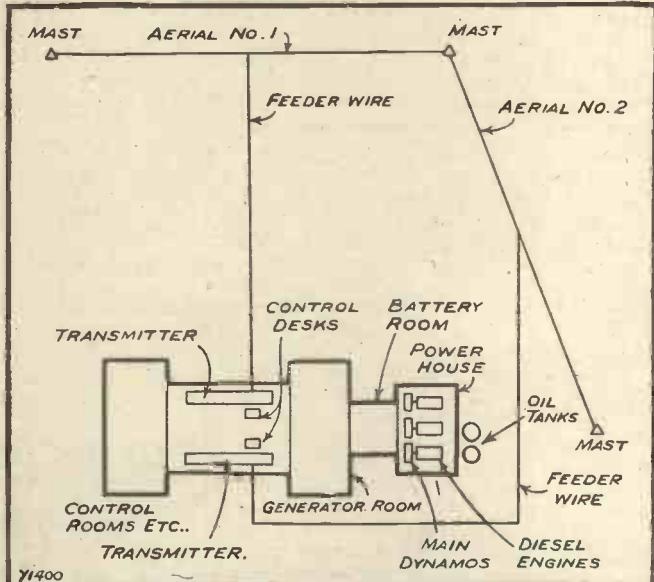
Finally, a word about Moorside Edge. Work is going on rapidly, and the B.B.C. is now carrying out tests to determine the best arrangement of the aerials.

A Radio Reprieve.

I understand that the statement in a daily newspaper that the Scottish Regional station at Falkirk will have masts 750 ft. high is mere guesswork. It is more likely that they will be 500 ft. high.

LATER.—I now learn that the B.B.C. has extended the contracts of the members of the Northern Wireless Orchestra until March 31st, 1931, and that the strength of the orchestra after that date has yet to be decided. This extended delay in carrying out the sentence on the Northern Wireless Orchestra seems to be an indication that there is still hope of a reprieve. At any rate, Northern listeners will be glad to learn that the present orchestra will continue to function for another five months.

THE "Lay-out" AT SLAITHWAITE



A sketch-plan (not to scale) of the North Region station at Moorside Edge.

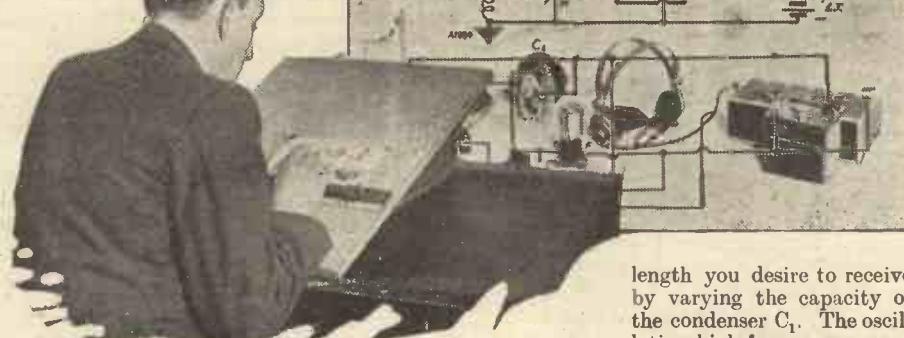
of the mainstay of their present-day programmes—the Northern Wireless Orchestra?

But for the threatened disbandment of this orchestra, early next year, one could take the present-day North Regional programmes (which are transmitted mainly from Manchester and Leeds only) as a foretaste of the North Regional programme from Moorside Edge, and one would say that it is a very tasty foretaste. But subtract the Northern Wireless Orchestra from the present programmes, and you have robbed them of much of their brightness.

This orchestra's programmes of "middle-brow" music—the lighter classics, waltzes, marches, musical comedy selections—are very popular. No satisfactory reasons have ever been given by the B.B.C. for this step.

We have been told that "outside" orchestras will be used, but one can hardly imagine the Hallé Orchestra providing a

RADIO IN PICTURES



THIS is the final article of my short series, and I am going to devote it mainly to high-frequency amplification. As I have already explained, H.F. amplification precedes rectification. You take the energy from the aerial and, without changing its nature in any way, magnify it by one or more H.F. amplifying valves, after that handing it over to the detector.

H.F. amplification increases the range of reception of a set. It enables you to pick out stations that you would otherwise be unable to receive at all, but it does not enable you to increase, to any great extent, the loudness of existing signals. For this you want L.F. amplification.

Look at our first composite illustration. Here you have one stage of H.F. amplification, and this is coupled to the detector valve via an H.F. transformer. An H.F. transformer consists of two windings of wire placed fairly close together.

The Core of the Matter."

These windings are shown in the photograph as ordinary plug-in coils. And two plug-in coils in close proximity make quite an efficient H.F. transformer. They are rather farther apart in the photograph than they would be in actual practice, but I have purposely given them wide separation.

It has probably occurred to you that an H.F. transformer is, fundamentally, an L.F. transformer without the iron core. That is not so very wrong, but it would be more truthful to say that the only real difference between the average H.F. and an L.F. transformer lies in the core.

You see, there is a core in an H.F. transformer, although in this case the core is of air, but the windings of an H.F. transformer consist of a very much smaller number of turns. In the L.F. instruments you get tens of thousands of turns of wire, while in the H.F. transformer it is generally a matter of but tens.

How It Works.

By the way, in rare instances you do get H.F. transformers having iron cores, but these are very much the exception to the rule. There is little need to increase the intensity of the magnetic field developed around the winding of an H.F. transformer, owing to the fact that high-frequency current is very effective in producing magnetic influences.

However, let us see how the circuit shown in our first illustration operates. First of all you tune your aerial system to the wave-

length you desire to receive by varying the capacity of the condenser C_1 . The oscillating high-frequency energy then developed in the tuning circuit (comprising the coil and condenser) is impressed across the grid and filament of the H.F. valve.

A Tuned Transformer.

The effect of this is to cause the current flowing from the H.T. battery round the anode circuit of the valve to fluctuate. These fluctuations will be magnified replicas of the H.F. impulses developed on the grid. In its travel the anode current passes through the primary winding of an H.F. transformer, and so a magnetic field is constituted that alters in intensity at the same high frequency.

As the magnetic field cuts across the secondary winding of the H.F. transformer, H.F. current is developed in this. This secondary winding forms a part of the tuned circuit that is coupled to the grid of the detector valve. You might wonder why it is necessary to have a tuned circuit here and why we cannot dispense with the variable condenser marked C_2 .

A tuned circuit is not essential for the operation of this "hook-up"; you could have what would be known as an untuned

In his final article "Pentode" discusses H.F. amplification and illustrates his interesting notes with a further two of those unique "radiographs," which show you how to read theoretical diagrams.

(5). H.F. AMPLIFICATION.

secondary winding to the H.F. transformer, but you get much better results when you do have a circuit that you can tune to the wave-length of the station you are receiving. This circuit will then work in sympathy with H.F. currents of a frequency corresponding with that of the required station and prove unsympathetic to other frequencies.

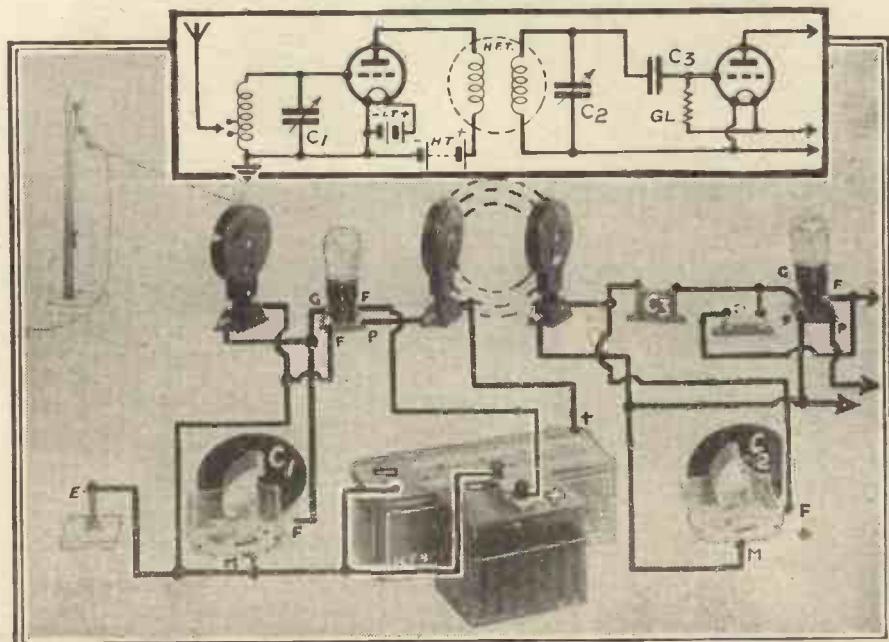
Another method of coupling H.F. valves is known as the tuned-anode scheme. This is illustrated in our second composite picture. If you refer to the diagram that illustrated resistance-capacity coupling last week you will see that the condenser C_1 and the coil L_1 in the tuned-anode H.F. circuit replace the resistance in a resistance-capacity coupling.

Like R.C. Coupling.

Resistance-capacity coupling can, indeed, be employed for H.F. stages, but it is not a particularly efficient scheme for such a purpose. The job of the variable condenser C_1 and the coil L_1 in a tuned-anode circuit is merely to enable a high resistance to be built up against H.F. currents. The greatest resistance is reached when the tuning circuit formed by condenser C_1 and coil L_1 is tuned to exactly the frequency of that station you are handling.

(Continued on next page.)

CAN YOU IDENTIFY THE COMPONENTS?



With the assistance of the key lettering you should have no difficulty at all in identifying all the components in both the theoretical diagram and in the photo.

RADIO IN PICTURES.

(Continued from previous page.)

The purpose of a screened-grid valve, and of neutralisation, is to prevent unwanted reaction effects occurring in high-frequency stages. Reaction, as you will remember, is a feeding back of energy from the anode circuit of a valve to its grid circuit for further amplification. A certain amount of feed-back in an H.F. valve circuit may do nothing more than increase slightly the sensitivity or the amplifying properties of the valve, but only a minute amount of such reaction can be carried out in an efficient H.F. amplifier without "spill-over" occurring.

Stopping "Spill-Over."

Once there is a "spill-over" the vicious circle is constituted and the circuit breaks into sustained oscillation. To prevent a "self-oscillation" in H.F. amplifiers great

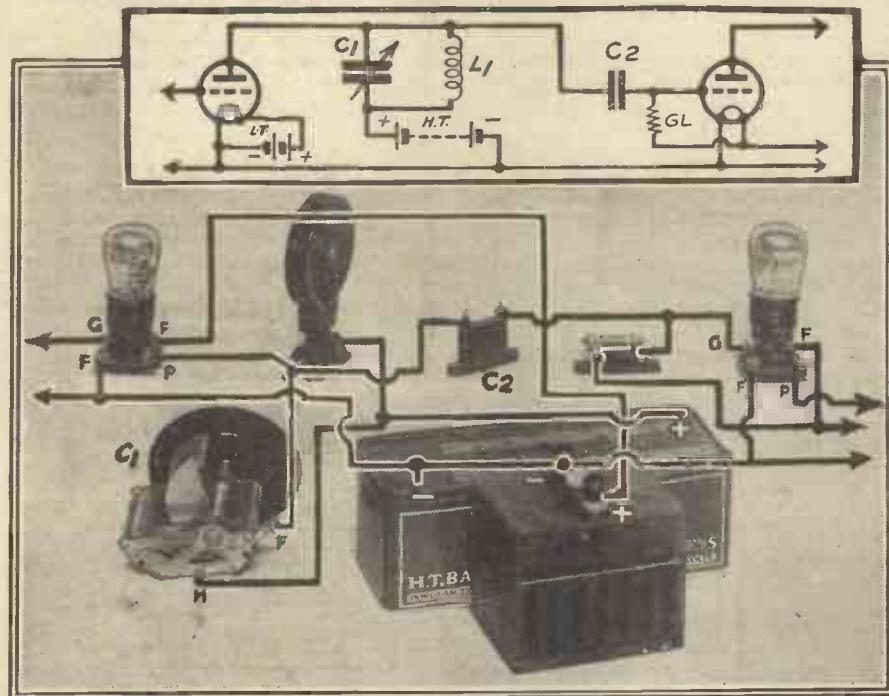
they must constitute condensers, and, as you know, if you connect a condenser between the grid and plate of the valve, you will introduce a capacity link or coupling.

In the screened-grid valve this inter-electrode capacity is almost entirely wiped out by the introduction of a fourth electrode. This is another grid which is inserted between the ordinary grid and the plate of the valve.

It is known as the screening grid, and it acts as a shield, from a capacity point of view, although it does not impede the electrons passing from the filament to the plate. Indeed, as this shielding grid is connected to a positive tapping on the H.T. battery, it assists the electrons on their journey, and tends to make the valve a more efficient amplifier.

Therefore, besides getting rid of that troublesome internal capacity effect, it also enables the circuit to be operated more effectively, and an additional gain results which makes the screened-grid valve a wonderful proposition.

USING A COIL AND A CONDENSER FOR COUPLING



The preceding illustration shows an H.F. transformer coupling, but in the above the tuned anode method is depicted. This scheme is effective, but is seldom used in the simplest forms these days.

care should always be taken to keep everything connected with an anode circuit as far away as possible from things associated with its grid circuit.

Many modern receivers incorporate metal screens, plates and boxes, in order electrically to isolate various parts; but however efficient such screening may be, and however widely all the wires connected with an anode circuit are separated from the grid wires, there still remains one thing that can give you quite an efficient but unwanted coupling effect between anode and grid, and this is the internal capacity of the valve itself.

After all, the electrodes of the valve—plate, grid and filament—are pieces of metal, and they are placed fairly close to each other. Therefore, it is obvious that

Indeed, so superior was the S.G. found to be over the ordinary type of valve in the matter of amplification, that it was not long before the manufacturers decided to apply the same principle to L.F. valves. Thus, the pentode, which is really a screened-grid valve adapted for low-frequency purposes. The pentode has yet a further grid, and so has five electrodes.

S.G.'s and "Neuts."

Neutralisation, which is now becoming almost obsolescent in favour of the screened-grid valve, applies generally to the ordinary three-electrode type. It comprises systems whereby the anode current is made to split, one part developing a voltage in a direction opposite to that which goes back to the grid in an attempt to create a reaction effect.

However, I will not go into the subject of neutralisation in detail, because, as I have said, it is now seldom used. Screened-grid valves are so simple in their application and so remarkably effective that, except in special cases, they are now almost universally used for high-frequency stages.

But I am not going to include an S.G. circuit, for I am sure you will be able to interpret one of these by yourself.

I must insist that I have not endeavoured to cover the whole theory of radio in this series of short articles, nor have I attempted to give you a complete range of circuits of all sorts. My aim has been to give you sufficient ground work in the reading of diagrams for you to be able to appreciate the various "P.W." articles and sets to their greatest advantage.

What the Pictures Show.

I will just run through the components shown in the first composite illustration this week for the benefit of new readers.

The aerial is connected to one or other of two tapping terminals on an X type of plug-in coil. This plug-in coil is shown standing in a baseboard-mounting coil holder. Across the ends of this coil is connected a variable condenser (which is marked C₁). F and M stand for "fixed" and "moving" respectively, and refer, of course, to the vanes of the variable.

You will have no difficulty in identifying the valve, while the two plug-in coils constitute an H.F. transformer. C₂ is another variable condenser, and this one is used for tuning the secondary of the H.F. transformer.

C₃ is the grid condenser and GL the grid leak.

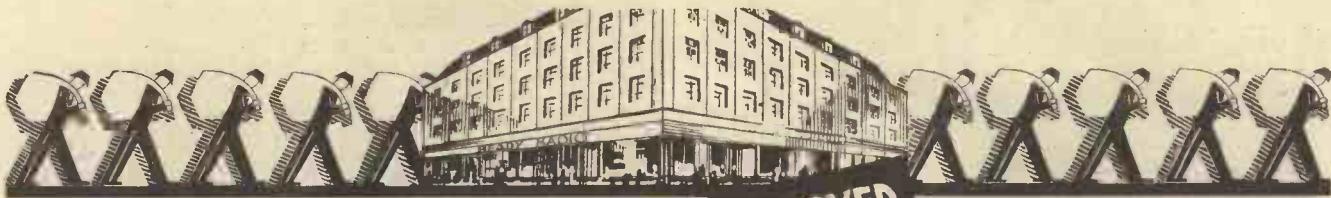
Once again you will see that the wires in the practical hook-up do not follow exactly the routes indicated in the theoretical diagram. As I have already explained in a previous article, the purpose of the theoretical diagram is to show the electrical construction of the circuit as clearly as possible.

Theory and Practice.

There would be absolutely no point in making the lines follow the twists and turns that it is necessary sometimes for the wires in a receiver to follow. Of course, I have tried to make the practical hook-up look as much like the theoretical circuit as possible; the average receiver, on the other hand, often bears little or no resemblance at all to, the pictorial aspects of its theoretical circuit. A valve may appear to the right of a variable condenser in the theoretical circuit of a set, while in the set itself it may be to the left. Also various leads will go to terminals and not direct to batteries, earth and aerial, etc., as in my pictorial hook-up.

As a matter of fact, I had at first intended to include further and more complicated circuits, but after a bit I realised that that was entirely unnecessary in view of the fact that practically every week at least one rattling good set is described in "P.W." and that this set is almost certain to be illustrated with theoretical and practical wiring diagrams, as well as with photographs.

Given, then, the first clue, you should find no difficulty at all in unravelling all kinds of circuits with such admirable material at hand.



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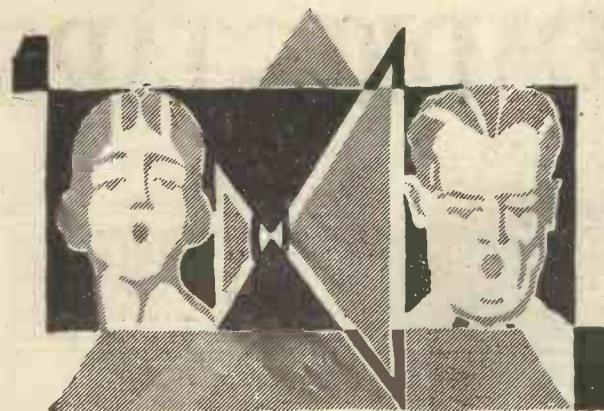
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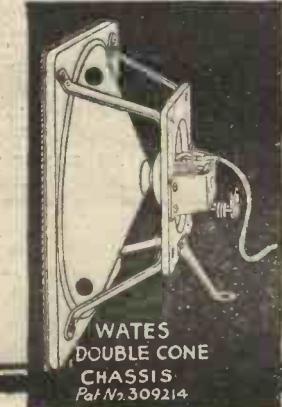
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Write for Full List.

AT HOME WITH RADIO STARS



Here we have the commencement of a brilliant new series of articles. These sketches from real life will give you exclusive and intimate sidelights on practically all the leading radio artistes and personalities.

(1.) JOHN ANSELL.

IT is a shame (for radio listeners) that Mr. John Ansell has resigned from the B.B.C., but no doubt the theatrical interests with which he is connected have benefited by the change. What is their gain is the B.B.C.'s loss.

On evenings when he wielded the baton in the studio it was a well-known fact that the musical programmes of the Wireless Orchestra were judiciously compiled with a view to giving four millions of listeners light popular compositions.

The programmes which John Ansell arranged for the Wireless Orchestra are the

It is far better to know a musician as a man rather than to know him as a musician only. Bach, for instance, is beloved by the high-brows as the Father of Music; but he was also the father of no fewer than twenty children, was often in debt and was withal a family man; which fact may endear his music to some people.

Now, my curiosity about John Ansell was aroused some months back when a friend of mine, the art editor of one of the "home" magazines, said he had just come back from securing some photographs of Little Greenfields, one of the most delightful one-floor Surrey homesteads.

In conversation it came out that Little Greenfields is the home of John Ansell. My turn to see Little Greenfields came later.

The house has a history. Once upon a time it was a stockyard, and the ground surrounding it and the solid old-English brickwork of which it was built induced the owner to convert it to what it now is—a restful and altogether delightful place, a little "churchy" in parts, perhaps, but that is only because of the old-world touch about it. It is just the sort of home one would imagine to be possessed by a busy musical man.

It Was Once a Stockyard.

The broadcasting interests with which he was formerly connected took up a deal of his time. There is so much behind-the-scenes work at Savoy Hill, of which the listening public knows nothing.

I understand that the new interests with which he is associated also leave precious little spare time. The result is that to a busy musician a restful home is a *sine qua non*; and in Little Greenfields there is plenty of rest and quiet.

The place has, naturally, had considerable conversion from when it was a stockyard. The old mixed brickwork has been covered with oak beaming and plaster, but the quaint old tiled roof has wisely been retained.

An external chimney has been built on to the end of the building, and this gives an inglenook in the main room, the lounge. Out of this a tiny window above the fireplace peeps into the open.

Corridor Charms.

I gather that John Ansell loves flowers. The garden is a picture—or, at least, it was when I visited it.

Down one side of the house a terrace is formed against the wall by a row of flagstones, and against this a wide border of tall, red tulips and white and blue myosotis looked very charming.

Another very picturesque thing was the row upon row of pots of geraniums in the window ledges, of which there are many, for a narrow hall with long low windows runs down practically the whole length of one side of the house.

There is an indefinable charm about a long, corridor-like hall with beams on the wall and in the ceiling, with the border of bright red geraniums and with the pale walls a soft background to a black oak settle and—of course—a grandfather clock.

The Reason Why.

It certainly makes you forget broadcasting and the rush and hurry of a business life. It makes one want to forget everything except music—which, I suppose, is why John Ansell has it so.

I suppose nobody wants to have the private details of his home discussed, but I can't refrain from mentioning the impression of old-worldness which is left on one's mind by the large inglenook, copied from a Sussex cottage, and the open red-brick hearth, the rows of pewter, brass and willow-pattern, and the old country furnishings of oak and elm.

John Ansell having left the B.B.C. I am assured there is no bad feeling on either side, and his resigning has been necessitated only by business reasons.

I wonder if he has a wireless set, now!

A POPULAR CONDUCTOR



A recent photo of John Ansell, whose conductorship of the Wireless Orchestra was one of the brightest features of the B.B.C. programmes.

nearest approach to the ideal for pleasing every branch of listeners (without being "middle-brow") that we have heard for a long time. It makes Mr. John Ansell and his activities particularly interesting.

A short while ago, just before he resigned from the B.B.C., I listened to a delightful hour of orchestral music of that light variety which nobody can quite classify as definitely high-brow or low-brow.

"Little Greenfields."

It was typical of John Ansell; and as the strings led up to a thrilling climax and then down in a lull of quiet melody, my memory, swayed by the music, travelled back a short while to when I had the pleasure of visiting John Ansell's quiet country home.

Musicians are supposed to be temperamental beings; yet even temperamental beings must have bodies, and in a curious kind of way one wonders how they live, and how their home-life reflects itself in their musical work.

FROM THE TECHNICAL EDITOR'S NOTE BOOK.



"MAGNET" H.T. BATTERY.

The G.E.C. people recently sent me a couple of their new triple-capacity type H.T. batteries. These are 60-volters, and retail at 13s. 6d. each. A point in their construction which particularly appeals to me is that "super-grip" sockets are fitted.

Any type of wander-plug of more or less the standard size will slip into the sockets readily and grip tightly, but they do not jam, and are easily removed. Readers who have had experience of the shallow cone-shaped sockets that grace (or disgrace!) some batteries will agree with me that this is one of those things that makes for better radio.

The construction of the new "Magnet" triple-capacity type battery is splendid throughout, the cells are large and robust in construction, and they are joined together by substantial strip connectors. Further, they are accommodated in a sort of eggbox structure that ensures both compactness and high inter-cell resistance.

This latest "Magnet" battery is undoubtedly a fine production, and I can thoroughly recommend it to the attention of readers.

"CRITIC" COIL HOLDERS.

The "Critic" coil holder, samples of which were recently to hand, is designed for baseboard mounting and can be supplied with either side or front terminals at 9d. either pattern.

The bakelite moulding of this "Critic" holder is one of the cleanest I have seen, and its insulation resistance is high. It is, of course, a single-coil holder, and it takes any ordinary plug-in coil snugly, and efficient contact is made.

THE "BUSTO" SWITCH.

A neat panel-mounting switch having a snap action is made for retailing at 1s. 3d., by Busto & Co., Ltd., of Birmingham. This switch is of novel design, and I have not seen anything quite like it before.

Its "make" is good and its "break" is of a most definite character. And although the contacts are of a completely self-cleaning character, the construction is such that the switch spindle cannot possibly turn.

THE "PIFCO" ALL-IN-ONE RADIOMETER.

The "Sherlock Holmes of Radio" is what Provincial Incandescent Fittings Co., Ltd., call their All-in-One Radiometer. And in view of the innumerable jobs that this

Tested and Found-?

device can do, it is by no means an exaggerated description.

You can test valves, circuits, H.T. batteries, L.T. batteries, components, and practically everything there is in a radio set to test, with the All-in-One Radiometer, and the price of the device

is but 12s. 6d.

Fundamentally, it consists of a multi-purpose meter with a small battery inside it. This last is a 1½-volt cell that lasts for

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

We should like to point out that we prefer to receive production samples picked from stock, and that we cannot guarantee their safe return undamaged, as it is our practice thoroughly to dissect much of the gear in the course of our investigations.

And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are therefore framed up in a readily readable manner free from technicalities unnecessary for that immediate purpose.

ages, and even when it wears out, costs only 3d. to replace.

The combination of meter and battery in a neat little instrument of watch pattern is, in itself, novel, as far as I know, but the real ingenuity displayed in the design of the All-in-One Radiometer is to be seen in the coloured and engraved scales of the dial, each giving readings according to the particular tests that are being carried out.

The whole thing is, indeed, so simplified that anyone can use it, even the veriest novice. To test a valve you merely plug it into the valve sockets provided on the back of the instrument, and an absence of needle movement would indicate a burnt-out filament.

What is very important, the needle has a dead-beat movement. The voltage and milliamp scales provide readings up to 8 and 160 volts and 40 millamps, and are quite close enough for all ordinary purposes.

RADIO INSTRUMENTS, LTD.

Messrs. R. I. are now distributing their new season's catalogue and two broadsheets (one for pasting up in show rooms and one for the dealer to supply to the public. Both are similar in layout).

There is also available a descriptive leaflet of the new R.I. mains units.

THE "EASY-WAY."

Messrs. Peto-Scott's new season catalogue, "The Easy-Way To Perfect Radio," contains a very comprehensive range of all the leading makes of radio apparatus, and a strong feature is made of kits of parts for home constructors. The whole of the goods listed are available through a system of deferred payments.

VOLUTE PLIERS COMPANY.

The address of this concern is 19, Victoria Square, London, S.W.1, and not Victoria Street as stated last week.

FOR LOUD-SPEAKER ENTHUSIASTS.

One of the biggest price reductions of the year is that of the 36s. Wates Star Loud-Speaker Unit which has proved so popular that it can now be sold at 25s. The Standard Battery Co. recently sent me one of these units fitted to one of their large chassis.

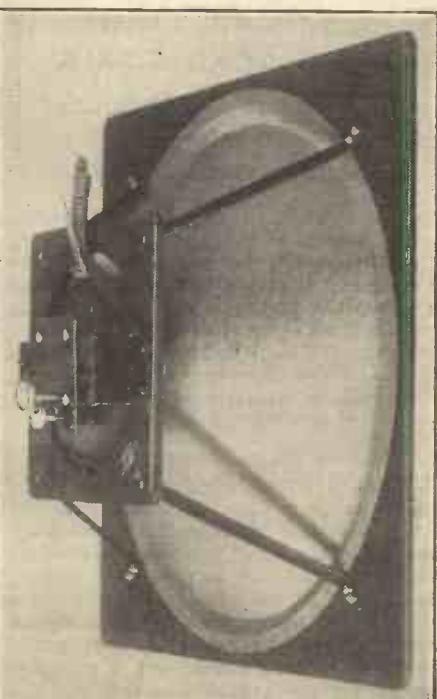
I had, of course, heard the device in operation on previous occasions, and I believe I have included a report on it in these pages.

It is a good unit, and at 25s. it constitutes a distinctly tempting offer. It is constructed on massive lines and has a special movement adjustable by means of two fine-screw controls.

Fitted to the large Wates chassis a fine response is the result. There is clean bass and a brightness indicative of a fairly even upper register. It is a loud speaker that interested "P.W." readers should make a point of hearing.

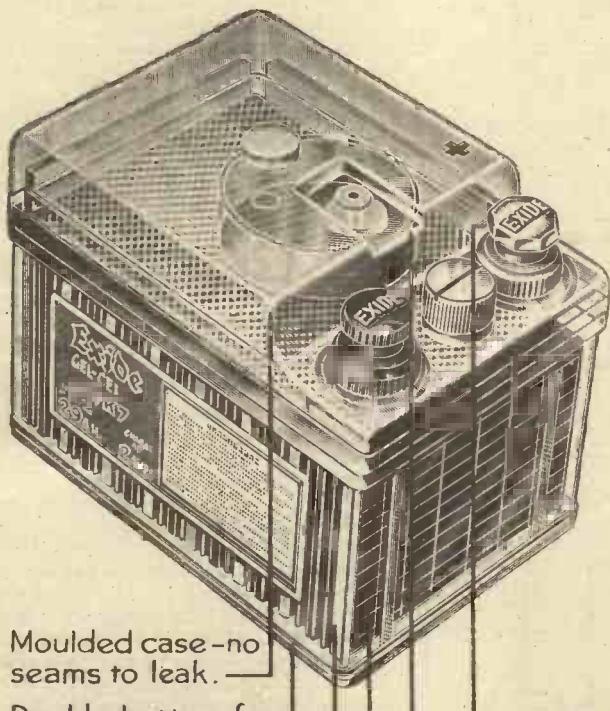
MULLARD CATALOGUES.

Three excellently produced booklets due to the Mullard people give details of Mullard Two-volt Valves, Mullard A.C. Mains Valves and Rectifiers and Mullard Accessories and Loud Speakers. A fourth publication of note is the Mullard Rapid Valve Guide Catalogue which I would certainly advise every "P.W." reader to secure.



One of the Wates Star Loud-Speaker units fitted to its appropriate chassis.

Voted-the best battery in Wireless World public Ballot



Moulded case - no
seams to leak.

Double bottom for
extra strength.

Exide Long-Life Plates.

Exide Jelly Acid.

Improved Acid Trap.

Non-interchangeable
terminals, differently
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AGAIN an Exide Battery has won first place in the "Wireless World" Olympia Ballot. Every year an Exide Battery wins this distinction. This now-famous Ballot is voted in by the more advanced wireless experimenters—men who know what to look for in a battery. In the Exide Gel-cel—the new jelly acid battery—they have seen advantages never before available in a low tension battery for portables. Examine them yourself and when next you need a battery for a portable set you will insist on an Exide Gel-cel.

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CAPT. ECKERSLEY'S QUERY CORNER

Under the above title, week by week, Capt. P. P. Eckersley, M.I.E.E., our Chief Radio Consultant, comments upon radio queries submitted by "P.W." readers. Don't address your queries to Captain Eckersley, however—a selection of those received by the Query Department in the ordinary way will be answered by him.

More Motor-Boating.

M. R. B. (Dundee).—“My present receiver, an H.F. det. and 2 L.F., I constructed in 1925, and this gave every satisfaction until quite recently, when the transformer primary winding gave up the ghost. I obtained a modern type transformer of good make, and inserted this, but the result is violent motor-boating. Why should this happen now, and not before ?”

Different ratio, different frequency response, different position (perhaps), different relative connection of windings. Try (1) de-coupling; (2) reversing one winding; (3), screening. But 2 is an experiment, try de-coupling first. Thus I suppose you have the arrangement shown at the top of my sketch.

So alter it as shown in the lower circuit.

R is 20,000 ohms, say, and C, 4 or more microfarads. Do this to all L.F. valves. (You will have to raise H.T. volts a bit.)

* * *

Mounting on Metal.

O. L. (Lancs). “Do you consider that capacity effects arising from mounting an S.G. valve holder direct on a metal base-board (which in conjunction with a vertical metal screen effectively shields an H.F., S.G. stage from the detector) cancel out any advantages that might accrue? Should the valve holder be raised off the metal by a piece of wood ?”

The control grid of a screened-grid valve is the only part, on one side of the earthed screening grid, which is “sacred” and at high potential.

You ask is it fair that this should be given a high capacity to earth. Surely it doesn't matter, because the circuit connected to it is tuned and so the grid is

anyhow connected through a (large) condenser to earth as shown in my sketch.

As to the anode, this too may be tuned, it is also obviously not connected to the valve holder. So go ahead and mount it on metal.

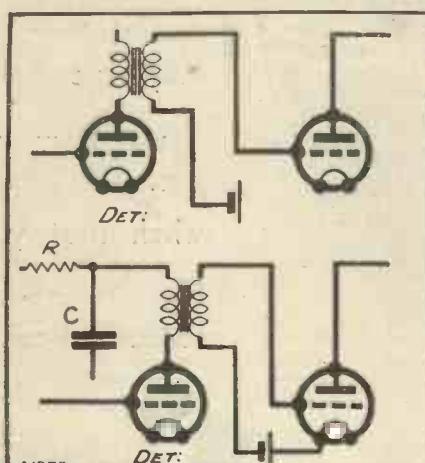
* * *

What is the Capacity?

A. E. (Walthamstow). “Is there any formula or method whereby I can calculate the capacity of a fixed condenser I use for a parallel-feed system with an L.F. transformer.

“I wish to parallel-feed the second L.F. transformer in my ‘Magic’ Three (the

TRANSFORMER CONNECTIONS



The lower arrangement is recommended to M.R.B. (Dundee).

one I am using is not the same as the one specified), so as to enable me to employ an L.F. or small power valve in the V2 position.”

You have, I take it, a little box and that is said to be a condenser, but you don't know the value of its capacity. There are all sorts of ways, of course, but with the apparatus at your disposal, I doubt if you can measure the capacity accurately.

I suppose the condenser to be of the order of 0.1 microfarads; if it were smaller you could get it by substitution and calculation with your resonant circuit. Really, I think it much better to send it to the makers and ask them to tell you its value.

If you have a transformer, however,

MORE MOTOR-BOATING—MOUNTING
ON METAL—WHAT IS THE CAPACITY?
—A SPARK AT THE L.S.

connect it like this with a valve (see below.) Make it oscillate by connecting the primary terminals one way or another. Listen to the note.

Find out the note from your piano. (Remember middle C = 256 cycles, next C 512, the next 1,024, and so on.) Then if you knew the secondary's inductance you could calculate as follows:

Assume the secondary of the transformer has an inductance of about 200 henries, then we know that

$$n = \frac{1}{6\sqrt{CL}} \quad \text{or} \quad C = \frac{36 \times n^2 \times L}{1}$$

where n is the frequency you hear in the telephones in cycles per second, L is the inductance, and C is in farads. (A microfarad is a millionth of a farad.) Good luck!

A Spark at the L.S.

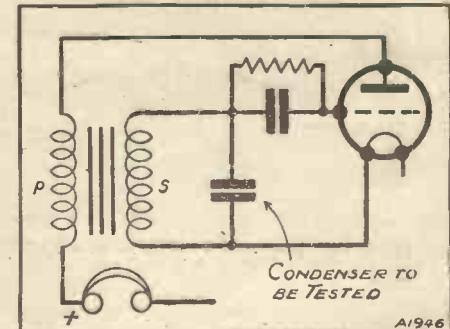
C. A. (Barnet). “Please can you tell me whether my output filter is faulty? The symptoms are these:

“If I switch on my set, and then disconnect the loud speaker, taking it into another room, and then connect it to a pair of extension terminals, I get a spark directly the loud-speaker tags touch the terminals. Is this in order, or does it mean that my output filter condenser is leaky?”

Yes, that's all right surely; you are just removing the charge in the condenser.

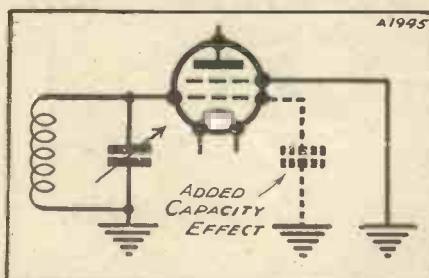
Thus, if you charge up one plate of a condenser positively, leaving the other free, the other plate becomes negatively charged and when connected to earth the whole condenser is discharged through the conductor connecting it to earth—in your case the loud speaker. Do not worry!

A SIMPLE OSCILLATOR



The experimental circuit recommended to A.E.

THE S.G.'S CIRCUIT



O.L. (Lancs.) was worried about the “Added Capacity” effect.

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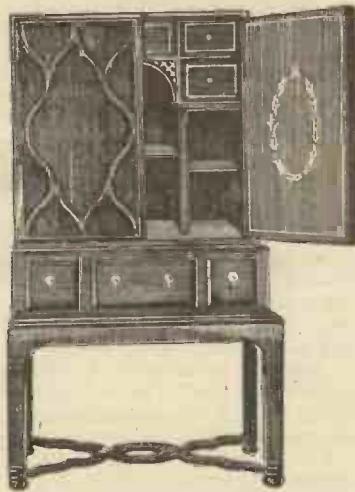
If you have never done much woodworking before, it does not matter. "THE PRACTICAL WOODWORKER" is a book that will tell you what tools to use, how to put up your work bench, what woods to use.

Then, with the aid of thousands of illustrations and working

drawings it will show you how to make nearly 1,000 useful articles. Everything is so clear, it is as good as having a master craftsman standing by you, telling you what to do at every turn.

Advanced workers will find in "THE PRACTICAL WOODWORKER" many splendid and lengthy articles on period furniture, woodcarving, inlaying, upholstery, etc. Every wireless enthusiast should learn how to make beautiful Cabinets, or to do any kind of woodworking job in or outside the house.

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Please send Free Illustrated Booklet containing particulars of "THE PRACTICAL WOODWORKER," also information as to your offer to send the complete work for a small first payment.

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I am interested in your Tool Offer.....

Pop. W.E. 1930.

CORRESPONDENCE.

RADIO IN NORWAY

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 any information given—EDITOR.

RADIO IN NORWAY.

The Editor, POPULAR WIRELESS.

Dear Sir.—I herewith beg to send you a photo of my private receiver taken at my country house, as it may possibly be of interest to your readers.

My private receiver, which I have constructed in my summer holidays, is a super. The cabinet is made from Trolite at the front, but the rest of it is cross-wood covered with fine leather. The corners are connected with brass-guards.

It is built in two compartments. The lower contains the A.C. part and the L.F. part, and the higher the rest of the receiver. In this apparatus is included the best materials possible, and you will therefore note some well-known English parts.

On the front you will first see the 3 Wates milliammeters. They are registering the current drawn by the first three valves; the second, the second detector current; and the third, the output valve.

On the front is further to be seen the two Indigraph dials, which I have found to be the only useable on this enormously selective receiver. All the other knobs are for the automatic grid bias, as the receiver is built also for valve tests.

To the left is arranged a round window. In this is shown automatically a red light when all the valves are in use for distance reception, a yellow light for local and a green for gramo. reproduction.

The antenna used is 1½ yards long and no earth is used. The first circuit consists of an Igranic A unit, tuned with an Igranic condenser.

Near the panel is a coil. This is used for the local receiver. In this case a light is shown to indicate that only two valves are burning. Now the local antenna is automatically connected to the grid of the second detector, and the rest of the receiver is cut out.

The A and B unit is of my own construction. It is able to deliver 125 m/amps at 200 volts tension. The choke gives 30 henries with 100 m/amps, and is made by the Norwegian firm Noratel, as is also the transformer.

When the receiver is used for gramo. reproduction,

the second detector is changed to a first L.F. and a green light is shown in the window.

There is not the slightest sign of A.C. hum, in spite of the compact construction. The floor is made of very thick aluminium plate which is connected to the minus B from which the bias is taken automatically to the cathodes of the indirectly-heated valves over variable dropping resistances. Variable because of the valve testing.

The receiver is stable in any condition—as the Norwegian Mountains!

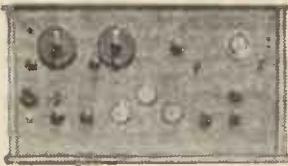
Yours very faithfully,
S. W. FLOOD.

THE "CRYSTABUTE."

The Editor, POPULAR WIRELESS.

Dear Sir.—Your "Crystabute" in a recent "P.W." is, I think, the finest crystal set I have ever made up. I have made all your crystal sets, especially

SIGNAL LIGHTS!



The main part of our Norwegian reader's set. There are three indicating lights of different colours, showing exactly how the set is "switched."

those dealing with separation of Brookmans Park, but the "Tube" is absolutely IT. My aerial is 25 feet high, and the distance from Brookmans Park is, I think, about ten miles or less. The two programmes are quite separated, and the strength is enough for two pairs of 'phones comfortably.

I MENTIONED last week a correspondent's views on the amplification obtainable on short waves from an S.G. valve, particularly in relation to my scheme for "tying it down" by coupling the aerial tightly. Now another interesting point arises with which I can find no fault.

It is this: that while an S.G. valve does get rid of "dead spots" that are due to the aerial system, they will still be present in another form. Instead of showing up as spots in which the set will not oscillate, they will be spots in which no amplification is obtained.

An Annoying Thought.

As such they will, of course, be difficult to discover; but, nevertheless, their presence is sufficient to make me worry about the set.

I am never happy if I know that there may be something wrong with a receiver. If something is wrong with it, I am happy, because I just have to go ahead and put it right. The lurking idea, though, that one is not getting the last ounce out of the gear is very annoying!

Now for a strange phenomenon that I am able to exhibit to all and sundry. It is a receiver comprising S.G., detector and L.F., with jack switching for the plate circuit of either the detector or the last valve.

With the 'phones plugged into the detector there is a wonderful threshold howl, but in the note-mag.. without the slightest alteration, it is absent. There is

I think this set will take some beating, but there you never know with "P.W."

Congratulations.

North Finchley, N.12.

Yours ever,
C. P. ROSE.

"NEW VALVES WANTED."

The Editor, POPULAR WIRELESS.

Dear Sir.—Mr. Carden Shields' comments on the German Arcotron valve are very interesting, but I doubt if there would be much demand for such a valve here. If the grid is a metallic film on the glass, the electrode spacing must be too great for really high efficiency. Moreover, it seems to me that specimens must often differ considerably from the standard, since a glass tube does not lend itself to precision manufacture and assembly as does a metal electrode. English people have always favoured the maximum efficiency per valve—compare our valves and sets with the American—and I do not think they would jump for even a very cheap valve with these disadvantages.

These valves would have to sell at very low cost, but while only a minority of listeners have A.C. mains laid on English manufacturers cannot embark on the necessary mass production.

Bedford Park, W.4.

P. R. LESLIE.

THE "MAXI-POWER" FOUR.

The Editor, POPULAR WIRELESS.

Dear Sir.—Having made up the "Maxi-Power" Four from the description in POPULAR WIRELESS with the help of your excellent free blue print, I feel that I must write and say what wonderful results I am getting.

As my set is incorporated in a radio-gram outfit I modified your design to the extent of putting a change-over switch in the detector valve grid lead, and using a volume control instead of a fixed grid leak for the first L.F. valve.

I also made the output stage push-pull and built de-coupling units into the detector and L.F. anode circuits.

I can only say that the results obtained more than justify the extra trouble involved. I can get nine long-wave stations at reasonable loud-speaker strength, while a list of medium waves received would be too long and tedious to write or read. Selectivity is entirely adequate, as even with the 35-turn primaries I can cut out Manchester—12 miles away—in three degrees of the maximum setting.

For the gramo. side I am using a Burnept needle-arnature pick-up, and results are beyond reproach.

In conclusion, may I thank you once again for a very wonderful circuit, and also for the excellent blue print, which greatly simplified the construction thereof.

Yours truly,
G. ATKINSON.
Cheshire.

SHORT-WAVE NOTES

By W.L.S.

News and views concerning short-wave transmission and reception.

not even a leak across the transformer secondary as a precaution against the threshold howl!

Thinking that the solution might lie in the fact that the note-mag. had a choke-filter output and the detector had not, I arranged my choke and condenser externally, so that instead of plugging in the 'phones, I plugged the choke itself into either one jack or the other; but this has not altered things at all.

Use a Choke Output.

Of course, there are various things that stop the howl when the detector only is in use, but these do not solve the original problem. For instance, the provision of a resistance as high as 250,000 ohms across the output choke, or even the headphones, cures it at once.

Incidentally, I might mention, for the benefit of those wearing Brown's "A" 'phones (and several of the really enthusiastic DX hounds do), that it is a wise precaution to use choke output. It is not the best thing in the world for head-

phones to have 8 or 10 millamps of D.C. flowing through them, first in one direction and then in the other. (I never met anyone who would take the trouble to see that his 'phones were connected up correctly for polarity.)

Just before writing these notes, I had been listening to a speech by Mr. H. G. Wells, relayed over the transatlantic 'phone on 20·5 metres. The concluding announcements were to the effect that England was now closing down to the Columbia Broadcasting Company's network. We hear very little of these relays, and yet I understand that the average transatlantic relay is a great success in the East-to-West direction.

Practice Records.

Someone, a few weeks ago, brought up the question of Morse records for practice purposes. I am indebted to a Bournemouth reader for the following particulars: Suitable records are H.M.V. Marconi Official Training Signals, 9502 to 9513. Catalogue No. 625B to 630B. Also Columbia Morse Code records, 3262 to 3264.

An enthusiast from Seaton, Devon, wants to know how to make his set function well below about 30 metres, having been unsuccessful as yet. Well, W. B. H., that would take a large amount of space, but several others seem to be placed in the same position. I therefore hope to make my next article a complete "Beginners' Guide" on this particular subject. It is certainly too wide a subject to deal with adequately and briefly at the same time.

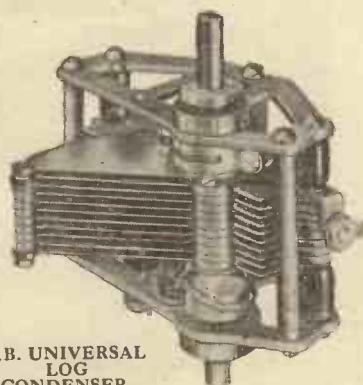


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"Popular Wireless," 15/11/30.



RADIODITORIAL

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

The Editor will be pleased to consider articles and photographs dealing with all subjects pertaining to wireless work. The Editor cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped and addressed envelope must be sent with every article. All inquiries concerning advertising rates, etc., to be addressed to the Sole Agents, Messrs. John H. Lile, Ltd., 4, Ludgate Circus, London, E.C.4.

The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the techniques of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and 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 BROKEN HEART.

D. W. (Fishponds, Bristol).—"For months reception has been really heartbreaking. I have spent hours trying to improve it.

"Nothing I could see was wrong, and in the end I was simply broken-hearted. I could not afford to spend more on it, and was telling

a friend about it when he offered to look over it for me.

"He has had a good deal of experience with sets, and after listening to it for a couple of minutes, he said : 'Um ! Sounds like a broken primary to me.'

"To cut a long story short, he brought round a spare transformer he had, connected it up, and lo ! the set was just as good as ever. You can bet I am pleased, but I still feel sorry for myself when I think of the hours I spent trying to find that fault.

"What is the usual way of telling when a primary is broken in case I ever strike another

one ? Or must I always depend on the good offices of a friend ?"

You can easily test for a break in the wiring of a transformer, a choke, a coil, or even straightforward circuit connections in the set itself by means of the phones and dry-cell test.

This is very easily carried out, and consists of connecting a pair of phones in series with a dry cell and listening to the clicks caused by making and breaking a contact. This is arranged so as to include the parts of circuit under test.

Good strong clicks when the circuit is made and broken indicate that the connections throughout are sound, but failure to get a click shows that the wire is broken somewhere and thus enables you to locate faults very quickly. Full details of the method have been given, and are still given, in "Radiotorial" from time to time. (Please note that all Technical Queries should be asked on the forms provided, which will be sent free of charge on application.)

(Continued on page 494.)

HOW IS THE SET GOING NOW ?

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.

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Feed your output valve through a Varley L.F. Choke or a Varley Output Transformer and put an end to this waste. You will get increased power and purity from your output valve. The sensitivity of your loudspeaker will be increased and its windings safeguarded against burning out.

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The batteries that give unwavering power

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 492.)

A CIRCUIT FOR CENTRE-TAPPED COILS.

N. F. (Paddington, London, W.).—“In addition to several valves of the H.F. (not screened-grid) type I have on hand quite a number of centre-tapped coils, and I am told that these can be used for neutralised H.F. stages, and for Hartley circuit reaction.

“Could you give me point-to-point wiring of a two-valver on these lines ?”

You will need the usual components for such a receiver, as mentioned in the connections given below.

The aerial terminal is joined to a flexible lead that goes to the centre tap on the aerial coil. One end of this coil goes to earth, to a .0005 tuning condenser, to two filaments, to a metal screen between H.F. and detector stages, and to L.T. negative and H.T. negative.

The L.T. + terminal goes to on-off switch, the remaining side of this switch going to the remaining filament terminals on the two valve holders. The grid of the H.F. valve holder goes to the remaining side of the .0005-mfd. tuning condenser, to the remaining end of the aerial coil holder, and to one side of the neutralising condenser. The remaining side of this neutralising condenser goes (through the screen) to one side of the coil holder that will hold the coil which acts as a primary of the H.F. transformer. The other side of this coil holder goes to the plate of the H.F. valve.

The H.T. + 1 terminal is connected to the centre tapping of this coil. Close beside this coil holder is another which takes the secondary coil, one end of this going to the .0005-mfd. tuning condenser and to a 2-megohm leak, and .0003-mfd. grid condenser. The remaining sides of the grid leak and grid condenser are connected together, and taken to the grid of the detector valve. The other end of the secondary goes to the remaining side of the .0005-mfd. tuning condenser, and to a .0001-mfd. reaction condenser. The remaining side of the reaction condenser goes to the plate of the detector valve holder and to H.F. choke. H.T. + 2 is connected to one ‘phone terminal, and the other ‘phone terminal goes to the remaining side of the H.F. choke. The final connection is from the centre tapping on the secondary

to L.T. + wiring—i.e. any point between the on-off switch and the filament connections on the valve holders to which it is joined.

A RESISTANCE FOR REGULATING VOLTAGE ON THE PLATE.

T. A. R. (Huddersfield).—“To simplify wiring and external connections, I should like to use one H.T. + terminal instead of different ones for the various valves. I know this means using fixed resistances to drop the voltage to that required on the plates, but I do not see how the value of the resistance in circuit is calculated.

“Is this done in the same way as for filament current ?”

Fundamentally the problem is the same, whether the question is how many ohms to put in to “reduce”

a low-tension battery from, say, four to two volts, or to “reduce” a 200 supply to 100 volts in the case of the plate circuit of the valve. And in both cases the important thing to know is the correct current consumption of the valve at its rated voltage.

For instance, if you are going to use an L.F. valve which when properly biased and with correct voltage of 120 on the anode takes a plate current of 4 millamps, and you wish to give 120 volts to this but your supply is 200 volts, you could calculate the anode resistance required to bring down the voltage to the necessary figure as follows :

Divide the volts which must be dropped—or, in other words, the difference between the plate voltage required and the voltage available—by the “amperes” taken by the valve’s plate circuit.

In this case the plate current should be 4 millamps (.004 amp.), so this figure must be divided into the difference between the two voltages, which is, in this case, 80 volts.

.004 goes into 80 twenty thousand times,

$\frac{80}{.004} = 20,000$ and so the required resistance for such a valve and voltages would be 20,000 ohms.

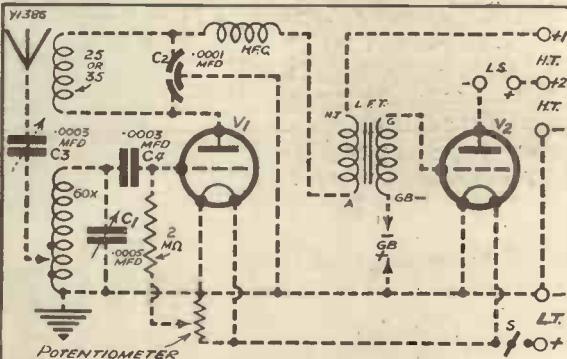
BALANCING THE COIL AND CONDENSERS.

P. H. A. N. (Wexford).—“I learned from ‘Pentode’s’ articles, and I have since proved in practice, that a small coil in conjunction with a big capacity tuning condenser will cover the same wave-length as a much larger coil in conjunction with a small tuning condenser. Which of these arrangements gives the greater selectivity, or is there no difference ?”

On ordinary wave-lengths selectivity is usually better when a small inductance and a comparatively large condenser setting is employed, than when a larger coil tuned to the same wavelength by means of a smaller condenser.

(Continued on page 496.)

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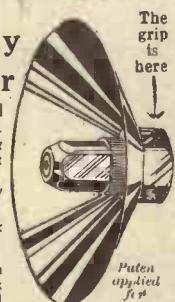
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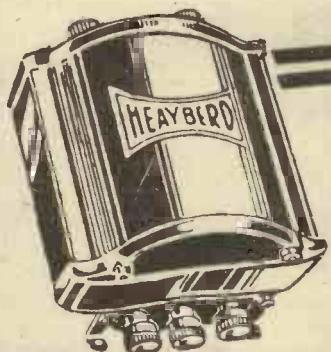
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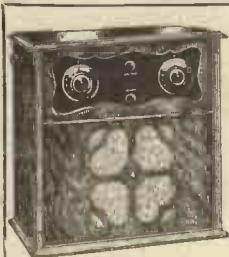
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RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 494.)

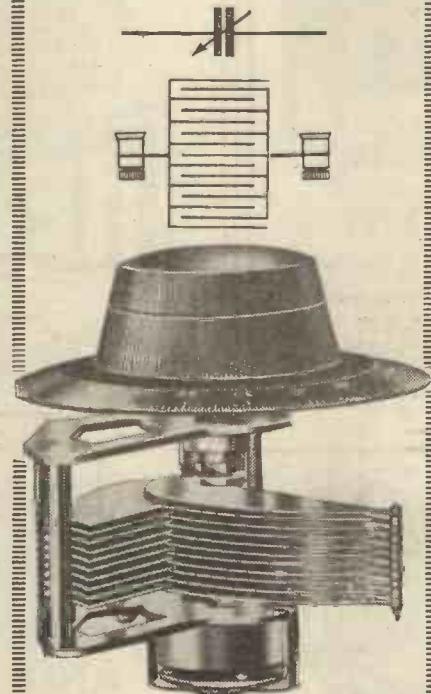
ADVANTAGES OF OUTPUT FILTER FOR LOUD SPEAKER.

R. M. (Limerick, Ireland).—"When first made, the set was very unstable, and in fact would not work at all except with a continuous buzz. Acting on P.W.'s suggestion I fitted an anti-motor-boating device (consisting of fixed resistance and a 1-mfd. condenser) which worked wonders and made the set usable at once.

"But there is still a faint tendency to jarring on certain notes which I put down to L.F.

"INSIDE" INFORMATION

No. 5. THE VARIABLE CONDENSER.



Everyone knows the variable condenser and how one set of vanes can be moved in relation to the other. Above the photograph, the sketch shows that each terminal is connected to its own set of vanes. The theoretical sign for a variable condenser (top) shows the essential adjacent surfaces, the arrow indicating that the active area is adjustable.

THE NEW "P.W." DIAGRAPHS.

instability. Would this be improved by using a filter output for the loud-speaker circuit?"

Probably improvement would be effected by decoupling the output circuit by means of a filter circuit. In any case there is much to recommend this practice, apart from the effect on L.F. instability, and we should certainly advise you to try the method in preference to running the plate current from your last valve through the loud-speaker winding.

Even if the jarring to which you refer is not caused by L.F. instability (and is not therefore affected by the filter arrangement) there are other advantages of a filter, and you would then know that you must look elsewhere for the cause of the jarring, such as insufficient grid bias, loud-speaker or cabinet resonance, etc.

MEASURING PLATE CURRENT.

T. H. A. (St. Annes-on-Sea, Lancs).—"I have a milliammeter wired into my four-valve set in the negative high-tension lead between

(Continued on page 498.)

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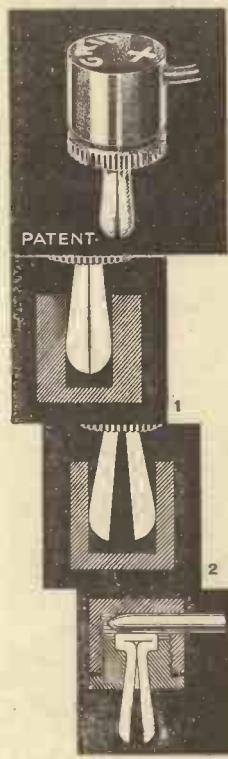
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Matched Valves 1/- extra per set.
Send C.O.D. if desired.
Phone: City 3798

LIST OF P.R. SUPER GOLDEN SERIES.							
	Type	Fif. volts	Amp. amps.	Imp. ohms	Amp. amps.	H.F. Det. L.V.	R.C.
4/6 EACH	GPR 5/2	.095	24,000	13.8	1.35	H.F. Det. L.V.	R.C.
4/6 EACH	GPR 5/2	.095	12,000	32	1.35	H.F. Det. L.V.	R.C.
4/6 EACH	GPR 5/2	.095	40,000	32	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	10,000	1	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	40,000	41	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	20,000	19.8	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	11,000	37.8	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	7,600	41	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	4,000	103	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	2,000	203	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	1,000	406	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	500	812	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	250	1612	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	125	3232	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	62.5	6464	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	31.25	12896	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	15.625	25792	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	7.8125	51584	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	3.90625	103968	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	1.953125	205936	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.9765625	411872	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.48828125	823744	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.244140625	1647488	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.1220703125	3294976	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.06103515625	6589952	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.030517578125	13179888	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0152587890625	26359776	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.00762939453125	52719552	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.003814697265625	105439104	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0019073486328125	210878208	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.00095367431640625	421756416	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.000476837158203125	843512832	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0002384185791015625	1687025664	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.00011920928955078125	3374051328	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.000059604644775390625	6748102656	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000298023223876953125	13496205312	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.00001490116119384765625	26992410624	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.000007450580596923828125	53984821248	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000037252902984619140625	107969642496	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000018626451492309572265625	215939284992	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.00000093132257461547861328125	431878569984	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.000000465661287307739306403125	863757139968	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000002328306436538696532015625	1727514279936	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.00000011641532182693482660078125	3455028559872	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.000000058207660913467413300390625	6910057119744	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000000291038304567337066501953125	13820114239488	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.00000001455191522836685327509765625	27640228478976	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.000000007275957614183426638798828125	53280456957952	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.000000003637978807091713319394415625	106560913915904	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000000018189894035458566596972078125	213121827831808	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.00000000090949470177292832989860390625	426243655415604	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.000000000454747350886464164949301953125	213121827831804	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000000002273736754432320824746959765625	106560913915902	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.000000000113686837721616041237347984375	53280456957951	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000000000568434188608080206187239721875	26640228478975	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000000000284217094304040103093619609375	13320114239487	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.000000000014210854715202005204730930475	66640228478973	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000000000071054273576010026023694975075	33320114239486	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.00000000000355271367880050130184747525375	16664022847897	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.000000000001776356839400250650093737517875	83320114239483	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000000000008881784197001253250468687589375	41664022847897	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000000000004440892098500626625234343896875	20832011423948	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000000000002220446049250313312617171944375	10416640228478	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.000000000000111022302462515665630858547221875	52083201142394	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000000000000555111512312578328152472210109375	26041664022847	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.000000000000027755575615628916407620510505475	13020832011423	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000000000000138777878078144582038102525252375	65104166402284	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.00000000000000693889390390722910195126261261875	32552083201142	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.000000000000003469446951953611450957801306309375	16276104166402	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.00000000000000173472347597785552529540565315475	81380520832011	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.000000000000000867261737988927777777777777777775	40690251627610	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000000000000004336308689444888888888888888888875	20345128131380	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.00000000000000021681543447224444444444444444444375	10172564065190	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.00000000000000010840771723612222222222222222222375	5086282032595	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.000000000000000054203858618061111111111111111111875	2543141016297	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000000000000000271019293090305555555555555555554375	1271570508148	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000000000000000135509647545152777777777777777777375	6357852540744	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000000000000000067754823772573333333333333333333375	3178926270372	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.00000000000000000338774118862866666666666666666666375	1589463135186	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.000000000000000001693870594314333333333333333333333375	794731567593	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000000000000000008469352971571666666666666666666666375	397365783796	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.000000000000000000423467648578583333333333333333333333375	198682891998	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000000000000000002117338242892916666666666666666666666375	993414450494	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.00000000000000000010586691214464583333333333333333333333375	496707225247	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.000000000000000000052933456072232916666666666666666666666375	248353612623	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.0000000000000000000264667280361164583333333333333333333333375	124176806312	1.35	H.F. Det. L.V.	R.C.
POW. 7/6 EACH	GPR 11/3-4	.09	0.00000000				

RADIOTORIAL QUESTIONS AND ANSWERS. (Continued from page 496.)

the L.T. and H.T. negative terminals. This tells me the total current consumption of the plates of the valves, but I should like to know these separately.

"As the milliammeter is permanently wired into circuit I do not wish to move it if it can be avoided, so can you tell me if there is a way of telling how much current each valve separately is taking, as well as the total current taken by all the valves?"

You can tell this in a moment by pulling out of their sockets the valves it is not desired to measure, and leaving in the single valve the current of which you wish to know. If your milliammeter is a sensitive one there will be a distinct decrease in the total current flowing as each valve is pulled out of circuit.

Probably you will find that when the power valve is removed there will be a very big drop in the reading, such as, for instance, from 22 to about 7. The other valves will not cause such a big drop, but the L.F. valve and the screened-grid valve may cause a drop of two or three millamps each.

Usually the detector valve takes very little, especially if it is resistance-capacity-coupled, or is of

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The lightest,
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THE "NEW COIL" TWO

(Continued from page 467.)

because the layout is completely symmetrical. There is thus no need to trouble about reversing right and left when working on the back.

Having pricked into the ebonite to mark the position of the holes, run a small $\frac{1}{8}$ in. drill through each, then go over them with larger drills, and enlarge them up to the correct sizes for the fixing bushes of the components.

Ready to Start

Next fix the panel to the baseboard with three screws, passing through holes in the lower edge of the panel into the front edge of the baseboard. (Panel brackets are scarcely necessary with so small a set.) Then prepare the terminal strip and fix it to the rear edge of the baseboard in a similar manner.

Now attach the appropriate components to the panel, and you are ready to start the assembly of the parts on the baseboard. Provide yourself with an assortment of brass screws ($\frac{1}{8}$, $\frac{1}{4}$, and $\frac{5}{8}$ in. are the most useful sizes), and proceed to fix down the components in the positions shown in the wiring diagram.

This part of the job will not take you long, and then you will be ready to start the wiring. You will discover this is very easy, too, for the layout was carefully designed to make it so.

A Time-Saving Tip

It is just a matter of following out the wiring diagram carefully and methodically, and without hurrying unduly. As you fix each wire in place cross out the corresponding line in the diagram, and you will be surprised how quickly and accurately you finish the job.

When it is done, check up each lead once more to make sure it agrees with the diagram and satisfy yourself that it is really sound : see that every lead is securely gripped by any nut or terminal which holds it, and see every soldered joint is perfect by giving it a pull with the pliers. It may seem a tiresome procedure, but it may save you hours of annoyance later.

Now the receiver is finished and ready for test, and you just want the necessary working data.

The detector valve should be of the H.F. or "special detector" type, and the L.F. of the "power" variety. The detector socket is the one nearer the coil unit, and the L.F. is nearer the "L.S." terminals.

Some Final Hints

The H.T. voltages should be some 60 to 80 on H.T.+1 (adjust for the smoothest possible reaction control), and 100 or 120 volts on terminal H.T.+2. Grid bias will be about $4\frac{1}{2}$, 6, or $7\frac{1}{2}$ volts, according to the maker's instructions for the particular power valve you have chosen.

With these matters attended to you are ready to try out the set and discover for yourself what a fine little outfit you have built. We have already told you how to use the selectivity control, and it only remains to mention that the wave-change switch knob should be pulled outwards for the medium wave-band and pushed inwards for the long waves.

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NEW COIL TWO

(Described in this issue.)

or 12 Monthly	
CASH	Payments of
Kit "A"	£3 - 9 - 6
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Kit "C"	£5 - 2 - 3

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or 12 Monthly	
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Kit "A"	£3 - 18 - 3
Kit "B"	£5 - 5 - 9
Kit "C"	£6 - 10 - 9

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FOR THE LISTENER

(Continued from page 472.)

enough to attempt to spell, proved much too hard a nut for Colonel John Loder to crack!

Two things emerged from their recent conversation about Russia; first, the extraordinary gulf between Soviet ideals and our own; and second, the good progress which (according to Soviet ideas) is being made in the reorganisation of that vast country.

Colonel Loder's blunt criticisms were the criticisms of a traveller; but nothing he could say shook the confidence of the representative of the Soviet Embassy.

"Our workers," he claimed, "are living in better conditions than those in many other countries." All the same, I got the impression that no outsider knows very much of what is going on in Russia. A curtain is drawn.

"The Importance of Being Earnest."

Wilde's play, "The Importance of Being Earnest," is one of those plays in which the author creates characters and situations in order to drape them with the felicities of his wit. It is brilliant in the extreme.

Epigrams are as thick as blackberries on a hedge. But the difficulty is to make it live. It was hard enough to bring it to life thirty years ago; and almost impossible to do so nowadays.

Save for the brilliances, it was, like Ernest himself, "dead, quite dead." Peter Hannen as Algernon, and Norah Baring in the party of Cicely, spoke clearly, and machine-gunned the epigrams and witticisms over to us very well; but Gladys Young, as Lady Bracknell, was the only one who seemed to be at all inside her part.

To cut this play is to kill it. Mr. Gielgud cut it well; and need have no qualms about it, for it was practically a corpse before he began!

Science and Sermons.

I and many others are grateful to Mr. Gerald Heard, who in "This Surprising World" keeps us up to date in scientific matters; but I cordially object when, as recently, he uses stones or ants or bacteria as texts upon which to hang homilies.

Every man to his job. Mr. Heard is a very good man at the job of popularising scientific findings. He speaks at 7 o'clock. The youngsters are in bed. The rest of us are perfectly capable of finding the moral for ourselves, if we want to.

If we don't want to, Mr. Heard runs a risk.

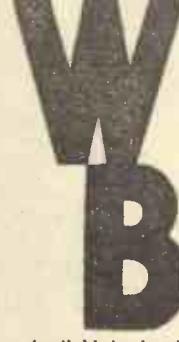
At the Piano.

Maurice Cole has recently been playing Bach. He has been very good. The steady development of this young pianist gives great pleasure to his many friends.

Arthur Rubenstein, playing with the Symphony Orchestra in the Tschaikowsky Concerto in B Flat Minor, was superb. He can hit the piano even harder than Marcelle Meyer—and that is saying a good deal! But however hard he hits, he never loses tone, and the accumulative effect of his playing is a memorable experience.

Marcelle enjoyed herself in the Mozart Concerto, but not more than I did. She is great.

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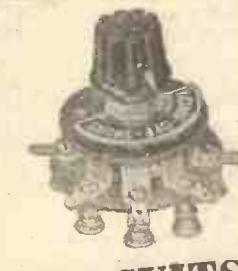
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TECHNICAL NOTES.

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

Clean Soldering

A SIMPLE hint was given in this journal a week or two back for protecting the panel, when doing under-panel soldering, from particles of solder and traces of flux.

The hint in question, as you will remember, was to fix a piece of brown paper over the panel, this paper being pierced by the projecting parts of components, so that any solder or flux which escaped went on the brown paper instead of upon the panel.

I suppose the majority of experimenters and constructors use some form of paste or rosin as a flux for soldering. This is certainly safer than "soldering juice" (a solution of zinc chloride) in the sense that if traces of the flux are left behind on the joint they will not corrode it.

But, at the same time, I always think that the "juice" is much quicker and certain so far as the making of the soldered joint itself is concerned.

Producing Leaks.

When the hot iron is applied to the soldering paste this naturally sputters and particles of it may be thrown upon the surface of the panel. These are not likely to cause any serious electrical leakage in themselves, but they form a greasy and sticky surface which, in time, collects dust, and it is this dusty surface which is a more serious source of leakage than the grease itself.

If you elect to use grease as a soldering flux, then it is very much more important to keep the panel and, indeed, all surrounding parts of the set, protected from any fine particles of the flux which become spattered about.

The zinc chloride is definitely an electrolytic conductor, and it has also a curious habit of "creeping," so that if you let it get upon the panel you will very soon be troubled with serious electrical leakages.

Furthermore, it will corrode the joint, or any other metal parts with which it comes in contact, if it is left sufficiently long, and so it is very important to clean the joint after the soldering is completed.

For Safety.

For all-round radio and electrical work I think, perhaps, the soldering paste is to be recommended as being so much safer, although for general work on the bench, where there is no danger to surrounding objects, and where the joint can afterwards be cleaned with water, the liquid flux is, in my experience, very much quicker and more convenient.

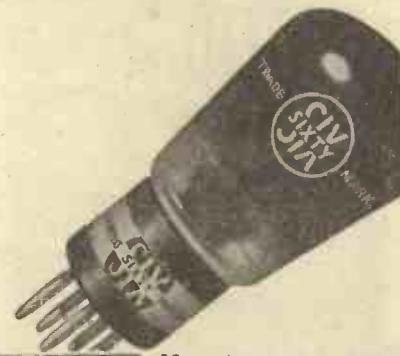
Power and Super-Power.

There seems to be a popular impression amongst amateurs that if a power valve is substituted for an ordinary low-frequency amplifier the output will necessarily be louder, whilst if a so-called "super-power" valve be substituted the output will be colossal.

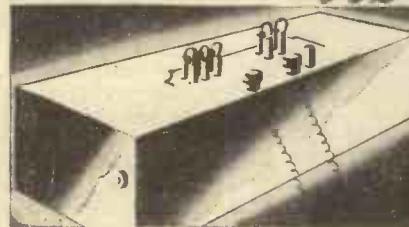
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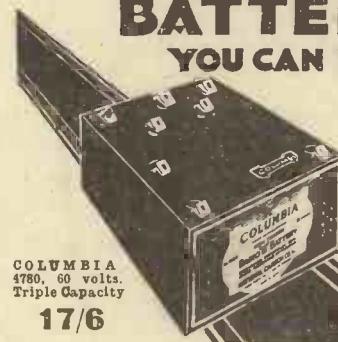
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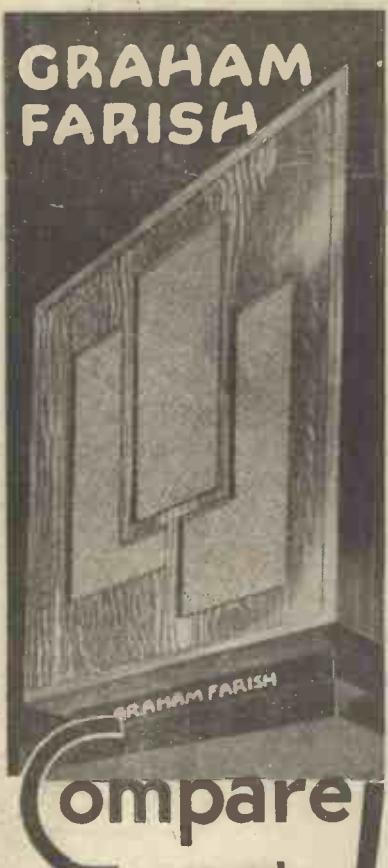
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TECHNICAL NOTES

(Continued from previous page.)

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Perhaps it is that we are apt to some extent to be hypnotised by the words themselves. The psychology of the word "super" has, indeed, been exploited for many years past by American film producers!

Questions of Amplification.

As a matter of fact, the output from a valve, in relation to the input, depends, amongst other things, upon the amplification factor, and it may be in some cases that the amplification factor of a so-called "power" valve is actually comparatively small.

In the case of a super-power valve the amplification factor is almost invariably quite on the low side. What, then, you may say, is the advantage in using the power or super-power valve if it does not mean that greater output is obtained?

Every wireless experimenter knows, in fact, that power and super-power valves are always associated with large output (in intention if not in realisation), and therefore it may come as a surprise to many to know that a power valve does not necessarily produce greater output.

Power Handling Capacity.

The explanation of the whole thing is simply this. If you have developed in your receiving circuit, prior to the first power stage, a reasonably large signal strength, then for the next amplifying stage you must have a valve which is capable of handling the already strong signals and increasing the same by amplification and handling the new increased output.

The extent to which the input is magnified before becoming the output is not for the moment important. Now, a valve which is capable of handling a reasonably large input and converting it into a larger output is vaguely and somewhat loosely called a "power valve."

In the same way, if you desire a still further stage of amplification it is obvious that the next valve must be capable of handling greater power than the previous one, and the same argument applies again.

A Popular Mistake.

But this does not mean that the power valve or the super-power valve has necessarily produced any very great magnification in the signals. For instance, let us suppose that you have both a power stage and a super-power stage, the magnification factor of the power stage being, say, 10, and that of the super-power stage being, say, 6.

If you substitute the super-power valve in the power position you will actually obtain a smaller magnification than you obtained with the power valve.

I think you will see, without any further explanation, that the distinguishing feature of a power or a super-power valve is its capability of handling a comparatively large amount of power and that this has not necessarily any direct connection with its actual amplification factor.

Additional Running Costs.

Naturally the impedance of the valve will as a rule be lower the greater the power which it is intended to handle, and it is

(Continued on next page.)

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TECHNICAL NOTES.

(Continued from previous page.)

this which enables the valve to handle a large amount of power without consequent overloading and distortion.

It goes without saying that both the filament current and the anode current will be increased, since the extra power involves an extra heavy H.T. current, and this, although driven by the H.T. voltage, consists in fact of emission current from the filament.

A Simple Illustration.

I mention this because there is often a temptation, especially on the part of beginners, to put in power valves where ordinary valves will do, in the belief that greater output will thereby be obtained. To use a power valve in the earliest stages of the L.F. amplifier is like employing a seven-seater motor-car to carry only a single person.

As the signals are amplified in, say, the second or third stages of the L.F. amplifier, so the need for a more capable valve arises. Returning to the motor-car analogy, this corresponds to the party having increased to, say, 4 or 5 persons, when naturally a more commodious car becomes necessary.

Pentode Points.

Whilst on the subject of power valves and super-power valves, it is perhaps advisable to mention the pentode which also seems to have a good deal of fascination for many.

It is often thought that the pentode is a sort of power valve and super-power valve all rolled into one, and that the introduction of a pentode L.F. stage will in some magic way give the equivalent of a whole additional stage.

Without wishing in any way to underrate the special advantages of the pentode valve, I should point out that the foregoing idea is quite a mistaken one. The pentode, as a matter of fact, is what might be called primarily an "economical" valve; that is to say, it gives at a single stage quite a large amount of amplification and it is capable, owing to its special design, of handling a comparatively large amount of power: but its impedance, as you would expect from its high amplification factor, is also large compared to that of an ordinary power or super-power valve.

Moreover, it is not able to cope with a very large grid swing—in other words, the loudness of the input with which it can deal is comparatively limited. In the same way, however, its input is also definitely limited owing to its high impedance, and therefore it does not produce the same result as may (in proper circumstances) be obtained by the use of, say, an L.F. valve followed by a super-power valve.

The Proper Conditions.

Perhaps I can sum all this up by saying that if you want to do the most with a particular stage of low-frequency amplification, and provided the conditions are appropriate (this is very important) the pentode may be an extremely useful valve.

But if you want to handle really large amounts of power you will, as likely as not, find that the pentode is not the valve for the purpose but that you must rely upon the

(Continued on next page.)

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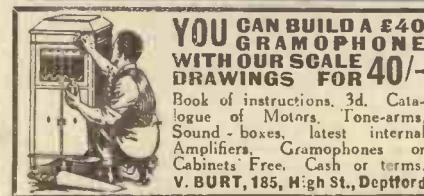
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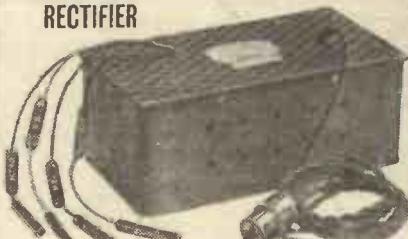
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TECHNICAL NOTES.

(Continued from previous page.)

more conventional arrangement of successive stages, increasing in power-handling capacity.

An Interesting Question.

In a very interesting article recently by Mr. Victor King, the question of mains hum was discussed and it was pointed out that—provided the actual background is not above a reasonable minimum—the actual distracting effect differs with different people.

It is curious how one can get accustomed to a sound, especially if it is a continuous or uniform and unvarying sound. The ticking of a new clock, for instance, is at first very noticeable, but after a few days one becomes so used to it that one only notices the clock if it stops, that is, if the noise ceases.

TECHNICAL TWISTERS

No. 35.—Valve Connections.

CAN YOU FILL IN THE MISSING LETTERS ?

On the ordinary valve, the pin which is "staggered" away from the others makes connection with the

The terminal on the top of an S.G. valve is joined internally to the

The extra terminal on the base of a Pentode is joined internally to the

The centre-pin of a 5-pin A.C. valve holder makes contact with the

The ordinary detector's grid leak return normally goes to the side of the filament.

LOOK OUT FOR THE MISSING WORDS NEXT WEEK.

Last week's missing words (in order) were : Potential. Amperes, Resistance, Ohms. Higher.

All this is perfectly true, but it raises the very interesting question as to how much background in a mains-operated receiver can be reasonably tolerated. It is clear that the background must in any case be of very small intensity compared to the average loudness of the reproduction, and it is also clear that some people are very much more sensitive to background than others.

An Essential Feature.

At the same time, it would appear that the background, using the mains, can never be completely eliminated (in the same sense as with battery operation), and it becomes a question as to the point at which the background may for all practical purposes be said to have been extinguished.

It is obvious, at any rate, that a very close approximation to practical perfection—if I may use the phrase—is obtainable with modern receivers and components, and there is no serious reason why any appreciable background should be tolerated.

CHEAP METERS

You would not attempt to navigate a liner with a vest-pocket compass. It is equally foolish to take electrical measurements on batteries with a cheap pocket meter of about 50 ohms per volt. They simply ruin H.T. batteries. Ask these questions first. Is the resistance not less than 500 ohms per volt? Is the accuracy to the Brit. Eng. Assoc. standard?

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JUNIOR R.K. Fitted with 6" corrugated Cone, with moving coil having an impedance of 10-15 ohms at 50/4000 cycles. Price £4 15s. This model is not supplied complete with cabinet.

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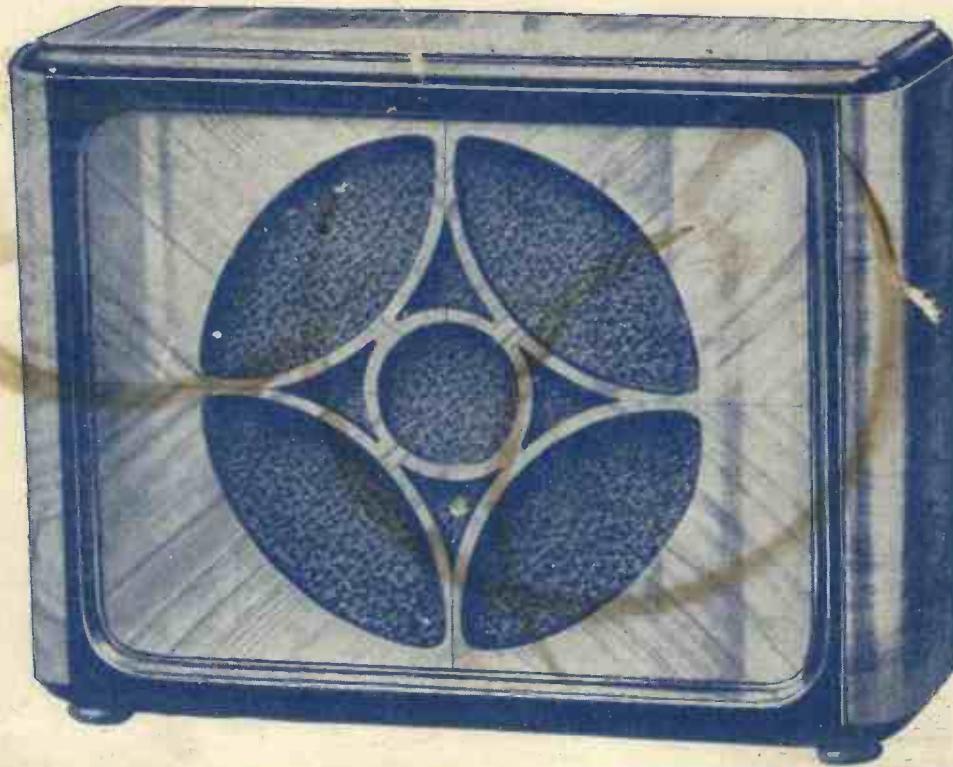
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