

The Wireless Constructor

6^d

AND TELEVISION REVIEW

Vol. XVIII.

AUGUST, 1934.

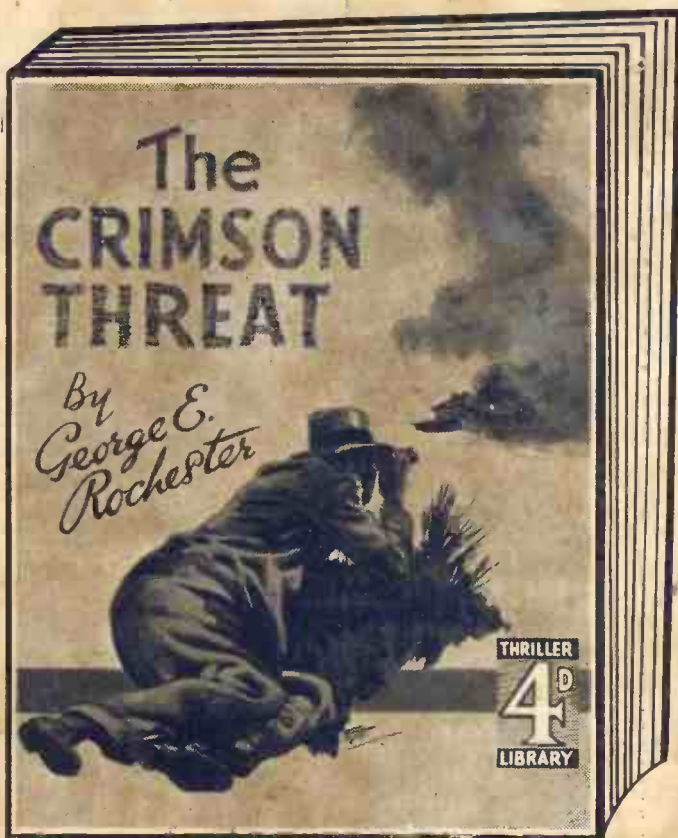
No. 94.

"THE SCREEN-PACK" FOUR

A
HIGH-EFFICIENCY
UNI-CONTROL
set



and Special Features BY JOHN SCOTT-TAGGART
F. INST. P. A. M. I. E. E.



Splendid
Book-Length
Thrillers
for 4d. ONLY!

No. 1
THE CRIMSON THREAT

by *George E. Rochester*

Dr. Morot, mad scientist-inventor, operating from his laboratory on the Northumberland moors, determines to master the world through his secret incendiary gas, which burns such materials as iron and stone.

The scientist plans to terrorise the country and the world with his "crimson fog."

A foreign capital is almost completely destroyed and London badly damaged—and then Dick Keston steps in and deals in his own way with the craft of the sinister Doctor. On no account miss this gripping story of Secret Service work and adventure.

No. 2
**THE EXPLOITS OF A
DEAD MAN**

by *Paul Urquhart*

The vital secrets of Britain's air defences, sought after by foreign powers, have been stolen by a gang. In this powerful novel you will read how an ex-R.A.F. Officer is commissioned to regain these important papers. But in doing so he comes into dread peril and has to "die" in order to win his single-handed fight against Britain's enemies.

Be sure to read this thrilling yarn of non-stop excitement and danger.

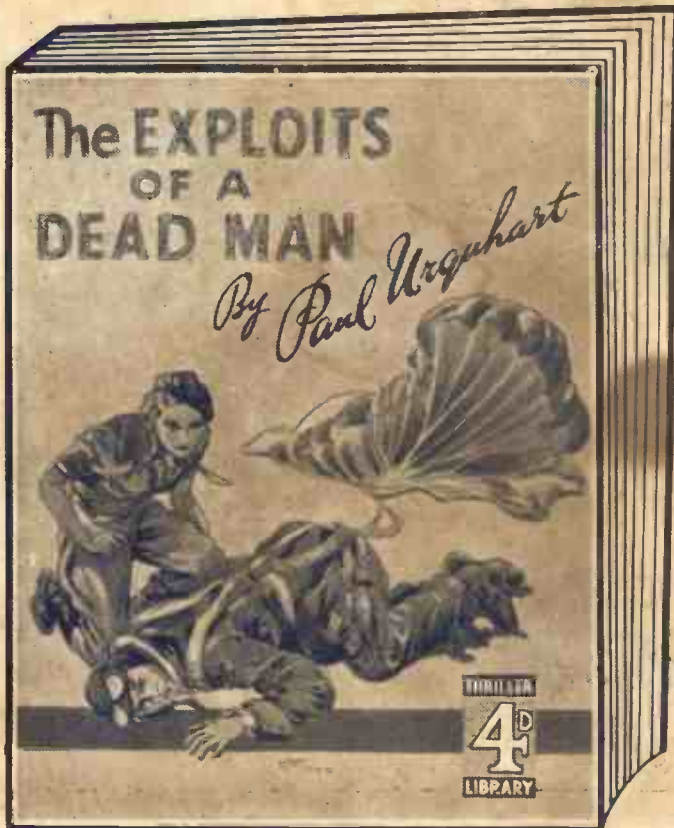
Ask for these Numbers of

**THRILLER
LIBRARY 4^D.**

Each Number

The Grand NEW Library

Now On Sale at All Newsagents.



CONTENTS

	Page		Page
The Editor's Chat	147	B.B.C. News	167
Topical Tips	148	Voices on the Air	168
The "Screen-Pack" Four	149	As We Find Them	169
Wireless in the Great War	153	How to Obtain Better Radio	170
New Radio Developments	155	From My Armchair	171
Short-Wave Notes	156	Simplified Selectivity	175
A Business B.B.C.	157	Your Loudspeaker	176
Round the Dials	158	In Lighter Vein	177
What Do Sounds Look Like ?	159	How the Valve Grew Up	179
Television : An Opportunity for Constructors	161	Underground Aerials	182
Questions I am Asked	164	Pick-up Tracking	184
A Power Amplifier	165	The Star of the Month	188

As some of the arrangements and specialties described in this Journal, may be the subjects of letters patent, the amateur and trader would be well advised to obtain permission of the patentees to use the patents before doing so.

PUBLISHED BY THE
AMALGAMATED
PRESS LTD THE
FLEETWAY HOUSE
FARRINGTON STREET
LONDON E.C.4



Full of Good HOLIDAY FARE

A Fine Feast for Sixpence!

The simple sum of 6d. buys you a banquet of reading, in "Printers' Pie"—the holiday annual of the year. There's a thrill or laugh on every one of its hundred sparkling pages. Over 40 of the most famous writers and artists have supplied the ingredients for this feast of fun and fiction. Look at the brilliant contributors:—

H. G. Wells
Rudyard Kipling
Beverley Nichols
R. C. Sherriff
H. de Vere Starpoole
Rafael Sabatini
Sir Philip Gibbs
Lord Dunsany

May Edginton
Marjorie Bowen
A. P. Herbert
P. C. Wren
Ian Hay
George Preedy
Bruce Bairnsfather
Gilbert Wilkinson

and many many others.

★ Every penny of the profits from the sale of "Printers' Pie" will be devoted to the Printers' Pension Corporation, a famous old charity which for over one hundred years has assisted aged printers, widows and orphans.

Printers' Pie

100 PAGES—ALL PHOTOGRAVURE 6d.

S.T.400
S.T.500
S.T.300 STAR
PUSH-PUSH FIVE
S.T.400 A.C. CONSOLETTTE
OLYMPIA RADIO-GRAM

Did you build any of the above sets? If so, and you are on A.C. Mains, you can considerably improve its performance. Either convert to metal rectification, or build one of the special eliminators we have designed to work the battery-operated sets from the A.C. Mains, and you will get a constant high-tension supply for as long as the set itself is in use.

Write for blue-prints, price 6d. each, post free.

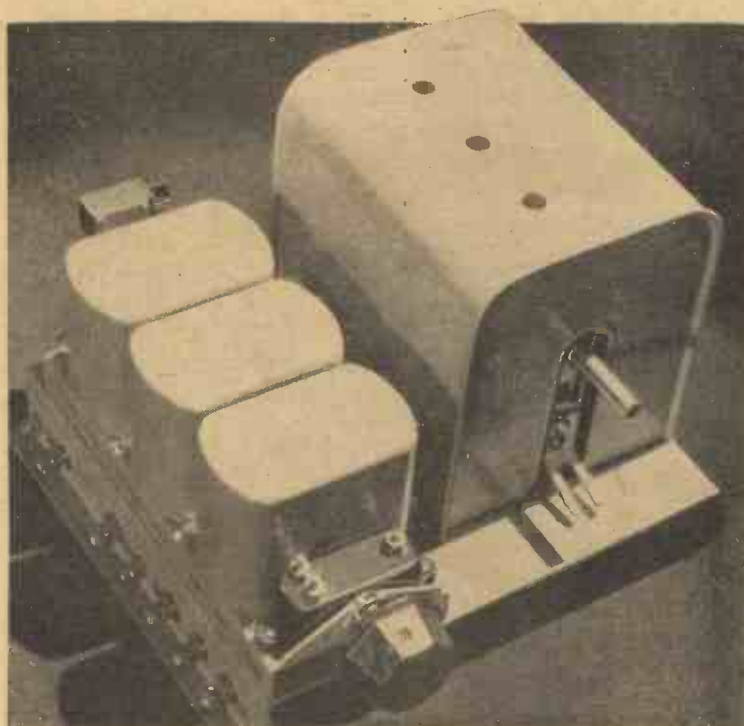


WESTINGHOUSE

METAL RECTIFIERS

THE WESTINGHOUSE BRAKE & SAXBY SIGNAL CO., LTD.,
82, YORK ROAD, KING'S CROSS, LONDON, N.1.

The secret of simplicity and efficiency in the "SCREEN PACK 4"



● No wonder the designers of the "Screen Pack Four" chose and specify the "Colpak" exclusively! Experts and amateur constructors alike are full of enthusiasm for its marvellous simplicity and incomparable efficiency.

The "Colpak" is built of the finest components only, carefully tested and perfectly matched, and as it incorporates Ferrocart Coils, the highest degree of selectivity and sensitivity is ensured.

For the "Screen Pack Four," ask your dealer for type H. Colpak, as illustrated here. Price 57'6 complete.

Made under licence from patentee, Hans Vogt

C O L P A K

Ferrocart Tuning Unit

● Write to-day for latest booklet *Radio List No. 12*, to Colvern Ltd., Romford, Essex.

COLVERN

THE
EDITOR'S
CHAT

THE WIRELESS CONSTRUCTOR

AND TELEVISION
REVIEW

The "Screen-Pack" Four—More About Television—Latest Licence Figures

THE "Screen-Pack" Four, which is fully described in this issue, has been designed in order to meet our readers' demand for a battery set with the widest possible appeal. We hope that the "Screen-Pack" Four will meet that demand.

Readers will notice that there are two low-frequency amplifying stages—enough to provide an ample margin of magnification for the operation of more than one loudspeaker, and further, a scheme of mixed couplings has been decided upon, the first L.F. stage being resistance-capacity coupled, and the second, transformer coupled. This combination ensures stability and a high-class response.

The H.F. side of the set makes use of a hand-pass aerial entry, followed by a stage of screened-grid amplification. There are three tuned circuits, so it will be appreciated that a high degree of selectivity can be obtained. Ferrocort iron-cored coils are used in order to increase the H.F. efficiency; these can be obtained as a complete unit.

For Big Volume

Our second constructional feature in this issue is a power amplifier, adjustable for either 5- or 7-watts output.

This unit makes a mains power amplifier which can be added to any receiver with a small output. Driven from A.C. mains, it is a first-rate instrument for converting an existing battery or mains set into one with greatly increased volume. Cheap to build, and reliable in operation, this amplifier should meet the needs of many readers who have been asking

for various adaptations of the "Ferro-Power Five" which we described at the beginning of this year.

But as we point out on another page, the only way to get a large output from an existing receiver, without completely demolishing and rebuilding it to some other design, is to add a self-contained power amplifier. That this is an easy task, you will appreciate when you read about the power amplifier described in this issue.

Experts' Evidence

During the past month television has again been very much to the fore,

FRANCE'S RADIO NEWS REEL



The studio at Post Parisien, a station now coming over very well. At the end, between the curtains, is seen a cinema screen which is used for news reels, the commentator standing at the desk seen in front and describing the events on the screen for the benefit of listeners.

Tune for this station on 312.8 metres: it uses a power of 100 kilowatts.

and the public is undoubtedly awaiting with great interest the report of the Government Television Committee.

We hope to be able to give details in our next issue of the evidence placed before the Committee by our radio consultant, Dr. J. H. T. Roberts. As many of our readers will remember, Dr. Roberts, who is a distinguished

physicist, has many inventions to his credit, and has been a close student of television technique for many years. There is no doubt that the evidence he will place before the committee will be of great value and of general interest.

Rivalling the "Talkies"

Only the other day, Mr. Hartley Davies read a paper on the question of television to the Conference of the Cinematograph Exhibitors' Association at Blackpool. Mr. Davies paid tribute to the success of television, and to the engineering and inventive skill which recently enabled a popular actor to be televised from London to Copenhagen. But he expressed his opinion that the kind of television is not yet in sight that will make it commercially possible to transmit pictures on a screen sufficiently large for an average cinema audience to get full entertainment value.

It is amazing to note that the conference broke up (according to a report in the "Manchester Guardian") "breathing more freely"! It appears that many cinematograph exhibitors had what is colloquially known as "the wind up," thinking, no doubt, that television was on the point of hatching into a fully fledged entertainment proposition, thus rivalling the "talkies."

Brains and Money Fusion

We have always deprecated excessive optimism about the present entertainment value of television; and we repeat again that we do not wish to encourage our readers in the belief

(Please turn to page 183.)



TOPICAL TIPS

Practical suggestions which are the outcome of actual experiences in radio work.

My first tip this month is a "safety first" one. It concerns the use of the ubiquitous razor blade for cutting-out purposes.

If the material in use is somewhat thick and requires a fair pressure on the blade when cutting, one does not feel too secure with the double-edge or "Gillette" type blade. It would only require a small slip to produce a nasty cut.

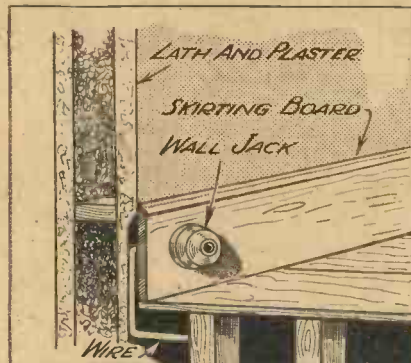
Prevents Accidents

It was this fear which caused me to look around for some form of holder for the blade the other day. And I found it in the razor itself.

Not only does the scheme, which is extremely simple, give complete immunity from the possibility of being cut, but it provides a holder which enables the blade to be held firmly. Thus it is possible to put more pressure on it and to control the movement of it much better.

The idea is best gathered from the diagram. The blade is fitted into the holder in much the same way as usual, but instead of all three holes being placed over the projections, only two are fitted over. One of the end holes of the blade thus fits over the middle

FOR EXTENSION WIRES



The problem of positioning speaker jacks can be solved by using the space often to be found behind wainscotting boards.

projection, and the middle hole goes over one of the end projections.

The net result of this is that while the blade is firmly held, it projects about three-quarters of an inch at one end, this amount being quite sufficient for all sorts of jobs.

The other sketch on this page concerns the fitting of loudspeaker jacks in various rooms of the house.

It is not always an easy matter to decide just where to fit the jacks. A height of about two or three feet from the floor is usually chosen, but then the difficulty of running the wires to the jack is rather great because it

REMINDERS FOR PORTABLE SET OWNERS

Cracklings at this time of the year are often due to atmospheric. Do not assume you need a new H.T. battery until you have tested the present one with a voltmeter, while the set is working.

Correct orientation of the frame aerial is necessary for maximum volume, but variations from such a setting will often aid in cutting out an interfering station.

Make sure that any loudspeaker adjustment is at its most sensitive setting.

See that the L.T. accumulator terminals, L.T. switch contacts and valve filament-pins are all clean and making good contact.

is not a simple matter to get them up inside the wall, assuming, of course, that it is a double partition wall.

If it happens to be an outside brick wall the trouble is even greater. But if you are content to fit the jack on the wainscotting there need be little difficulty, and it is just as convenient there really. After all, this position is considered a satisfactory one for plugging in household electrical fittings.

If the wainscotting board is removed

it will usually be found that there is a small space behind it sufficient to take the wires. This is sometimes due to the board being slightly sloping and sometimes to the effect of the extra plaster applied to the wall above the wainscotting.

The illustration makes the method of running the wires quite clear. It is simply necessary to bring them through the floorboard just behind the wainscotting and then up to the loudspeaker jack.

Earthing Components

Quite a number of components have their screen or core earthed by a strip of metal which makes contact with one of the holding-down screws or nuts and bolts. The earthing is bound to be sound when a metal chassis is used, and nuts and bolts employed for holding the components in place.

But when an ordinary wood screw passing into a metallised wood base-board or chassis is utilised, earthing

USING RAZOR BLADES WITH SAFETY



All those who have used double-edged razor blades for various cutting purposes will appreciate this suggestion for getting a better grip and control. The method also obviates the possibility of accident.

is dependent upon the thread of the wood screw making contact with the metallising.

As a rule, this proves quite satisfactory, but if the earthing carried out in this manner is an important one, the following scheme will doubly ensure that contact is perfectly sound.

A Simple Scheme

Between the moulded bakelite case of the component and the metallising on the baseboard or chassis, a small piece of thin copperfoil is placed so that the wood screw will pass right through it. No hole is made in the foil, the screw being allowed to force its way through.

In so doing it will force the foil down around its thread for a little distance, and since the remainder of the foil will be resting on the metallising, contact between the screw and metallising will be absolutely perfect.

A. S. C.



The "SCREEN-PACK" FOUR

SELECTIVITY
EFFICIENCY
POWER

ALTHOUGH there have been many advances in radio-reception technique, the time-honoured method of dividing any receiver into two sections for purposes of approximate appraisalment still holds good.

These two sections are the H.F. and L.F. ends. Of the L.F. end we require ample power, together with good quality. We look to the H.F. end for selectivity and sensitivity: that is, the power to pick a desired programme from Europe's ether medley and to give it sufficient H.F. amplification to bring the detector input up to a given level.

Excellent Performance

Of course, there are other considerations which may assume more or less importance, but these are the outstanding factors.

The "Screen-Pack" is a battery set designed to have the widest possible appeal, and its excellent performance has been made possible in this way:

There are two low-frequency amplifying stages providing an ample margin of magnification for the operation of several loudspeakers, if necessary.

A scheme of mixed couplings has been adopted. The first L.F. valve is resistance-capacity coupled and the second one is transformer coupled. This, together with good decoupling, ensures stability and a high-class response.

Band-Pass for Quality

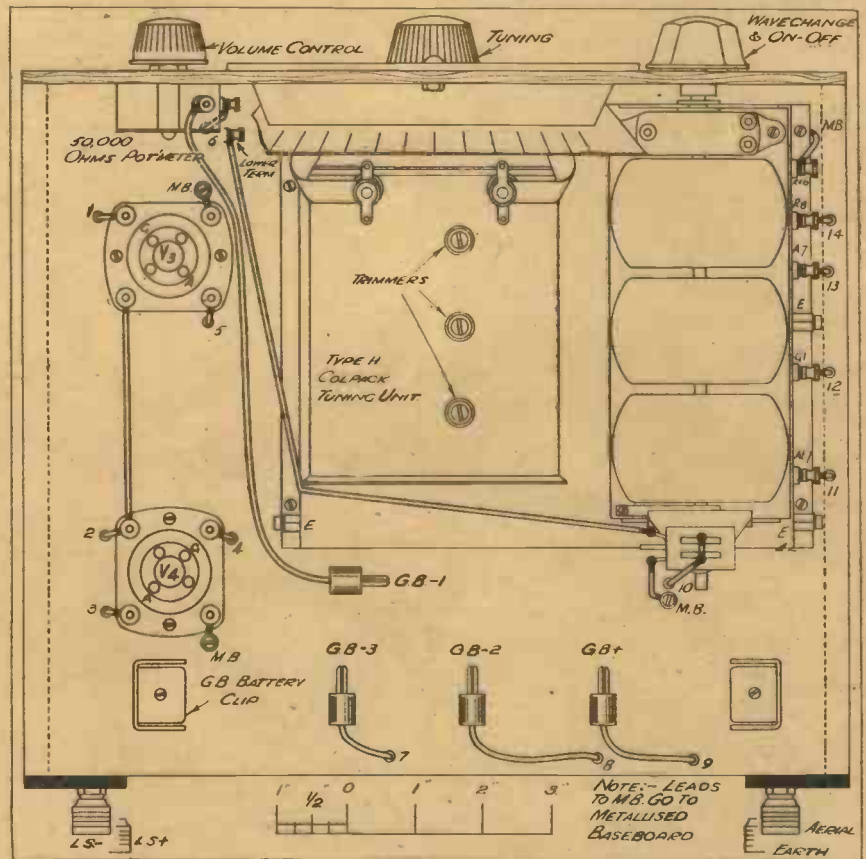
The H.F. end embodies a band-pass aerial entry, followed by a stage of screened-grid amplification. Volume controlling is by the variable-mu method, with which a wide range of adjustment is possible without any deleterious interference with tone. There are three tuned circuits, so that a high order of selectivity is achieved.

The excellent all-round performance of this battery receiver ensures that it will have a wide appeal. The volume available is ample to work several loudspeakers, and the three tuned stages endow the set with a high order of selectivity. Designed and Described by The Technical Research Dept.

The H.F. efficiency of the set is still further increased by the iron-cored coils that are used.

These are Ferrocart's, and are contained in a complete unit, the "Colpak." This comprises, in addition, a three-gang condenser and other items essential to the scheme.

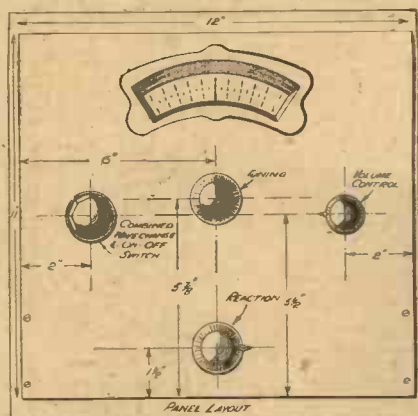
The use of a "pack" of this nature enables the constructor to enjoy ganging at its very best. When separate



Owing to the adoption of band-passing, there is not that reduction of high notes which is consequent upon peak tuning of the more normal unrelieved character.

Due to the special "Colpak" assembly, with its three coils and triple-gang condenser, the construction of the "Screen-Pack" Four is reduced to the simplest of operations.

Variable-Mu Volume Control



The unusual but pleasing appearance of the panel is largely due to its being almost square in shape.

coils are employed in conjunction with, perhaps, a different make of condenser, ganging may deserve some of the criticism that has been levelled at it.

A Completely Matched Unit

Even if the various items are suitable to work in combination, the constructor has to make several tricky adjustments if he is to obtain good results.

In the case of the "Colpak" the coils and the condenser are, of course, made so that they will operate together effectively, and all the matching and

ganging is part of the manufacturing process and is undertaken by the makers.

Incidentally, the unit very greatly facilitates the construction of the set. The wiring is reduced enormously, and the constructor is not faced with the possibility of slight misplacings of the coils or condensers or some of their wiring, which might result in loss of effectiveness.

As a matter of fact, tests with the "Screen-Pack" indicate that there would be nothing to be gained by having individual controls for the three tuned circuits. It is possible that an expert operator would be able to obtain equivalent results using the same components with separate condensers, but it is doubtful whether he could improve much upon them.

So far as the average constructor is concerned, three tuning controls

would represent an almost hopeless proposition. If two are at the very least only twice as difficult to handle as one, the intricacy of three is much more than three times, especially when, as with Ferrocart coils, the individual circuits are unusually selective.

Remarkably Clean Lines

Effective ganging, however, enables even the inexperienced operator to achieve performances of a high order in a

CHOOSE YOUR VALVES FROM THESE

	H.F.	Det.	L.F.	Output.
Cossor	220V.S.	210H.F.	210L.F.	230X.P.
Mullard	P.M.12M.	P.M.1H.L.	P.M.2D.X.	P.M.202
Mazda	S.215V.M.	H.L.2	L.2	P.220A.
Marconi	V.S.24	H.L.2	L.21	P.2
Osram	V.S.24	H.L.2	L.21	P.2
Hivac	V.S.210	H.210	L.210	P.X.230
Tungsram	S.V.220	H.R.210.	L.210	S.P.230
Dario	T.B.452	T.B.282	T.B.102	T.B.062

minimum of time and without the necessity of acquiring experience with the adjustments.

There is yet another advantage contributed by the "Colpak." Although, as we have said, it makes a set easier to assemble and wire, it also permits a professional appearance to be gained. The clean lines of the "Screen-Pack" provide ample evidence of this.

The design conforms to the chassis scheme, but wood is used for the major part of the construction. The base-board and its side supports consist of "Metaplex" (which is metal-faced plywood) and the panel is of three-ply.

Well Screened and Earthed

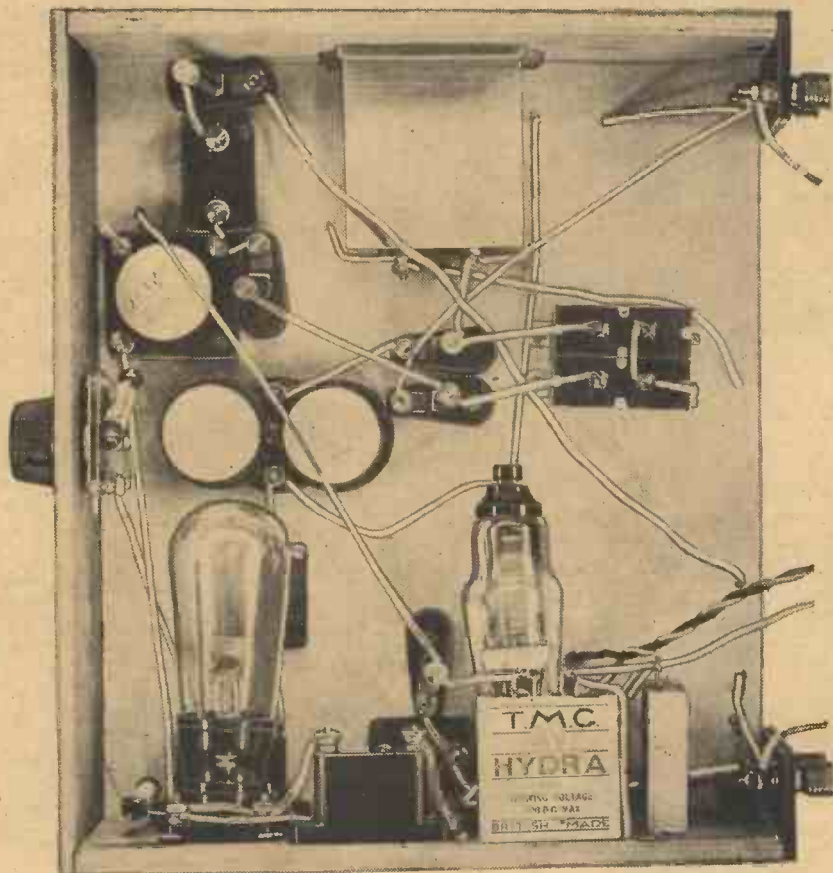
Satisfactory screening and earthing are obtained, and the structure is an easy one to fashion.

The "Colpak" tuning unit in this set is the Type H. Care should be taken that the article is ordered as such, for there is another type that is not suitable.

Owing to the presence of the metalised baseboard and supports on which many of the components are mounted it is important that the makes of components given in our list are adhered to, for, it should be remembered, there still are many that cannot be mounted on a metalised surface unless some means of insulating

From this under-chassis view of the complete receiver it will be seen how two of the valves are housed below the baseboard. These valves are the S.G. and detector.

THE COMPONENTS UNDER THE CHASSIS



Iron-Cored Tuning Coils.

their points of contact with it is introduced.

A typical example is that type of valve holder with exposed metal sockets that are apt to press down and touch the baseboard. The consequence

FOR RUNNING THE SET

Batteries : L.T., 2 volts. Block
 H.T., 120 volts. Drydex
 G.B., 16½ volts. Ever Ready
 Loudspeaker : W.B.

of this kind of thing happening with an earthed metallised baseboard will be obvious to all.

Commencing the Construction

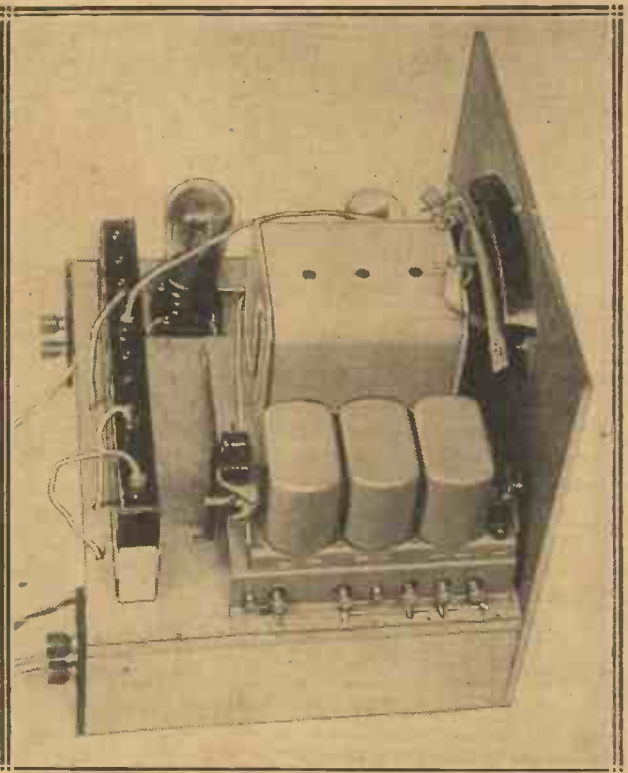
The first step in the building of the set is to assemble the chassis. This is quite easy, for the metallised surfaces of the "Metaplex" do not resist wood screws.

We have given the separation of the knobs of the "Colpak" as 4 in. Actually, it may be a trifle less than this. But the holes can be made slightly larger than is necessary to take the spindles. The oversize will not be noticeable, for the knobs will hide it, but it will ensure an easy movement of the controls.

The opening in the panel for the condenser scale and escutcheon can be cut with a fret-saw; and while it is as well to get the edges of this as clean as possible, any slight roughness will be hidden when the escutcheon is fitted.

A number of the components are mounted under the baseboard; some on the side supports. The position of each has been chosen with care so that the wiring is kept short.

It will make the wiring easier if the two .1-mfd. fixed condensers on the side support are not fixed into position before the wiring to at least the valve holder is completed. By the way, it is certainly unusual to have two of the valves one side of the baseboard and two the other, but this course has been



The coil and condenser assembly is ready wired when purchased, and this fact is largely responsible for the neat above-baseboard appearance of the chassis.

taken to get the most effective layout and wiring possible.

And in these days when the life of a valve sometimes runs into thousands of hours there can be no objection to such a procedure.

A number of the leads pass through the baseboard. Clearly it is advisable to use well-insulated wire for these, and even then it is as well not to pull them too sharply through the holes and against their edges.

Terminals are provided for the aerial and earth and loudspeaker connections, and flexible leads for the batteries. The lengths of these will depend upon the positions of the batteries, but they should be kept as short as is convenient.

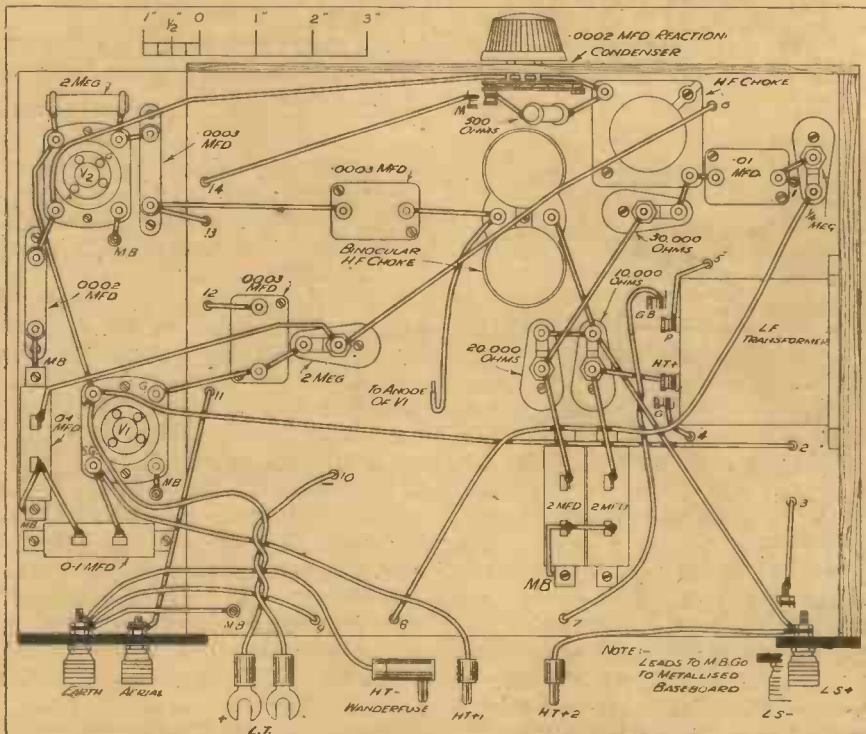
Mains or Battery H.T.

This is definitely a set with which a mains unit can be employed if desired. But the unit needs to have a suitable output for the particular valve combination used.

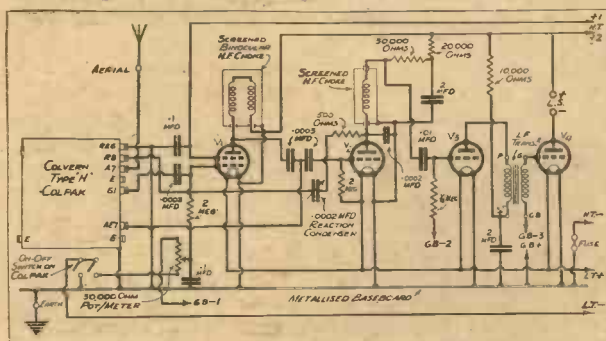
There are only two H.T. tappings, and upon H.T. plus 2 the maximum H.T. voltage should be imposed. 108 volts will be O.K., but 120 rather better than the difference in volts might seem to indicate. About 80 will serve H.T. plus 1.

The necessity for providing for a separate H.T. for the detector has been overcome by means of an automatic resistance adjustment. So that so

MOST OF THE WIRING IS SEEN HERE



Although a number of leads pass through holes to components above the baseboard, the greater part of the wiring is below. The holes are numbered for easy cross-reference between the two wiring diagrams.



long as the other H.T.'s are correctly set, that of the detector and the first L.F. (which is also resistance adjusted) are bound to be suitable for the types of valve recommended.

Slight Adjustment Required

There is no trimming in the ordinary sense to do; all that has to be done is to readjust the trimmer condensers on the top of the ganged condenser

very slightly in order to offset any slight variation due to the self-capacity of the wiring, etc.

As Messrs. Colvern themselves recommend, this adjustment should be made on a weak medium-wave station situated between 25 and 30 degrees on the tuning dial.

When this little operation has been carried out the set will remain ganged on both wavebands.

Simplified Trimming

This circuit diagram illustrates the features of the receiver and shows how the four valves are connected together.

The wavechange switch also serves as the on-off control (or vice-versa—it depends upon which way you look at it), and there is also provision for radiogram switching.

A Virile Receiver

It is a simple matter to add radiogram switching to the "Screen-Pack," ample room having been left for terminals at the back on another terminal strip.

The set handles delightfully. It is seldom necessary to have the control "hard over" even when searching for a station. But with it well advanced one distant transmitter after another will be heard as the one tuning dial is rotated without the reaction being touched. It is certainly an extremely virile receiver.

THESE ARE THE PARTS INCORPORATED IN THE "SCREEN-PACK" FOUR

- 1 Colvern "Colpak," type H., with battery switch.
- 1 Polar Arcuate drive (marked in wavelengths for inductances of 157 and 2,200 microhenries).
- 1 Bulgin 50,000-ohm potentiometer, type V.C.36.
- 2 T.M.C.-Hydra 2-mfd. fixed condensers, type 25.
- 2 T.M.C.-Hydra 1-mfd. fixed condensers, type 25.
- 1 T.C.C. .01-mfd. fixed condenser, type S.
- 2 T.C.C. .0003-mfd. fixed condensers, type S.
- 1 T.C.C. .0003-mfd. fixed condenser, type 34.
- 1 T.C.C. .0002-mfd. fixed condenser, type 34.
- 1 J.B. Dilecon .0002-mfd. reaction condenser.
- 1 Graham Farish 2-meg. "Ohmite" grid leak, 1½-watt type, with vertical holder.
- 1 Graham Farish 1-meg. "Ohmite" grid leak, 1½-watt type, with vertical holder.
- 1 Graham Farish 30,000-ohm "Ohmite" resistance, 1½-watt type, with vertical holder.
- 1 Graham Farish 20,000-ohm "Ohmite" resistance, 1½-watt type, with vertical holder.
- 1 Graham Farish 10,000-ohm "Ohmite" resistance, 1½-watt type, with vertical holder.

- 1 Erie 2-meg. grid leak, 1-watt type.
- 1 Erie 500-ohm resistance, 1-watt type.
- 1 Graham Farish screened binocular H.F. chokes, type L.M.S.
- 1 Graham Farish screened H.F. choke, type H.M.S.
- 1 Telsen L.F. transformer, type G.S.5.
- 1 pair Bulgin G.B. battery clips, type No. 1.
- 4 Benjamin 4-pin valve holders, "Vibrolder" type.
- 1 Peto-Scott "Metaplex" (both sides) chassis, 12 in. × 10 in., with 2-in. runners.
- 1 Peto-Scott plywood panel, 12 in. × 11 in. × ½ in.
- 1 Peto-Scott cabinet to suit above panel and chassis.
- 2 Peto-Scott terminal strips, 3½ in. × 1½ in.
- 4 Clix indicating terminals.
- 6 Clix wander-plugs.
- 1 Belling & Lee wander-fuse.
- 2 Clix accumulator spades.
- 1 Coil B.E.G. "Quikon" connecting wire.
- Screws, Flex, etc.

PEOPLE talk of Nature's infinite variety. Believe me, it is all bunkum. Ordinary folk take things at their face value. This is not surprising when you consider that nearly everything that crawls around on the surface of the earth (including the ubiquitous motor) has a distinctive call-sign.

What Has Nature Done?

But we wireless fans, who dive beneath the surface of things, have discovered a skeleton in Nature's cupboard. What has Nature done for us? What indeed. Put us in the cart.

Almost every breakdown short of dead silence is accompanied by nothing but a lot of miserable crackling noises. H.T. running down? Crackle. Transformer burning out? Crackle. Terminal loose? Crackle.

And they one and all crackle in the same key. It's enough to make any self-respecting "fan" tear his hair.

CRACKLES

How much easier it would be to spot faults that produce crackles, if only crackles did not all sound so much alike.

Jones, whose knowledge of wireless is confined to switch pushing, planks his portable down on your table with a "Sorry to trouble you, old man, but it's kicking up the deuce of a row." You switch on, and heartily agree.

H.T., L.T., and loudspeaker are easily eliminated. So far you have drawn a blank. Then out comes the body of the set from its case. Soldered joints seem O.K., and the search narrows down to what component in the box of tricks is most likely to be breaking down.

Obviously one through which H.T.

is continuously being pumped. An elderly transformer catches your eye. Out he comes, and a test in your set leaves you with that sinking feeling. No crackle.

In this particular case you have just one more dip into the lucky bag, before being confronted with the set repairer's nightmare, a hidden flaw in the circuit which may take days to track down, if indeed rebuilding isn't quicker in the long run.

Anxious Moments

You pin your faith to a little flat bobbin wound with hair-like wire, the H.F. reaction choke. It is an anxious moment; then you heave a sigh of relief. It crackles away cheerily.

A friendly sound, for your troubles are over; the culprit is unearthed.

Still, what a lot of bother would have been avoided if only that little component had been gifted with an S.O.S. call all its own! E.M.

WIRELESS IN THE GREAT WAR



THE SINKING OF THE "LUSITANIA"

WARNING. Travellers intending to embark on Atlantic voyages are reminded that a state of war exists between Germany and Great Britain, that the war zone includes the waters adjacent to the British Isles, and vessels flying the flag of Great Britain are liable to destruction."

The above greeted the American public when they opened their morning papers on the 1st day of May, 1915, but no one took the warning very seriously; these threats from German sources, especially those regarding the Lusitania, were becoming so frequent as to be absurd, and this feeling prevailed amongst the majority of the passengers and crew of the Lusitania, about to make her return journey across the Atlantic to England. There was naturally a certain amount of nervousness, but to many the warnings and threats merely added a piquant excitement to the voyage. The Germans, with all their threats, would not dare to commit such a crime against civilization.

Tremendous Responsibility

The captain and officers of the Lusitania were not so easy; theirs was the tremendous responsibility of conducting safely across the Atlantic close on 2,000 men, women

and children, and a vessel worth one and a quarter million pounds; to say nothing of the fact that the Lusitania held the blue riband of the Atlantic, and was therefore the world's greatest passenger liner.

At eleven minutes past two in the afternoon of a May day in 1915, a torpedo struck the Lusitania, on her journey from New York to Liverpool. Twenty minutes later she had sunk with terrible loss of life. Here is the story of the part played by wireless in this most ghastly tragedy of the sea.

By "RADIAT"

From the wireless point of view the first few days of the voyage were much as usual. The wireless office on a great

ocean liner is always a busy spot—weather reports, time signals, passenger and service telegrams, and now war warnings.

In those early days of hostilities there was always the possibility of a German commerce raider stealing past the cordon of British warships in the North Sea and holding up shipping in the North Atlantic.

Mines and minefields had begun to appear in all sorts of unexpected places, and worst of all the dreaded white wake of the submarine torpedo was becoming increasingly frequent on the European trade routes. To this let there be added the normal dangers of the sea such as rough weather, disablement, derelicts and even icebergs, and the importance of the wireless work will be appreciated.

The First Indication

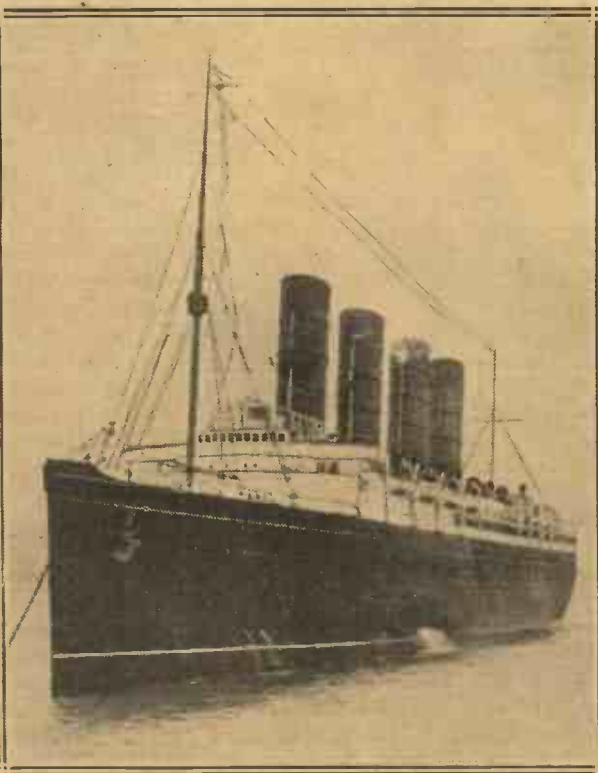
The German threat to the Lusitania was therefore of particular interest to the wireless room which was in direct touch with all that was going on in the outside world.

Calm, smooth weather was experienced throughout the voyage, and the Lusitania made her usual good progress, but at reduced speed, owing to the desire of her owners to save coal. Her average speed was 21 knots, instead of the usual 25 knots.

On May 6th the great liner was approaching the southern Irish coast, or in other words the dangerous war zone. Into many minds came the German warning "British vessels found within the war zone will be destroyed." With the German threats in his mind, and in accordance with Admiralty instructions, Captain Turner of the Lusitania ordered all lifeboats to be hoisted out in readiness, and all look-outs doubled.

The first indication that his anxiety had not been without foundation came to the liner's captain from the wireless room, when the operator on

THE PRIDE OF THE ATLANTIC—1915



Carrying almost two thousand men, women and children—more than half of whom perished—the Lusitania sank off the coast of Ireland, on May 7th, 1915; sent to her doom by torpedoes from the German submarine, U.20

"Torpedo Coming on Starboard Bow . . ."

duty reported that the following message had just been received:

"From the admiral at Queenstown. 8 p.m., May 6th. Submarines active off south coast of Ireland, and last seen four miles south-west of Copper Point, near Coningbeg."

More Messages Followed

A little later the wireless rang up with another message:

"From Valentia Wireless Station to Lusitania. Take Liverpool pilot at Bar and avoid Headlands. Pass harbours at full speed, steer mid-channel course. Submarines at Fastnet."

A third urgent message was also received from Valentia wireless station:—"Submarines active in Irish Channel and last heard of 20 miles south of Coningbeg."

To the captain's mind the Irish seas appeared to be infested with enemy submarines. What were they waiting for?

was made to prevent them from realising just how serious the danger had become, how doubtful the issue actually was. The awful question arose: should the ship sink how many could be saved?—for the tragic fate of the Titanic was still fresh in people's minds.

The captain and those of his immediate juniors who were fully aware of the danger went about their business in their usual brisk and calm manner: "There was nothing to worry about; the Lucy was as safe as the Bank of England."

The Calm Before the Storm

In the wireless cabin the gravity of the situation was fully appreciated. All the wireless apparatus was carefully overhauled, the chief anxiety being that all would function well should the supreme moment arrive.

Apart from such nerve centres as the wireless cabin and the captain's

Surely all danger was now past. There was the friendly Irish coast visible on the port bow, with the Old Head of Kinsale just coming into sight. The sea was calm and the slight fog which had come up in the morning had now cleared off; the scene was ideally peaceful.

The Lusitania Struck Twice

But it was the dreaded calm before the storm. A hoarse warning cry from the look-out in the crow's-nest.

"Torpedo coming on starboard bow—"

Too late; the unbelievable and unforgivable had come to pass, the torpedo had struck.

There came a terrific explosion from the engine-room directly underneath the third and fourth funnels. Immediately afterwards a second explosion occurred due to another torpedo striking the wounded vessel. The Lusitania was ready; almost before the shock of the explosion had subsided the ether was vibrating with the fateful signal, S O S.

No Assistance at Hand

The wireless land station at Valentia took up the cry, S O S. All along the coast the fatal tidings flew. From Cape Wrath to Ushant operators clenched their teeth and wrote in their log books the dreadful words, "S O S, Lusitania sinking fast, send immediate assistance please."

On the Lusitania, the operator, with grim face and tightly set jaw, stuck to his key. All the Eastern Atlantic must by now be aware that the greatest outrage which the sea had ever known, had been committed, and not by the cruel sea or wild waves, but by the hand of man himself.

The vessel began to list heavily to starboard; ships were rushing to the assistance—would they be in time? Alas, the nearest vessel equipped with wireless was twenty miles away, an hour's steaming in a fast ship.

Many Lifeboats Useless

The list on the stricken vessel was becoming worse, in the wireless cabin log books and telegraph pads slid across the operating desk, the operator had to wedge himself in position. On deck difficulties were being experienced with the lifeboats; the list caused the starboard boats to hang too far out for them to be lowered properly, while

(Please turn to page 135)

HIGHWAYMAN OF THE SEAS!



An actual wartime photograph of a German U boat coming alongside a liner, which it has order'd to stop.

The course followed by the Lusitania, the time which she had left New York, were known to everyone, so that if the Germans, as they maintained, really meant to sink the great liner, theirs was a fairly simple task. A vessel of the Lusitania's size would be somewhat difficult to miss from any submarine. But it was unthinkable that the Lusitania could be sunk with all the women and children on board.

"Safe as a Bank"

Although the passengers were by now aware that the dangers from submarines had increased, every effort

bridge, the passengers and crew passed a calm and uneventful evening on that night of May 6th, 1915; for many, alas, it was to be the last evening spent in this world.

At 1 p.m. on the next day, May 7th, a reassuring message came down from the wireless cabin. Submarines had been sighted off Cape Clear at 10 a.m. that morning. But the Lusitania had passed Cape Clear some time before; this cape was now well astern and no submarine could hope to catch up with the comparatively fast Lusitania once the submarine had been left behind.

NEW RADIO DEVELOPMENTS

Details of a magnetic system of generating oscillations on wavelengths around the 100 centimetre mark.



THE field of radio waves at present reaches down to wavelengths of about 15 centimetres (about six inches), those under 50 centimetres being generally produced by oscillators with positive-grid valves.

At a recent meeting of the French Physical Society, M. Ponte, chief engineer of the *Compagnie Générale de T.S.F.*, read an interesting paper on the use of magnetic fields for the



A MAGNETRON VALVE

This is the type of valve employed in the new system of obtaining ultra-short radio waves by means of magnetic fields.

generation of very short waves and on what he terms magnetron transmitters.

It has for some time been known that waves under 3 metres can be produced by devices utilising the properties of electrons, accelerated by the presence of magnetic fields in and around the valve.

The generation of short waves by these devices can, of course, be explained only by the movements of electrons on their flight inside the valve.

Well Down the Scale

While, in the case of positive-grid valves, an explanation based on the movements of electrons on both sides of the grid is quite sufficient, recourse should, in the case of magnetrons, be had to the influence of a space charge, the establishment and disappearance of which give birth to oscillations. However, the production of very short waves by this system entails the

use of very high voltages and strong magnetic fields in a relatively small compass; in fact, such devices as hitherto used are anything but practical.

The same applies to the split-anode magnetrons devised by Japanese physicists in an attempt at generating waves of decimetre order by utilising the phenomena above referred to (variation of the space charge due to movements of the electrons).

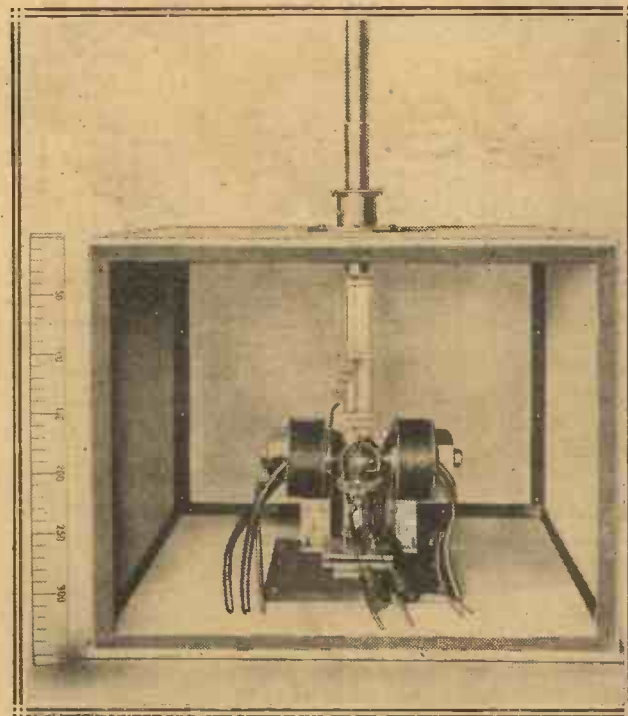
Now, M. Ponte, in the course of his recent research work, has been led to design simple and reliable transmitters on waves of 70 to 120 cms., in con-

nection with telegraph and telephone work.

Good Range Achieved

The first tests with these transmitters were conducted at Sainte-Assise and at the Levallois works of the *Société Française Radio-Electrique* over short ranges. Results obtained have been very satisfactory both in connection with telegraph and telephone work.

Various types of aerials and reflectors were used, enabling the radiated energy curves to be plotted. When providing a flat metal reflector no sound could be perceived behind the latter.



COMPACT DESIGN

A typical magnetic transmitter in its screening box. The millimetre scale on the left indicates that the apparatus is approximately only 11 inches high.

Considerable distances (50-100 kilometres and even more) could be covered with the power at present

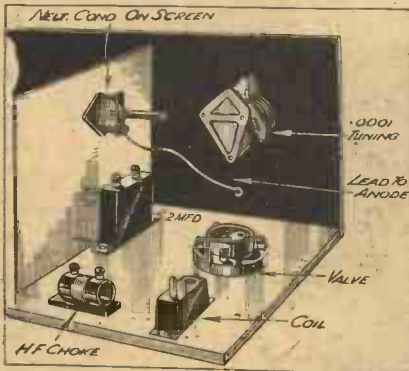
available in the case of directed waves and with good visibility between the two points to be linked. Even when visibility is not good, communication over a few kilometres can still be secured, providing that topographic obstacles are not too great.

The magnetron is more robust than an ordinary valve, and the transmitter possesses the simplicity and

connection with which the wave actually generated is dependent only on the outer circuit, which, from a practical point of view, secures a number of important advantages.

(Continued at foot of next page)

SHORT-WAVE NOTES



How you should lay out the H.F. stage of a short-wave receiver such as the one of which the circuit is shown below.

In answering the question, "What is the best S.W. set for a novice?" our short-wave expert describes the ideal receiver and points out that it is also the best receiver for an experienced listener.

By W. L. S.

Here, then, is my suggestion: My ideal set would use a stage of H.F., with a screened-grid valve, roughly tuned to the waveband on which one intends to listen. This will be parallel-fed and coupled to a straight reacting detector, resistance-coupled to a stage of L.F. The latter may use either a triode or a pentode, and will be provided with choke-filter output and a good volume control.

With a pentode the latter will be of paramount importance, because, while the set should give loudspeaker reproduction on some of the better short-wave stations, headphones will undoubtedly have to be used for the weaker signals.

ONE or two readers have asked me to deal a little more with the technical side rather than the "newsy" side this month. Accordingly, I am endeavouring to answer the rather impossible query asked by one of them, namely: "What is the best type of receiver to recommend to a novice for short-wave listening?"

This business of receivers "for novices" is rather interesting. Just consider; a novice, obviously, has had no previous experience. He knows nothing about the difficulties he is likely to encounter, and he doesn't know the first thing about operating a short-wave set.

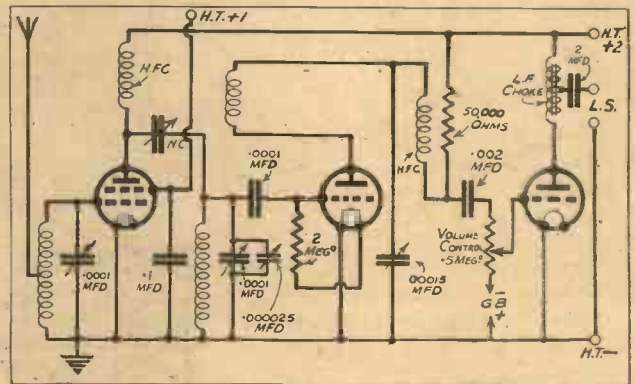
Simple Operation

It follows, therefore, that he wants a simple, fool-proof set which will give him a reasonable chance of hearing all that is going with no trouble and with ease of operation.

The first point that strikes me is: "Why should such a desirable set be confined for recommendation to a novice? Doesn't everyone want a set like that?" I do!

AN IDEAL CIRCUIT

With its tuned S.G. stage, grid-leak detector and resistance-capacity coupled output valve, this circuit, in the opinion of W. L. S., represents the best all-round short-wave circuit. Plug-in coils are advised for simplicity purposes, and one standard set of these will cover a large wave-band.



Circuit details will include a "band-spread" condenser of about 000025, connected in parallel with the conventional size of 0001. This will make easy tuning possible on all the short-

wave broadcast and amateur bands. Regarding the constructional details, I should recommend that the base-board be covered with copper foil and that a metal panel be used. No extension handles should then be necessary to do away with hand-capacity effects.

The S.G. valve will be coupled to the detector by means of a good short-wave H.F. choke and a neutralising condenser. The value of the latter may be adjusted for the twin requirements of sensitivity and selectivity, in order to arrange for a good compromise between the two.

Tight-Coupled Input Circuit

The aerial will be coupled fairly tightly to the S.G. stage, so as to flatten out the tuning, thus doing away with a second critical control, which might worry the novice.

When the constructor has graduated out of the "novice" stage it is an easy matter to loosen the aerial coupling. When this has been done sufficiently it will be possible to make the S.G. stage pull its full weight, and

by then a little practice in operating will enable one to make the best of two critical tuning controls. Plug-in coils would be used for convenience. Coil changing is not so very much trouble.

NEW RADIO DEVELOPMENTS

(Continued from previous page.)

The new system should already present great possibilities of practical development, even though only the small energy requirements—remarkable simplicity and robustness of material, great variety of possible layouts, perfect ease of directing emissions, great secrecy and considerable number of communication channels possible

within a restricted area—be taken into account.

As to the last-named point, it is possible to contemplate the operation without jamming of 4,000 telegraph and 2,000 telephone circuits within a range of 70 to 120 cms., as obtained with this equipment.

Very Easy To Instal

A great number of marine communications (between islands and main land, between ships, etc.) would thus become very easy to establish, as well as certain communications of a

military character, e.g. in fortified zones. In the latter case, in fact, it is necessary to keep the staff and equipment under shelter, sometimes deep under ground, and to have practically invulnerable aeriels.

All these requirements are readily complied with by the new system, as the transmitter can be placed well away from the aerial, whilst the latter can be reduced to a small vertical rod about 20 centimetres long. Moreover, if this aerial should happen to be destroyed it could readily be replaced from inside the shelter.



MAY I, as a humble though moderately successful business man who has been interested in wireless for a period a good deal longer than the age of the B.B.C., give a few of my own views and those of my business friends about the organisation of the B.B.C.? If what I hear of the vengeance of the B.B.C. visited upon any who dare challenge its omnipotence and omniscience is only partially true, it will be understood why I hide behind a pen-name!

Taking Critical Interest

For years, mesmerised by the magic of wireless and doped by the propaganda of exploiters, I was only too glad to worship at the shrine. Latterly, however, I have been taking some interest of a critical kind, and I am not disposed any longer to remain a passive eye-witness of the use of a service of which I am one of the proprietors by virtue of the payment of my licence fee of 10s. a year.

So, with the help of friends, B.B.C. Year Books and official statements, and annual reports, I have come to certain conclusions which I think should be communicated to fellow listeners.

Let me begin by trying to define the objective and purpose of broadcasting as common sense would give it. There is no doubt that what you and I, as licence holders, expect first of all is good entertainment, varied as much as possible and with as many clear-cut contrasts as circumstances permit.

Adequate Strength Needed

We also want this entertainment delivered to our sets without interference and at adequate and consistent strength. We want news, well

A successful business man gives his views on the B.B.C. and explains the kind of modifications he would make in our broadcasting service if allowed to apply business methods to its conduct.

presented and up to date. We want an evenly balanced and well-presented reflection of the world as it is.

By this I do not mean either that we wish to be harassed by jazz or by up-lifters. We have real intellectual interests in things that matter, but we want this interest satisfied and stimulated in a way which is efficient for the medium of radio.

IS IT WANTED?



The organ at Broadcasting House was installed at very considerable expense. Does it supply the sort of programme the average listener wants?

We may be expecting too much; perhaps this is healthy. That we have very little concern about the high officials, the governors, directors, mandarins, and pundits of broadcasting, perhaps is a pity, but certainly is human. What we care about is the result. If we have any interest in personalities, it is to get to know those who actually perform on the microphone as announcers, artists, musicians, and talkers. That, roughly, is the requirement of the average listener as I define it. He is neither highbrow nor lowbrow. He will always reserve to himself the right to object and to condemn, but, being fair-minded, he will praise when the spirit moves him.

Technical Efficiency

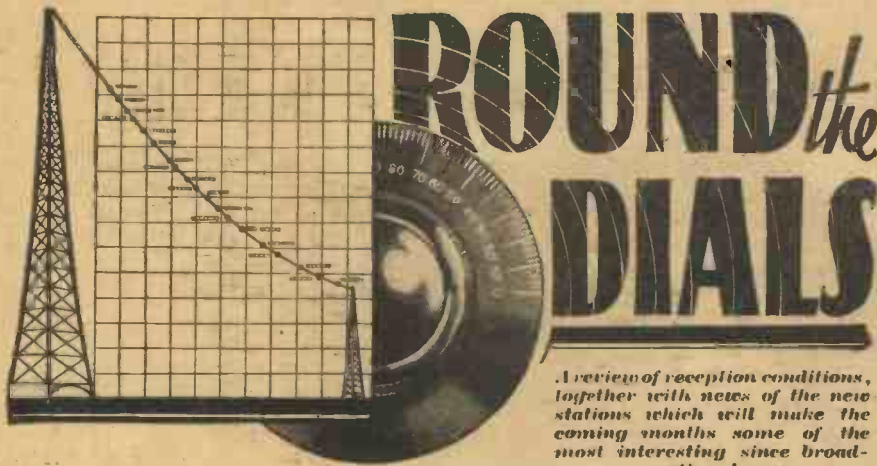
Having tried to define the objective and purpose of broadcasting as it appeals to the average listener, let us consult him on business terms as to how he would set about organising the means for meeting his wishes, regarding him for the time being as a competent shareholder in a public concern. Input strength has already been mentioned. Therefore, technical efficiency must be admitted.

Within necessary limitations there must be good field strength well distributed. This calls for a high standard of efficiency on the engineering side.

Secondly, having got your "signal" through your transmitters in a way which makes its reception as easy as possible in as wide an area as possible, there is to be considered how to meet the programme requirements specified. Entertainment, being paramount, naturally controls the organisation.

Alternatives should have their specialists. Music, vaudeville, news,

(Please turn to page 185)



A review of reception conditions, together with notes of the new stations which will make the coming months some of the most interesting since broadcasting began.

ATMOSPHERICS, which did not appear in great strength so early this year as they were expected, have recently been making up for lost time. On some days there has been a more or less continuous mutter of them, and in such conditions even the most hard-boiled enthusiast finds the sparkle knocked off long-range reception.

But fortunately we have had some very clear periods, too, when even the thousand-miles-away stations came in well.

Long waves, as usual, suffered more from atmospherics than the medium waveband. But on the whole the programmes above 1,000 metres have been very satisfactory.

In the south, Luxembourg, and Radio Paris are the star turns, but Warsaw, Kalundborg and Motala have all had their great moments.

Huizen (or rather Kootwijk, which has been transmitting the Huizen programme after 3.40 p.m.) has not been so outstanding of late. Usually he is in the first three favourites of the London listening area, but at the time of writing is taking rather a back seat.

The chief long-wave interest, of course, centres round the new National station at Droitwich. Watch the daily Press for the latest developments of this long-hoped-for B.B.C. super-transmitter, which is going to make Europe tune to 1,500 metres with new interest.

On medium waves there is also plenty doing in the way of new station activities. Switzerland, delighted with her new high-power stations, aims at Alp-like efficiency, and has decided to "hot-up" Beromunster by increasing its power.

The present sixty kilowatts, which puts out a lusty programme on 539.6 metres to British aerials, is to be nearly

doubled. Moreover, this is no nebulous on-paper improvement, for some of the necessary new equipment is actually under construction at the present moment at the Marconi works at Chelmsford, Essex.

A last-moment improvement which was incorporated in the design of the new Droitwich station is also to be effected at Beromunster. This is the series-modulation system—one of the very latest developments in the design of broadcasting transmitters. It is a quality-cum-efficiency idea (rather like Class B for reception), and Motala, the Swedish long-waver, is also going in for it.

They will have to close Beromunster for three weeks or so in the autumn whilst the improvements are effected. But from all accounts we shall be more than repaid for this short enforced silence.

Whilst on the subject of new transmitters mention must be made of the Rumanian stations.

A British firm has just received an order from that Government for a couple of new installations, one being a twenty-kilowatt, which rating is much more powerful than the present Bucharest station on 364.5 metres. But the other new station leaves this far behind, for it is to be of super-power tell-the-world type, rated at 150 kilowatts! Is this to be another high-power long-waver?

Incidentally, this is the same power that the Swedish Government has ordered for their new long-waver at Motala (also to be built by Marconi's at Chelmsford).

Only last month we referred to Langenberg's latest station; and as quite a number of other transmitter improvements and extensions are due within the next few months it looks as though there is in prospect a real kick in long-distance reception for all keen searchers of the ether.

P. R. B.

A TRIBUTE FROM A PRIZE-WINNER

READ THIS NOTTINGHAM MAN'S APPRECIATION—AND REMEMBER IT NEXT TIME S.-T. DESCRIBES A SET.

Your A.C./S.T.400 is a great set—too much volume, really, for a house—and incidentally it's the best three-valve set of all-mains type I've ever heard, and I've done some visiting.

It was originally the S.T.300 converted to the S.T.400 with a conversion kit, and finally converted to the A.C./S.T.400, using Westinghouse metal rectification.

It's splendid, both on radio and gramophone, reproducing records with that fidelity and thump that designers long for in their sets, but quite often fail to obtain.

A friend of mine built a ——— all-electric, but when he came down to listen to the S.T.400 he was amazed and instantly inquired what it would cost him to make his into one.

Several friends of mine employed in our department have expressed themselves satisfied with your sets, which they have built; and no one, I know, has changed over to one designed by anyone else.

I have great pleasure and can only express my appreciation by writing to you and saying that if every designer considered the constructor as much as you, there would be thousands more enthusiasts.—[From Mr. E. R. Oseroft, 53, Hilcot Drive, Aspley Estate, Nottingham.]

[The above letter is from a conductor employed by the Nottingham Corporation Passenger Transport. He won first prize for A.C. sets with his A.C./S.T.400 at the Annual

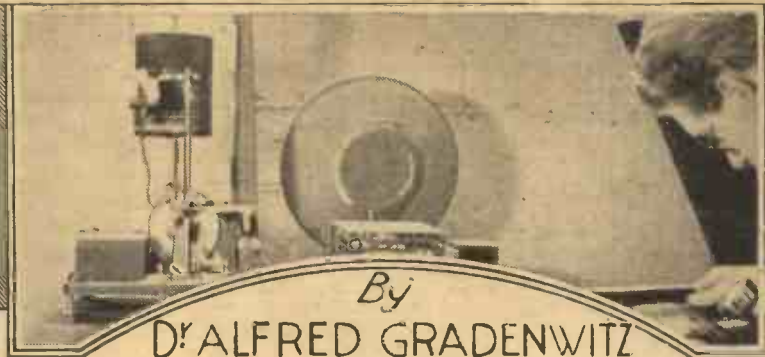
Exhibition. The first prize in the battery set section was won by Mr. J. Sissons with a battery S.T.400.]



This is Mr. Oseroft's S.T. 100 A.C. Radiogram.

WHAT DO SOUNDS LOOK LIKE?

**NEW
GERMAN
METHOD
EXPLAINED**



**A TONE
RECORD
THAT IS
PERMANENT**

By
DR. ALFRED GRADENWITZ

MANY attempts have been made to obtain an accurate and permanent picture of human speech. The letters of the alphabet, of course, cannot provide it. They are but symbols, leaving all the more delicate shadings of actual sounds out of account. In fact, there is no organic connection between them and the spoken language.

The question of an automatic speech record in the form of a curve portraying language is, of course, an altogether different proposition. This problem may now be said to have found a satisfactory solution, thus endowing linguistic research with new and wonderfully efficient methods based on the principles of radio engineering.

At an early stage of gramophone development—in fact, when records were still anything but perfect—the most sanguine hopes were already attached to this new means of registering language. Phonetic museums

were founded, e.g. in Vienna and Berlin, which were thought to comprise everything required for a most minute study of the spoken word.

Though any form of human speech could thus be preserved for future generations, in order at any moment to be reproduced to the listening ear,

records constituted a wealth of material lending itself to accurate observation. In fact, this valuable material seemed to be doomed to the contemplative existence of museum collections.

A short time ago the director of the Vienna Phonographic Archives, Dr. Leo Hajek, drew attention to the suitability of amplifiers for the investigation of speech records. Inasmuch, however, as this suggestion had not yet been developed to a workable method, Dr. Kurt Ketterer, late of the Phonetic Department of the Prussian State Library (at present

Sounds are so fleeting that any easy method of making a permanent record of them is of great interest and importance. Here we learn of an ingenious German device which enables not only the simple sounds, but tone effects, harmonics, etc., to be examined at leisure.

connected with the Radio Section of the Berlin Academy of Music), instituted a series of experiments with a view to transmitting sound vibrations from gramophone records to the rotating smoked drum of an electrically operated Zimmermann Kymographion, using an electro-magnetic system as stylus.

this only permitted a very crude estimate of any more intricate phenomena. There was no means of comparing the results of several experimenters with, and checking them on, one another, their acoustic training never being identical.

From Record to Drum

Moreover, even the most skilled sense of hearing had, in all more important questions, to be content with more or less summary statements; there was, for instance, no possibility of appreciating the quantitative and melodious characteristics of vowels.

Also some decisive points in the appreciation of consonants, even of European languages had to be left unsettled, though existing gramophone



TWO PICTORIAL EXAMPLES

On the drum to the left is a "voice" record taken in Germany by the system which Dr. Gradewitz describes. The drum is rotated whilst recording, and the sounds appear as wavy lines, every detail of which indicates the corresponding tones.

To the right is a piece of talkie film, and running beside the picture will be seen the sound track—another interesting instance of the permanent form in which sound waves can be recorded.



They Use It to Look at Languages!

These tests resulted in the development of a new and easy method which, with a minimum outlay, can be operated at any phonetic institute so far worked on the old traditional lines.

A Simple System

The stylus is a four-pole double-magnet system, such as is used to drive an ordinary loudspeaker, the paste-board diaphragm being replaced by a brass-sheet lever placed with its plane at right angles to the plane of the armature.

The tapering end of this lever carries the usual straw and parchment point for recording purposes, while the opposite end, fixed to the magnetic system itself, is free to rotate round a small rod. This is how the vibrations of the armature are communicated to the lever point—with properly magnified amplitude:

The straw is pasted with gum and, in order to avoid any characteristic vibrations, should be about $1\frac{1}{2}$ inches in length. The parchment point, for a similar reason, should be as short as possible.

A three-stage low-frequency resistance coupled amplifier is connected up to the apparatus above described through the intermediary of an output transformer.

Word and Phrase Melody

The amplifier should comprise special filter circuits, lest the mains frequency of the alternating current make itself felt in the records. These fundamental elements of the experimental arrangement can be combined, as the case may be, with an electric sound recorder applied to the subject's throat or with a microphone for obtaining an immediate record of speech. (Only the case where a gramophone record is picked up and transferred to the smoked drum has so far been dealt with.)

The process is exactly the same as in transmitting gramophone records to a loudspeaker, the alternating current generated by an electric pick-up actuating the magnet system which, instead of causing a diaphragm to vibrate, will, on the smoked drum, trace a faithful record of speech.

These graphic records will give ample information about everything likely to interest the linguist, enabling, for instance, the variable pitch, and,

SMOKING THE RECORD



A great advantage of Dr. Ketterer's method is that of simplicity. He is seen here preparing to make a new record by smoking the drum over an open flame.

thus, the word and phrase melody of any language, to be ascertained.

The actual pitch, of course, depends to some extent on the general course of speech, a speaker's voice being lowered at the end of a sentence and raised in an interrogative sentence, while varying in accordance with his or her actual mental attitude.

Tests recently made go to show that the same rule—though to a lesser extent—applies to Chinese and certain African idioms, in the case of which

the meaning of words is determined not only by the sequence of letters but as well by the word melody.

While the method, as already stated, can be used for testing the speaker's words immediately as they are enunciated, the use of gramophone records affords a number of advantages, e.g. the possibility of performing the experimental work at any time in the quiet and comfort of the laboratory and checking the acoustic record on the graphic record, thus ascertaining whether the speaker has a natural elocution and what psychological factors there have been modifying his or her tone of voice.

Moreover, the sounds studied in connection with a gramophone record, being part of a lengthy discourse, are free from such distortions as are inevitable in the event of each sentence being pronounced apart.

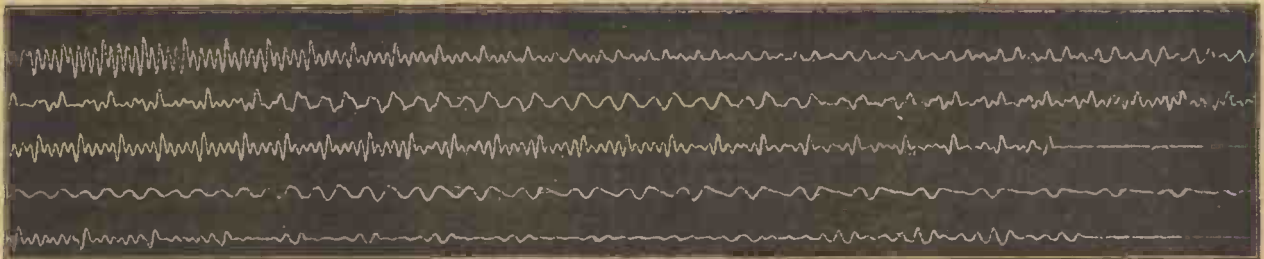
PREVENTING HUM

The fact that every precaution has been taken to smooth the power supply of a mains-operated receiver is no guarantee that hum will be entirely absent from the loud speaker.

The components and wiring in the grid circuit of the detector often pick up mains interference. A scheme which almost invariably cures this form of interference is to enclose the detector valve and its associated grid condenser and leak in a metal screen.

A standard valve screen is ideal for the purpose. Of course, it is essential to use a condenser of the "postage-stamp" variety, and a leak with wire ends, as the space inside the screen is limited.

Another point which should be borne in mind is that the leads to the radio-gram switch (if one is used) should be kept as short as possible and preferably screened. **A.S.**



THE DIFFERENCE BETWEEN VARIOUS SOUNDS. We all know that the vowel sounds are distinct from each other, and here is a graphic and permanent record showing the totally different construction or wave-forms of different vowel curves. It shows very clearly how the character of the waves changed almost insensibly from moment to moment as the tone of the voice was altering.

TELEVISION

AN OPPORTUNITY FOR CONSTRUCTORS

IF any of you have any television ideas, however nebulous and vague, now is the time to turn them over in your minds and polish them up.

All over the world people are thinking and talking television. In our own country an official committee is sitting; its report is awaited with almost feverish excitement.

Any inventor with a television scheme is certain of receiving consideration; a vast industry is prepared to give the man or men with the right ideas a riotous welcome.

Something Revolutionary

Scientists and technicians have pursued every known avenue of approach to the problem with unabated zest; but technicians and scientists seldom originate new lines of thought, for they become so immersed amid the trees they can't see the outlines of the wood.

However good any present television system may or may not be, there is nothing more certain than that someone, somewhere, is going to think of something so new, so revolutionary, that television will become as simple as a magic lantern; and the man who puts the scientists and the industry on the road to this will achieve fame and fortune.

Keen Imagination

I am firmly convinced that this is bound to happen. Perhaps you who are reading this agree with me, but has the thought entered your head that that fortunate man may be yourself?

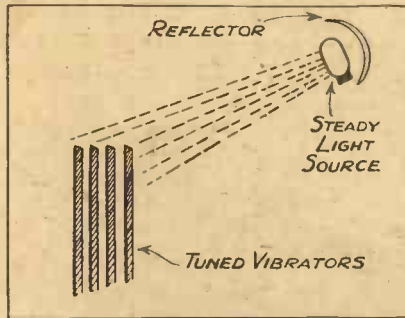
It does not matter if you know practically nothing about the deeper technicalities of electricity, wireless, optics, chemistry or any other of the allied sciences. If you have a keen

Here is an inspiring article for anyone of imagination who is interested in television. It shows that the vital needs of the new science are now presenting a great opportunity to you!

By G. V. DOWDING.
Associate I.E.E.

imagination you are in the race, and your lack of learning may even be an advantage and not a handicap.

I wouldn't give anything for your chances as a radio inventor, because the foundations of radio telegraphy and telephony have been so well and truly laid, and there are crowds of



REFLECTOR RESPONSE

This sketch illustrates a fundamentally simple idea of the type that might revolutionise present-day methods. If the vibrators each responded only to one note, light reflected from their mirror-edges would automatically respond to the sounds reaching them, and thus give a picture from sound.

research workers working in great laboratories all over the world busy putting in every conceivable kind of finishing touch.

The most the majority of THE WIRELESS CONSTRUCTOR readers could hope to do in that direction would be to contribute little gadget improvements, minor circuit twists and so on.

But television has hardly started.

There is practically no foundation laid at all. What there is may have to be ripped up, and the new foundation may bear the name of an apprentice engineer in Glasgow, a clerk in Birmingham, a sailor now on the high seas—in fact, anyone.

And in saying this don't let me give the impression that I am deprecating the work of the pioneers of the present systems. They have hewn through the entirely virgin forest. Their tracks may not be leading straight to the goal of ultimate success, but they are tracks.

Avoiding Duplication

You may not want to follow these tracks, but you can't ignore them. Or, if you do, you will waste some valuable guides. Get a general outline, however superficial, of what has been done. If you have read Mr. Kendall's articles in "Popular Wireless" you will have acquired all the information you need.

Then you will at least not duplicate more than is necessary of the work of others.

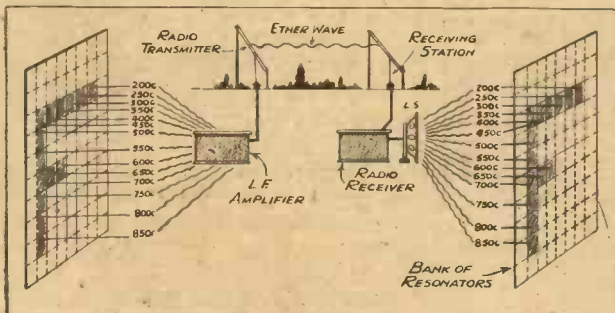
It may be that it is thought that television is too complicated for the ordinary constructor to handle. Perhaps you have visions of precision optical apparatus and intricate mechanism. If you have, then you are not visualising the kind of television that is needed. Simplicity in every aspect of reception at least is the prime essential.

Humble Beginnings

In any case, remember how the pioneers of the present systems started. John Logie Baird is an outstanding example. His first gear was a medley of cardboard and wood, and it is a tribute to the simplicity of his ideas, and no reflection on his abilities, to say that his apparatus could have been duplicated by almost anyone.

But, of course, it was only John Logie Baird who thought to make that particular contraption in the first place.

And now there are several mechanical systems and a number using



TRANSLATES THE LIGHT

An illustration which makes clear the possibilities of selective resonators building up a picture in the receiving apparatus to correspond to the one which operates the transmitting station.

You May Help to Lay Television's Foundations

cathode-ray tubes, but so far no one has produced a non-scanning television scheme of a practical nature.

I believe that this will be the next step, and such a big one that in one bound television will be brought right into the homes of listeners, whereas now it is to be found mainly in the workshops of experimenters.

Concerning Scanning

By non-scanning I mean that the pictures will be sent and received as a whole. Existing schemes do not operate in that way. The picture to be transmitted is broken up into a number of light points, and these are transformed into a succession of electrical impulses.

At the receiving end the impulses are changed into light fluctuations, and these are produced in series of adjacent strips in the viewer. Close synchronisation with the transmitter is essential.

If the picture could be handled in its entirety in the one moment of time instead of having to be taken point by point, there would be no need for synchronisation, and, possibly, the other receiving processes, too, would be greatly simplified.

Now I will assume that our search is for a simple non-scanning system of television—simple, that is, in so far as reception is concerned.

It must always be remembered that a certain degree of complication and expensiveness is permissible at the transmitting end. At the most there has to be only the one transmitting outfit in a given broadcasting area for every several hundred thousand receivers. A thousand pounds here or there at a transmitting station are no more, comparatively speaking, than so many shillings at the receiver end.

"Someone, somewhere, is going to think of something so revolutionary that television will become as simple as a magic lantern"

So if you have a scheme in mind where the reception is simple but the transmission intricate, you are still thinking practical politics so long as the ether link between transmitter and receiver is normal and workable.

Multi-wave channels can be ruled out, at least for the time being. The transmission must be possible through

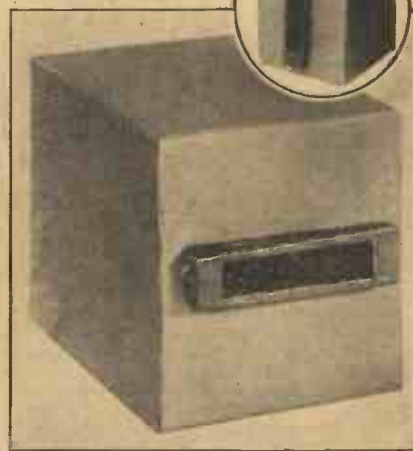
one radio transmitter working on one specific wavelength with no more than ordinary sideband overlap on medium or long waves.

There are two main problems: that of obtaining sufficient detail on ordinary wavelengths, or, alternatively, of making very short-wave working reliable and the simplification and improvement of the actual handling of the picture.

It is this second problem that I am going to discuss first. And there is so much to say about it that I shall probably have to leave out the other for the time being.

In my opinion, the best results so far have been obtained with cathode-

"TURNING LIGHT ROUND"



This box has two light filter slots—one across and one upright. Merely by the selective action of these filters, a point of light moving horizontally across the first slot appears in the second filter to be moving vertically!

ray tubes. But with these, horizontal and vertical scanning are necessary, and fairly elaborate electrical circuits are needed to provide this. Also high voltages have to be employed, and the cathode-ray tube itself is a somewhat fragile and costly device.

An Adaptable System

Nevertheless, the system is most adaptable and can be adjusted quite easily to take either low- or high-definition pictures.

The mechanical systems are not so adaptable, synchronisation is more of a problem and there is a certain amount of noise owing to the rapidly moving parts, and many listeners find this objectionable.

An ideal method would have no moving mechanical parts and would not require to be synchronised.

It is possible that Professor Fournier d'Albe gave us a valuable clue with his acoustic method. He proposed to analyse the picture to be transmitted into a number of points; that is, divide it up into separate patches, each

"It does not matter if you know practically nothing about the deeper technicalities . . . your lack of learning may even be an advantage and not a handicap"

patch being transformed into an acoustic frequency.

These acoustic frequencies are handled by the transmitter in a bunch, just like those which are generated by, for example, an orchestra. At the receiving end they are sorted out, and the picture is built up instantly by a bank of resonators, for each resonator of the bank is arranged to respond to one particular frequency.

Professor d'Albe did not live to proceed very far with his scheme. The most he did was to have half a dozen photo-electric cells at one side of the laboratory, and to show that, as he threw a light on one of these cells, so a certain one of six resonators at the other end of the room was made to respond, although the only link between the two sets of apparatus was by means of two wires.

Reception Simplicity

Regarding transmission by means of such a method, there is little that need be said. I have already suggested that it does not matter if the transmitting outfit is rather complicated and expensive so long as reception is efficient and simple.

Even if the Fournier d'Albe idea necessitated having a bank of hundreds of photo-electric cells, that would not constitute an objection. But could reception on such lines be made practical?

Well, for a brief spell I turned over in my mind a scheme which might have something in it. I visualised a compact bunch of resonators which were nothing more than steel wires of varying thickness and length: some many hundreds of them, each having a different natural frequency to which it responded.

Doing Away With Synchronisation and Scanning

Their ends would be brought close together so that they had the appearance of a brush. The end of each wire would be chromium plated, and would, in fact, be a tiny mirror. A steady light would be directed on the massed ends of the resonators.

You no doubt see the idea? If a certain frequency is present the appropriate steel wire vibrates and its end reflects a tiny point of light. If there are two hundred different frequencies, two hundred of the little vibrators operate and reflect two hundred points of light, which form a pattern—make a picture, in fact.

Bright Images

Could anything be simpler? You place your resonating steel "brush" in front of a loudspeaker, shine a light on it and you see moving pictures! No synchronisation, no scanning, no elaborate light control giving dim and unreal effects: a bright picture with a pound's worth of apparatus!

No, the wire resonators would not need to be as carefully tuned as the strings of a piano, for, so long as their natural frequencies were progressive, a slight error spread over the whole could not affect the picture seriously.

Is there a snag? Candidly, I have hesitated to give the idea as such much more than a passing consideration, because it would at least possess this limitation. The light points, and that means the detail of the picture, would be limited by the number of resonators, and these are naturally limited by the difficulty of obtaining sufficient and equal physical movement over more than a fairly small band of frequencies.

The Analysis

And our television system of the future must not be limited to low definition. All the same, there may be something here for us to work on.

Let us accept the general idea of a picture transmission comprising a bunch of different low frequencies, each frequency representing a particular light point. This is a quite practical assumption. It could be done.

Is there any other principle of analysis that could be used at the receiving end?

Perhaps there is something in the vague conception of a screen every point of which is, optically or acoustically, a different distance from a light or sound source. That nebulous idea might be worth working on, I think.

Light-Filter Effects

Curious things can be done with light. There is reflection and refraction. For myself, I have dabbled a little with light filters of a rather peculiar, if not entirely novel, character.

I made two oblong filters, both graduating in their actions from the one end to the other. A light point was shone along the one, and behind it the light diffused and passed to the

A horizontal scansion had been changed into a vertical one. If this could happen, why should not the second filter be made in the form of a circle and the light patch made to travel round it, thus transforming a straight line into a circle?

Going further, couldn't the second filter be a spiral?

Do you see the implication of this? What I was aiming at was the complete scanning of a whole picture by means of one simple backwards and forwards movement of a light spot along a straight line.

Building Up the Picture

The position of that light spot on that straight line would then decide the position of the light spot on the picture screen.

So the building up of the picture, then, depends only on varying the angle of reflection of a light spot emanating from a strong, fixed local light source.

Obviously, a tiny oscillating mirror would do the trick, the intensity of oscillation being determined either by amplitude or frequency of the received "picture currents." This time there would be scanning. But only a modified and simplified form of scanning. And there would still be no synchronisation.

Simple Solutions

Are there any snags in this idea? I am not going to say whether there are or not. But I can tell you this much: Some of those things concerning the scheme which at first sight look to be insurmountable objections may be very simple of solution after they have been considered closely!

That oscillating mirror is not the only method of fixing the initial light-spot position. There need not be a connecting sweep of light between the individual spots. But I do not propose to prejudice your minds by discussing this particular scheme in any further detail.

Maybe a WIRELESS CONSTRUCTOR reader will achieve success along similar lines; maybe we are yet miles away from the track that will lead us to that goal!

Who knows?

A COMPACT SCOPHONY RECEIVER

* * *

The compact instrument which this engineer is holding, is one of the recent developments in television. It is a Scophony type receiver for use on thirty-line picture transmissions.

* * *



other filter, which was placed at right angles.

Elaborating the Scheme

Merely by the selective action of these filters a light point moving along a horizontal track appeared in the second filter as a glow of light moving vertically.

QUESTIONS I AM ASKED



JOHN SCOTT-TAGGART

Q. 91. What are your present views on the prospect of television in the home?

A. I could hardly deal adequately with such a matter in this department. It is bound to come sooner or later. I should be surprised to see television popular within five years.

As regards methods, the size of the screen may ultimately determine this. Some cathode-ray method may be the likeliest solution for small-screen work, but I personally should prefer a screen at least three feet square and brilliantly illuminated. A projector such as is used for amateur film work is what I have in mind, and this may call for quite different technique.

One thing is certain. The public will require a very high standard of photographic quality. They will always compare television with the talkies, whereas the only thing they could compare ordinary broadcasting with was the gramophone—at that time an easy thing to beat.

Q. 92. What is your opinion of the electrostatic type of loudspeaker? I have heard it gives an excellent response, and I am thinking of changing over from a moving-coil type. Do you advise this?

A. No. The cost of making a really good electrostatic speaker is to-day prohibitive, although the position may alter in the future. Such a speaker also requires a polarising D.C. voltage across the two metal plates forming the speaker—for an electrostatic speaker is simply a condenser fed with varying high-voltage E.M.F.s.

These varying E.M.F.s. are obtained by means of a step-up transformer connected to the output valve of the set, and the changing voltages cause the plates to be attracted to a greater or smaller extent.

Provision for a high enough D.C. voltage is very difficult in the case of a battery set. Unless you have a high

polarising voltage (about four times the "modulating" E.M.F.s.) you will obtain only a small output from the speaker. In fact, the problem of obtaining adequate output is one of the greatest besetting the path of electrostatic-speaker development.

My own experience of some commercial speakers of this type shows that they reproduce the high notes very well, but are inadequate lower down the scale.

For ordinary reception of foreign stations a response above 5,000 cycles per second is not needed. You will find that an electrostatic speaker will

Television prospects, electrostatic loudspeakers and station identification, are the subjects covered this month by Mr. Scott-Taggart, who deals with them in his usual clear and readable manner. All constructors will find this page of considerable interest.

revel in high-note interference and heterodyne whistles will sound like sirens.

When there is little risk of such interference, e.g. when receiving "the local" strongly, the wider the range of response the better, and an electrostatic speaker may with advantage be used in combination with a moving-coil speaker. A much cheaper model of electrostatic speaker could be used for this purpose.

Q. 93. It is a mystery to me how some fellows can come fresh to a set and proceed to identify and draw up readings with nothing but a printed list of stations—no wave-meter or chart. Can you do this?

A. Blushingly I must admit that I can. I, incidentally, know the Prague Plan off by heart and am nearly station-perfect on the Lucerne list. The best way to go about identifying stations is probably to underline

all the British stations on the list in front of you. Then work between these.

For example, just below West Regional you may hear an Italian with perhaps a woman announcer, a nightingale interval signal and lots of musical words ending in "o." Look at your list and you will find Genoa. Immediately below this is Hilversum, a strong station with a Dutch intonation which you will soon recognise.

After a little experience you can tell Dutch, Norwegian and Swedish (both sound laboured, sing-song and monotonous), German (amazingly clear diction and plenty of expression, and in these days a good deal of cheering, heiling, etc.), Czech (absolutely unmistakable medley of harsh and angry-sounding citizens with mouths full of hot, prickly potatoes), French—well, we all know a bit of French, n'est-ce pas? Then we come to North National and, ee lad, tha knows that aw reet.

Between North National and Scottish National, if you hear anything at all it must be Heilsberg or Renneå. As Heilsberg is about twenty-five times as powerful as Rennes, the betting is on Heilsberg. If there is much cheering the identification is nearly certain. Rennes, of course, is French.

Further up the dials Beromünster talks German, but is Swiss. Just above Athlone, it must not be confused with Budapest. Mühlacker and Vienna may cause you some trouble, but the programme may help you. If you hear both German-speaking stations the higher-wave one is Mühlacker.

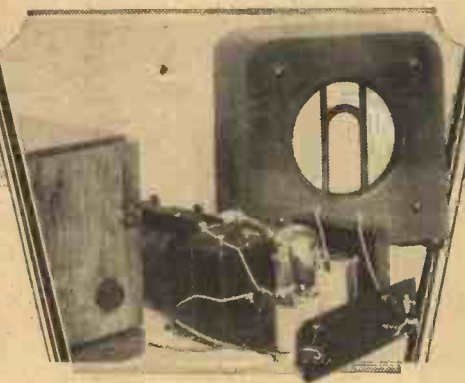
The actual programme, the news period, the interval signal and the closing hour all help the identification of stations.

Q. 94. Quite often I notice your opinions are contradicted elsewhere in the same magazine. Whom am I to regard as right?

A. Me.

A POWER

AMPLIFIER



SINCE the publication of the "Ferro-Power" Five at the beginning of this year we have had a number of letters from readers asking for various imitations of the L.F. side of the set in order that they may obtain a big power output from their individual mains receivers.

Such adaptations are, of course, impossible, and the only way to get a large output from an existing receiver without completely rebuilding it to some other design (such as the "Ferro-Power" Five) is to add a self-contained power amplifier.

Your Set Remains Unaltered

The term "self-contained" is used because it must be understood that by "big" power we mean an output of the order of 5- or 7- watts undistorted A.C., and this means an H.T. voltage of some 400 volts on the anode of the last valve.

Most ordinary receivers giving, perhaps, up to 3- watts output are "fitted" with 250 volts H.T. supplies, so that the power amplifier cannot be fed with H.T. from the receiver—it must be attached together with its own power-supply unit.

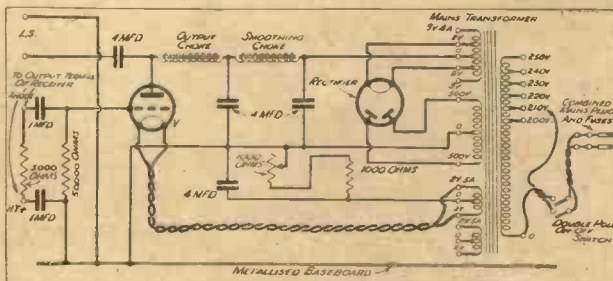
This is a very easy task, for the only set connections such an amplifier needs are those between the input terminals of the unit and the output

Adjustable for either 5- or 7- watts output, this mains power amplifier may be added to any receiver with a small output. Driven from A.C. mains, it is ideal for converting an existing battery or mains set into an outfit with almost "public address" volume. It is just the thing for dances, concert halls and other places where normal domestic volume is insufficient.

terminals of the receiver. Moreover, the amplifier addition need not entail any alteration whatever in the receiver.

FULL-WAVE RECTIFICATION

In this circuit diagram the full-wave rectifier is seen on the right, while the output valve is to the left. Note that the latter is of the directly-heated type and that a variable bias-resistance is employed.



It can be attached entirely "on the outside."

With such an amplifier in view one has a choice of two classes of valves, the 5-watt and 7.5-watt types. They each take the same H.T. voltage, and incidentally the same anode current, though the mutual conductances of the valves are vastly different.

This is an important point, and upon this feature must the final decision be made as to whether the amplifier is to be of the 5- or 7.5-watt output type. As a matter of fact the working con-

ditions of the two valves are so similar that the only thing that has to be altered in the design of the unit is the bias resistance in the cathode circuit of the valve. Thus it may be seen that the amplifier is in a way flexible, for though it may be initially constructed for a 5-watt output, it can be altered for the higher power very easily, and vice versa.

Handling Great Volume

In most cases it will be found better to use a 5-watt valve, and to load this fully from a number of stations from the receiver, than to install a 7.5-watt and find difficulty in loading it. The trouble is that the latter valve requires something like a 90-volt grid input before it will give its full output, while the 5-watt only needs 32 volts. This latter can easily

be supplied by any mains set, but it takes a well-designed receiver with large distortionless output to load the larger power valve.

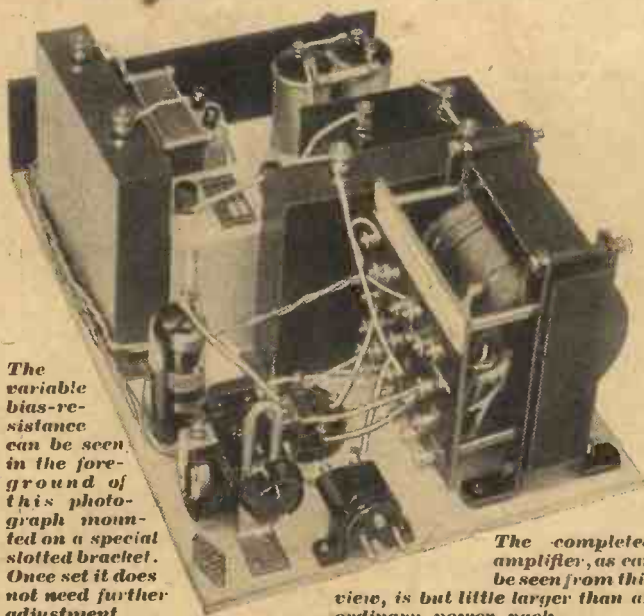
The trouble lies not so much in the output valve of the receiver to which the amplifier is to be attached, but in the detector, which can so very easily be overloaded before sufficient output is given to the amplifier to load fully the 7.5-watt valve. The 5-watt type, however, is easily loaded before the normal detector is overloaded.

The Alternative Output Powers

We would advise most constructors to build the 5-watt amplifier; that is, to install a 5-watt valve in it, making the necessary adjustments to the bias resistances.

Later a larger output can be tried if desired, without any radical change being required in the amplifier. This latter as shown in the wiring diagram and the photographs is wired for 7.5 watts, and the layout should be adhered to whether 7.5- or 5-watt output is required.

SELF-CONTAINED



The variable bias-resistance can be seen in the foreground of this photograph mounted on a special slotted bracket. Once set it does not need further adjustment.

The completed amplifier, as can be seen from this view, is but little larger than an ordinary power pack.

HERE ARE ALL THE COMPONENTS

- 1 Varley mains transformer, type E.P.24.
- 1 Wearite L.F. choke, type H.T.12.
- 1 Bulgin L.F. choke, type L.F.21.
- 2 T.C.C. 4-mfd. condensers, type 101.
- 1 Dubilier 4-mfd. condenser, type L.B.G.
- 2 W.B. 5-pin valve holders, type A.C.
- 1 Dubilier 4-mfd. condenser, type B.B.
- 1 Dubilier 50,000-ohm resistance, 1-watt type.
- 1 Dubilier 5,000-ohm resistance, 1-watt type.
- 1 Varley 1,000-ohm resistance, 10-watt type (see text) with holder.
- 1 Varley 1,000-ohms potentiometer, power type.
- 2 Dubilier 1-mfd. condensers, type 9202/BS.
- 1 Bulgin D.P.S.T. on/off switch, type S88.
- 1 Bulgin combined mains plug and fuses, type F.15.
- 4 Clix indicating terminals.
- 1 Peto-Scott ebonite panel, 10 in. x 3 in.
- 1 Peto-Scott "Metaplex" baseboard, 14 in. x 10 in.
- 2 coils of "Quikon" wire.
- Screws, flex, etc.

In that latter case the fixed 1,000-ohm resistance is omitted and the wire taken direct from the mains transformer to the side terminal of the variable resistance. (This gives 1,000 ohms variable control for the 5-watt valve, which requires about 500 to 600 ohms.) Also, for the 5-watt valve, the wire joining the terminals marked A and B on the diagram is not required. Instead, these two terminals are each wired to a different terminal of the adjacent 1,000-ohms resistance, thus placing it in the anode circuit.

Very Easy Construction

If 7.5 watts are desired the 1,000-ohm resistance is inserted as shown in the diagram and the setting of the variable control is readjusted—that is all that has to be done.

The construction of the amplifier is particularly easy. There is no panel of any great size, just a piece of ebonite to take the input and output terminals and the on-off switch, while all the components other than these are mounted on a piece of "Metaplex" baseboard.

THE CHOICE OF VALVES

- 1 Mazda type PP5/400 (for 5-watt output), or 1 Mullard type D.O.26 (for 7.5-watt output), see text.
- 1 Rectifier Mullard D.W.4; Tungram P.V.4200 or Dario F.W.3.

The circuit is of normal type, the 5- or 7.5-watt valve (either a PP5/400 or a DO26) being fed from a 500-0-500-volt power transformer, the H.T. being rectified by a 120-milliamp full-wave rectifying valve. The bias for the power valve is controlled by the variable resistance, the adjustment

The wiring is clearly shown in the accompanying diagram. Note that there is a fuse in each mains lead and that the on-off switch is of the double-pole variety.

Add It to Your Set

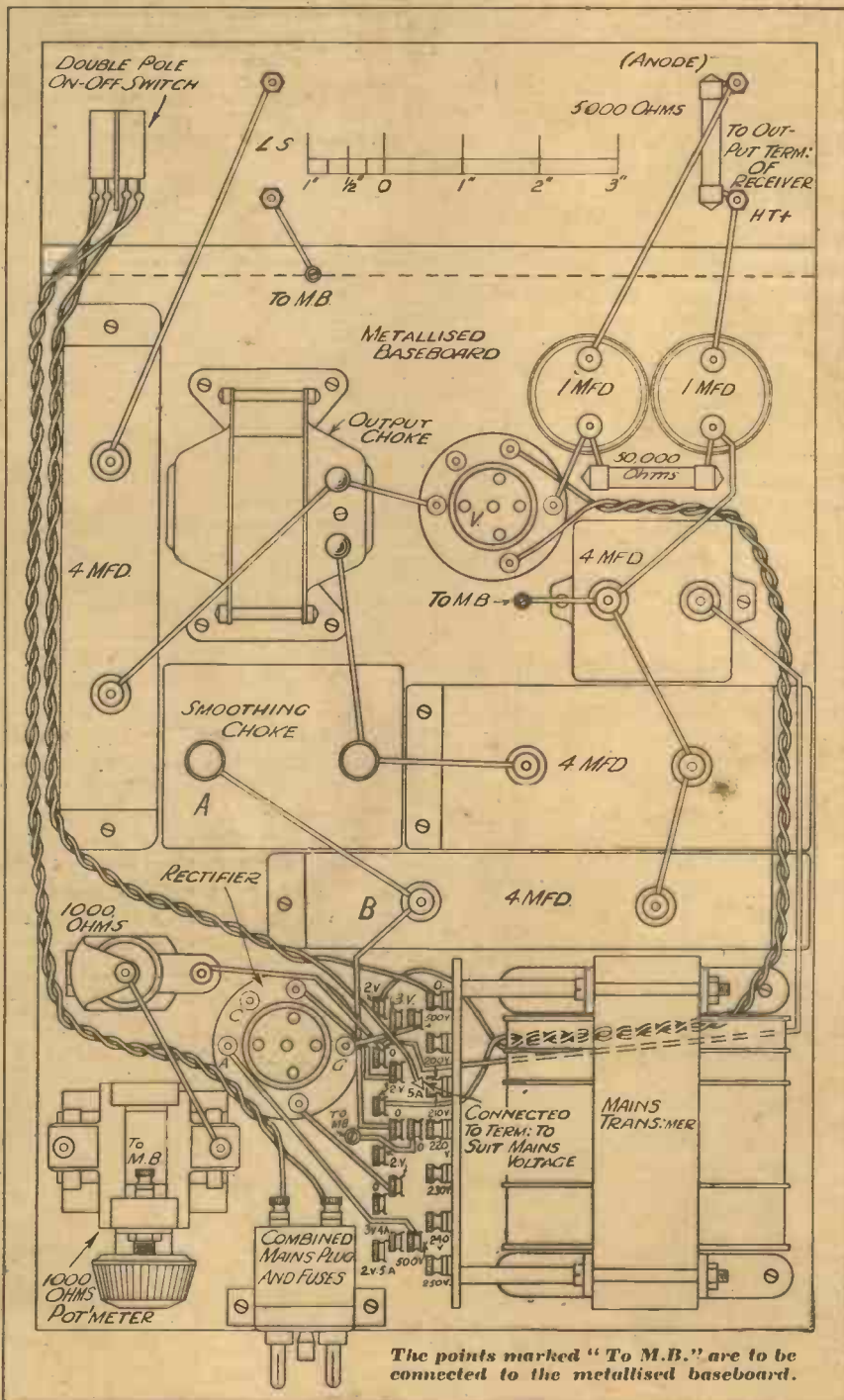
being checked by a milliammeter in series with the anode circuit.

The output is choke fed, while the input to the amplifier is so arranged that the grid of the

valve is completely isolated from a D.C. point of view from the source of input.

As it is designed to be attached to an ordinary mains set output, which may not have choke or transformer feed, the amplifier input is arranged to provide something under a 5,000-ohm

(Please turn to page 181.)





Henry Hall's Big Offer More Room for Broadcasting The Question of Announcers

An Inquiry into Programmes
ABOUT four months ago, Sir John Reith instructed his programme officials under Colonel Dawnay to make a complete, fresh investigation of the whole structure of programmes. They were to start with a clean sheet, and afterwards they were to recommend what they would do in ideal circumstances beginning in the autumn. A great deal of evidence was sifted, much thought and time were devoted to the subject, but the trouble was that the only opinions sought or accepted were those of people actually concerned in one way or another with programme work.

After much discussion, therefore, it is hardly surprising that the results of the investigation take the form of recommendations very much the same as the programme arrangements that already exist. The inquiry, therefore, is not of much value. Programmes next year will be about the same as the programmes this year. Public agitation, however, may force the B.B.C. to do something about the deplorably neglected alternatives and contrasts.

Big Money for Henry Hall

Henry Hall has broken into the list of big money favourites. A few weeks ago, a film company offered £15,000 to Henry and his Orchestra for appearing in one film. A few days later there was another offer of £1,000 a week for four weeks to Henry himself for acting in a film.

This is another example of the extraordinary value of microphone publicity in the dance music world. Mr. Hall is not likely to leave the B.B.C. yet awhile. The Studio is still his favourite hunting ground. For him the lure of the footlights is far from irresistible.

BY OUR SPECIAL CORRESPONDENT

B.B.C. Housing Problems

The B.B.C. has had to take yet another house in Portland Place. This is the fourth addition since the move from Savoy Hill. There was a rumour the other day that the B.B.C. was about to take over the Langham Hotel. This, however, is not true.

Possibly the rumour is a belated account of tentative negotiations started by the B.B.C. with the Langham Hotel authorities before the site of Broadcasting House was purchased. The present position of the B.B.C. housing problem is that with the four extra properties in Portland Place, St. George's Hall, the Skating

SIR WALFORD DAVIES AT HOME



A recent portrait of the popular broadcaster, who is Master of the King's Musick, taken in characteristic pose.

Rink in Maida Vale, and the buildings in Balham, they hope to manage satisfactorily for three or four years.

Women Announcers

There is a difference of opinion in the B.B.C. on the subject of women announcers. Mr. Roger Eckersley, the Director of Entertainment, who was responsible for the ill-fated experi-

"Time to Spare"

Journalists at the B.B.C.
Broadcasting House Film

ment with Mrs. Borrett, is the leader of the feminist party. He has continually urged that the B.B.C. should have a group of three or four women announcers.

His colleague, Mr. Lindsay Wellington, the Director of Presentation, leads the opposition with equal tenacity. Followers are evenly divided, but it looks as though the feminists are about to score a success. If so, there may be some interesting developments.

The "Time to Spare" Series

The excitement over the broadcast by the unemployed in the "Time to Spare" series, has made all the political parties concentrate attention on possibilities of broadcasting in connection with their various campaigns between now and the time of the General Election. This means that the position of the B.B.C. will be increasingly uncomfortable as pressure develops from various quarters.

It is likely, therefore, that the B.B.C. will seek to share its responsibility for dealing with party-political problems with a representative committee of Members of Parliament appointed at the initiative of the Speaker and with the authority of the Whips.

Christmas Day Empire Programme

I hear the B.B.C. gave the King a special Birthday Present in the form of a printed selection of the letters of appreciation of the Empire programme on Christmas Day, 1933. Royal interest in this feature of broadcasting appears to be undiminished. It is safe, therefore, to prophesy that the King will be willing to participate in another similar programme on Christmas Day this year.

Three Popular Radio Commentators

The Relay from Bisley

Summertime talks have always presented the B.B.C. with a rather difficult problem, because this is the season when the weather is all against that form of entertainment. So what talks there are in the programmes have been "seeded" with unusual care.

Fortunately the running commentators tend to redress the balance, and a good one is down for July 21st, when Capt. E. H. Robinson will describe the final stage of the competition for the King's Prize at Bisley.

The successful competitor in this contest can claim to be considered the finest rifle shot in the world, and as Capt. Robinson is himself a former winner he should be able to impart to his listeners the thrills of the famous meeting.

The N.U.J. and the B.B.C.

I have heard a rumour that The National Union of Journalists may serve notice on the B.B.C. that those members of its staff whose work is journalistic must be treated in accordance with the rules of the Union. There is a possibility in this of a big row. The B.B.C. has always set its face against allowing any of its

staff to claim any privileges because of trade union membership.

The B.B.C. argues that its work is exceptional, that its treatment of staff is on the whole better than would

be the case under trade union rules, and that, therefore, there is no need to take this into account. The N.U.J. disagrees with this view.

Sir John Reith's Home

I hear that Sir John Reith has decided to leave Beaconsfield where he has maintained a large country house for the past seven or eight years. Numerous engagements in London make it necessary for him to return to Town. Also, he has been considerably harassed by newspaper reporters, and I would not be surprised if he moves to an entirely unknown destination, to be kept rigidly secret.

Filming Broadcasting House

The making of the documentary film which the G.P.O. film unit is producing of British Broadcasting is now in full swing, and has been for several weeks. Scenes inside the "Big House" have now been taken and the staff have found themselves tripping over cables and knocking their heads on flood lights in the corridors.

When the film is complete it will probably be available for amateurs in sub-standard sizes as are the other G.P.O. films.

A FAMOUS BROADCASTER



This is Emilio Colombo who, with his orchestra, is frequently to be heard in the programmes.

THE season of outside broadcasts, commentaries, eye-witness accounts and whatnot is with us. What are these men like who run up and down the country to give us accounts of all the big sporting events? Let us visit this month three of the most important of them.

* * *

Bernard Darwin, as fine a golfer as he is a writer on that game, is in charge of the eye-witness accounts of all the big golf matches. Eight times he played for England and Scotland, and once for Britain against the United States. Twice, too, he was in the semi-final of the Amateur Championship. So there's no doubt that he knows his subject inside out.

Most of you have probably read his fine golf articles at one time or another as well as noticing that he has a perfect microphone manner. The talk after Britain's latest defeat in the Walker Cup, when Bernard Darwin had to drag himself away from the dinner of celebration, was masterly.

The delightful village of Downe, in Kent, holds his home, "Gorrings,"

VOICES ON THE AIR

Making the acquaintance of the people in the programmes.

and in his spare time he writes books on Dickens, and children's subjects.

* * *

Robert Charles Lyle, the B.B.C.'s racing expert, is married and lives—with his six children—at Thames Ditton. But his real home is the race-course, preferably in the commentator's stand. The Derby, the St. Leger, the Grand National and the Chester Cup have all been described to listeners by this finest of all racing microphone experts.

As a junior reporter he was on the "Daily Express" in 1909, but left as a result of telling R. D. Blumenfeld that he was worth more than thirty shillings a week. After the war he returned to the "Express"—with a salary much in excess of that thirty shillings! During the war he was

awarded the Military Cross and mentioned in despatches.

* * *

In the commentator's box at Wimbledon each year you will find H. B. T. Wakelam who, with Colonel Brand, undertakes the strenuous and most heating task of following every ball which is hit in all the big matches. When his score disagrees with the umpire's—well, it is generally Captain Wakelam who is correct. Nothing worries him—not even the heat, which is about as bad as a very hot Turkish bath!

After serving on five fronts during the war, with the Royal Artillery, Captain Wakelam finally resigned his commission, on the death of his father, to take up business.

In 1927 he was persuaded to undertake his first broadcast commentary. After this nothing could stop him. Soccer, Rugger, Cricket, Boxing and Tidworth Tattoo—all come alike to him, even if he does think commenting on a cricket match one of the most boring of occupations.

PATRICK CAMPBELL.



**AS WE
FIND
THEM**

**NEW
APPARATUS
TESTED**

The Latest Block Battery

THE Block battery, which we have recently had on test, is something entirely different from the conventional accumulator cell.

In the Block accumulator there are no plates in the generally accepted sense, and, of course, no separations to complicate the construction. Actually the cell consists of one substantial



**A "PLATE-
LESS"
CELL**

The Block battery has many distinctive features, among which may be mentioned the fact that the interior of the casing acts as one of the electrodes.

block of active material, the other electrode being the casing itself.

With this particular construction such troubles as paste shorts and sulphation are eliminated, and moreover about double the capacity for a given weight and size is achieved.

But the advantages of the cell do not end here. First of all, it is a pleasing looking battery, the bakelite casing being supplied in various attractive colourings.

Another feature is the position of the terminals. These are conveniently placed on the front of the cell, thus facilitating connection and disconnection.

Also the terminals are removed from the acid-creeping area, and do not stand on each side of the vent hole prey to acid spray, and thus subject to the corrosion which is so apt to occur in these cases.

The vent plug is of porcelain and screws securely into its hole, and a finishing touch (a practical point this) is given to the *tout ensemble* by the neat lid which covers the whole of the top of the cell.

Interesting reviews of the latest apparatus submitted by radio manufacturers and traders for examination and test in "The Wireless Constructor" laboratories.

The Block battery is thoroughly sound in every way, and we have no hesitation in recommending it to constructors.

The makers are Messrs. Block Batteries, Ltd., By-pass Road, Bark-ing, Essex.

An Attractive Screwdriver

There are numerous occasions when one is faced with the problem of fixing or unfixing something which is tucked away in a dark corner. Screws which have to be tackled by feel alone, because of the impossibility of doing two things at once, namely, holding a lighted torch and wielding the screwdriver. This is a case in point, and quite a common one, too. But there is now an ingenious screwdriver which has been specially designed for these jobs.

In the first place, it is a good stout

VERY INGENUOUS



This screwdriver incorporates a "flash-lamp" in the handle which projects a spot of light on the work.

screwdriver capable of dealing with screws with slots up to 1/4 in. wide. But added to this is the fact that at the foot of the insulated handle there is a bulb which shines on the work during the screwing or unscrewing operation. The bulb is of the pocket lamp type, and is supplied with current from a small battery located in the hollow handle.

The light need only be directed on the work when required, since a screw-button at the top of the handle acts as an on-off switch and thus controls the current.

It is a distinctly novel as well as workmanlike tool, and a variety of

uses will suggest themselves to the constructor.

The makers are Burgess Products Company, Bush House, London, W.C.2, and the price is 4s. 6d.

The Colvern F5 Coil

The modern iron-core coil is a definite advance on other types of inductances, and has done much to simplify set construction.

For a given inductance the iron-core coil is considerably smaller in its physical dimensions than the air-core type. With an iron-core fewer turns are required to produce the desired inductance, and the compact form of the coil makes screening a comparatively easy matter.

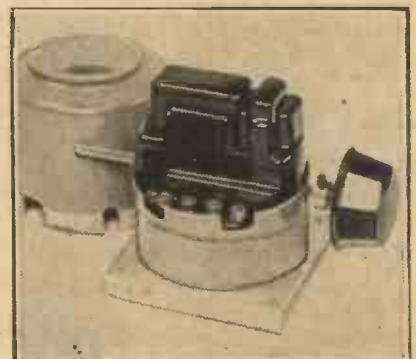
The initiator of iron-core coils was Hans Vogt, whose constructional design embodied a laminated core made up of iron-dust, i.e., very fine particles of iron.

This method has the advantage of reducing core losses to an absolute minimum, the possibility of eddy currents being eliminated by the fact that each iron particle is insulated from its neighbour.

The sole licensees in this country

(Please turn to page 188.)

GIVES HIGH SELECTIVITY



The Colvern F5 Ferrocart coil is particularly suited to sets of the det. and L.F. type. High selectivity and ample volume are two of its outstanding characteristics.

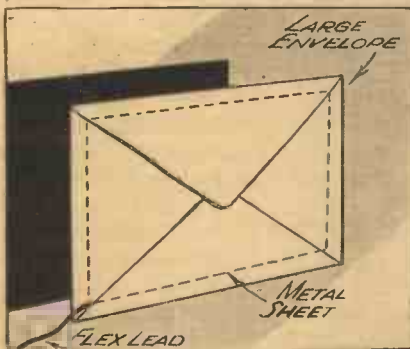
How to obtain BETTER RADIO



IN these days of efficiency in coils and valves it is not surprising that a great number of set constructors get trouble with instability in their receivers.

This is usually made known to them in the form of oscillation of the H.F. circuits when the set is properly ganged, or the condensers are tuned accurately to a station, or it takes the form of scratchy reproduction, or perhaps uneven and sudden reaction control.

SIMPLE AND SAFE



A sheet of metal wrapped in paper, or in an envelope will form a safe "trial" screen.

Iron-cored coils, steep-slope S.G. valves, and pentode output circuits all make for good results, but they also tend to provide instability troubles if the receiver is not designed properly.

Naturally, shielding of the various H.F. circuits is an important feature, in all sets having one or more H.F. stages, but such shielding will not always prevent trouble.

A Useful Gadget

However, let us consider the question of shielding first. A useful gadget to test the requirements of a set as regards inter-stage shielding is a piece of tin, or aluminium, in an envelope, as shown in the sketch. This can be placed without fear of causing short circuits

in any position in the set, and the lead from it taken to the filament circuit to find if the insertion of a screen at any point is likely to be advantageous. If it is found useful at any position, a permanent shield can be fitted.

An unstable set can try the patience of any constructor, unless he knows where to look for the trouble. These hints on the subject will be valuable to all set builders.

By FREDERICK LEWIS

The chief position of trouble due to lack of screening is between the S.G. anode and grid circuits, and it must be remembered that if the coils are not screened the linkage between them may take place through and under the baseboard, as well as above it. So that a vertical shield may not necessarily do the trick. A piece of metal under the baseboard (if this latter is not of the metal-coated type) should be tried at the same time.

But, as I have indicated, the effect of screening may not be a complete cure. There may be trouble due to H.F., or even L.F. impulses getting into the H.T. feed circuits, and thus being coupled into the set at unwanted points. Especially is this likely to be the case where an H.T. power-pack for mains supply is used.

In such a case the only thing to do is to decouple the receiver properly, and the diagram on this page has been

drawn to show the vital points where decoupling, besides screening, should be tried.

Assuming the usual type of circuit with one H.F. stage, a detector and reaction, and an output valve, let us consider the receiver step-by-step. I have shown resistance-capacity coupling for the output valve because this type of coupling is prone to cause trouble, and I wanted to indicate the use of the grid stopper (F), which is not so often required when transformer coupling is used.

Shielding the Reaction Leads

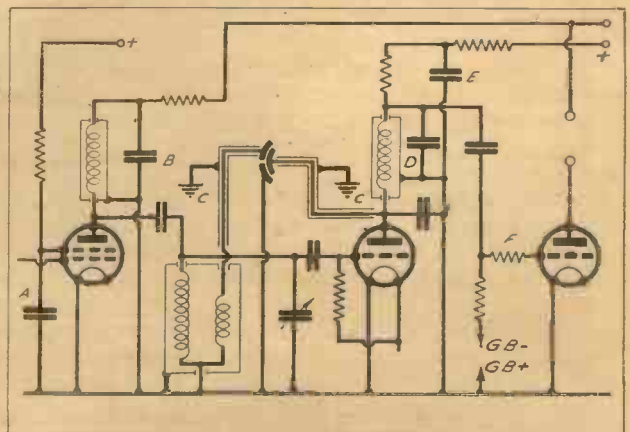
Let us take shielding first. All coils and H.F. chokes should be shielded to start with. Then if trouble persists, the reaction leads should be examined to see if they are likely to be the cause. If they are very long, and go back near the S.G. circuits they will probably need screening. This is done, as shown, with shielded wire (C).

The decoupling at A and B should always be carried out at the first sign of instability trouble, the resistances being of the order of 1,000 ohms, and the condensers not less than .1 mfd. in capacity.

A and B will stop H.F. being fed from the S.G. circuits into the H.T. supply. Next decouple at E, using not less than 2 mfd. (4 or 6 mfd. are better), and a resistance of about 25,000 ohms. The resistance F may be used, too, especially if a pentode output valve is employed. Its value should be about 100,000 ohms.

The condenser D may also assist, but must be kept small or loss of high

IS YOUR SET UNSTABLE?



The letters denote the important points in an average circuit where screening and decoupling should be provided.

notes will result. About .0001 mfd. is the usual value here. If reaction is very fierce, the condenser from the anode (below) D can be added, and here the size should not exceed .0001 mfd. for the reason already given.



A LETTER from Bombay—from Daby A. Chandry or Orshardly or Orhandy. No, it isn't, it is Ghandy. And a very serious and intelligent letter it is, albeit a little inferiority complex-ified.

He finds THE WIRELESS CONSTRUCTOR "not very technical, but fairly satisfying." Journals cater for different publics, of course, and writers for "T.W.C." believe in sound wholesome fare which is readily digestible. It is possible to produce a paper that gives technical information difficult to swallow and almost impossible to digest. As regards set design work, it is no secret that THE WIRELESS CONSTRUCTOR pays more highly than any journal in this country. So Mr. Ghandy reads it.

It is also no secret that practically everyone in the industry, and in the more technical zones, reads this magazine. I like to think—and want the publishers to think—that it is because of this lighthearted column of mine which contrasts so much with my more serious technical and legal work which my readers know nothing about.

"Imaginary Carlos"

Mr. Ghandy says: "I am *not* one of those exiles with whom you people sympathise so much, those 'poor unfortunates doomed to live in fever, heat and swampy jungles, far from the pleasant shores of beautiful England.' I have always found that when you wireless people ever go beyond

your own small island, it is always to those so-called exiles that you speak, but never to the foreigners themselves except, in so far as, when you deign to laugh at them through fictitious characters as your imaginary 'Carlos,' or your equally absurd 'T. K. Chan.'"

Ask to See Them

Well, Mr. Ghandy is certainly trying to get my goat. The better Carlos becomes, and the more real and vital he sounds, the more people think he is but a figment of my fevered brain. Carlos, come let me clutch thee. I see thee not and yet I hear from thee still.

This month's postbag has brought to Mr. Scott-Taggart a letter from an Indian reader in Bombay; another from a gentleman with scarlet fever; an amusing story from a West Country doctor; and the latest and greatest news from Carlos of Setubal. All these add to the enjoyment of this monthly chat between author and reader—what S. T. calls "this light hearted column of mine."

Let me assure you, Mr. Ghandy, that though you live at 16, Palli Hill (it sounds friendly enough), Bandra, Bombay, there will be some who think you are a mythical person.

Carlos' genuine existence was proved last month, and I am asking him if I can show some of his letters at the Olympia Show. As he is a good sort, he will agree, no doubt. At any rate, ask at THE WIRELESS CONSTRUCTOR stand to see some of the original Carlos communiqués. They will gladly be shown to you without charge.

As for Dr. Chan; his official position and the names of his ships were given. I have had no complaints from Hong

Kong; why should I get any from Bombay? If Dr. Chan reads this, will he send me his birth certificate? Carlos also?

But to continue Mr. Ghandy's letter:

"I am an Indian—an Indian born and bred, and moreover I am proud of the fact. I can write as good English as you ever can just as I can write as good Gujerati—my native language—as most people here."

All right, all right. The only Indian I know is pukka, and sahib and napoo. But I am perfectly aware that there are a few Indians in India. It isn't my fault if, thanks to Clive, Warren

Hastings and others, we helped India and made a good thing out of it. Write to Mr. Winston Churchill about it. I believe every Mogul who ever successfully ruled India was a

foreigner, but it isn't my fault. Incidentally, the only spelling error in your letter is the word "illeteracy."

Real Activity

However, Mr. Ghandy *does* say this: "I think of all the radio journalists, I like you the best of all."

This would be nice if I didn't loathe being called a journalist. The word is noble enough in its right application, but it simply suggests an ability to write. I think I have written more on radio than any other person in the world—and over a longer period of real activity.

But I write about what I do. It's

“This ’ere progress, it do go on”

the doing that has always been my interest. Several thousand pounds have been paid, on different occasions, for my shortest writings—sometimes measured in a few hundred words—surmounted by the Royal arms and a patent number. Journalist? Ugh!

A Sense of Humour

My inventions and consulting work have been my major activities, and the average reader must of necessity know little or nothing of these. I have certainly devoted years to the amateur cause, often for nothing, and often as a designer—but the word “journalism” makes me shudder. Someone will call me a technician next.

Mr. Ghandy has another complaint about a sister journal. “How would you like an utter stranger to ridicule, laugh at and deride a man whom you honour, respect and almost worship?”

I do not know what the passage refers to—I am writing this in a bathing costume—but I am sure it was not meant to hurt foreign susceptibilities. We Britons think we have a sense of humour, and occasionally get tired of having regard for the susceptibilities of the scores of peoples who form part of what we regard as less civilised parts of the world. Almost anyone south of the English Channel is regarded as a dago—or even as a dirty dago.

And we ridicule our own political chiefs. *Vide* any cartoon in almost any paper. We even laugh at ourselves.

But though we do not take ourselves quite as seriously as do other nations, we can bleed to death for an ideal and even with a laugh on our lips.

Pre-War Vintage

The letter closes with a question as to whether I transmit. I haven’t the time these days to go in for radio communication. But in 1920 I was 2LR and before, about 1913, I was LUX. You’ll see it in a Gamage

catalogue of pre-war vintage. Those were the days when we chose our own call-letters. At first we could use almost any, and I chose LU because it sounded distinctive in Morse. Then the Post Office said we had to have the letter X in our calls—anywhere. I stuck the X on the end of LU. It made a clean job of it.

I suppose there were about a score or so of us blazing the amateur trail. I did a bit of blazing on 3,000 metres, but the Post Office never knew about it. If they had they would have done a little blazing themselves.

Happy days, when the only worry was whether my translation of *De rebus naturalis* would fit the right passage.

* * *

Another reader: *I have just had scarlet fever.*

Good lord, and I licked the flap of your stamped, addressed envelope! And now probably all the readers of this column will catch it.

* * *

I don't think much of your aerial reaction. I am fifteen years old.



CARLOS BY THE SAD SEA WAVES?

Ah, well, all of us—at least, most of us—have been fifteen at some time or another.

* * *

Of course we all know it's good for trade to keep changing circuits.

Yes, and quite good for me. Otherwise I should have been in the workhouse in 1919. But I do far less changing than most people—or rather I do more changing but do it less often.

And don’t forget what the old lady so wisely said: “This ’ere progress, it do go on, don’t it?”

Here’s loyalty for you, my hearties. Mr. Burnet of Luton writes a belated but much appreciated song of praise for the S.T.400, which at 13 miles from Brookmans Park gives him all he wants, he says:

Incidentally, could you give me the address of your friend (?) at Chorlton-cum-Hardy as I'd like to blindfold him, put him in a dark room and make him wind and unwind and rewind a spaghetti—with boxing gloves on.

He also says “let me say that I enjoy your armchair chats more than any other feature of the periodical in which they appear.” But just as many say they are unreadable, so I don’t go into hysterics.

“Stirred With Enthusiasm”

All the same, when writing, querying, grouching on any matter, a paragraph of appreciation of these notes as a P.S. to your letter to Tallis House will warm my heart. It will also help me to extort a plumper fee.

* * *

Here is a kind of letter I like to get. It comes from a reader at Scarcroft, near Leeds, and speaks for itself.

I should like to congratulate you on your S.T.500 circuit. I have been out of touch with wireless for a year or two owing to unemployment. I built my first receiver ten years ago—the S.T.100. I bought POPULAR WIRELESS owing to the attraction of your name. I have been stirred with enthusiasm by your description and details and have read and re-read it, as that is as far as I can go at the present. I am determined to build it as soon as better times come. Thanking you for giving me a few hours of pleasure.

* * *

I have had a few letters from readers complaining that I have designed for another wireless journal. I do not think this is very criminal, especially as the journal in question is a sister journal to this.

After Two Years

I have never any intention of issuing two competitive sets at the same time in different journals. Otherwise those who loyally follow my designs would have real cause for complaint as they would not know which to build.

The fact remains that the S.T.300 has had a magnificent run and is only

READ ABOUT
 THE
**RADIO
 EXHIBITION**
 IN THE
 SEPTEMBER
**WIRELESS
 CONSTRUCTOR**

THIS NUMBER OF
**BRITAIN'S LEADING
 RADIO MAGAZINE**

Will contain special details and information about this year's magnificent show at Olympia.



THERE WILL ALSO BE
**AN ATTRACTIVE
 NEW SET DESIGN**

By JOHN SCOTT-TAGGART, F.Inst.P., A.M.I.E.E.

IN
**NEXT MONTH'S
 WIRELESS
 CONSTRUCTOR**

ORDER YOUR COPY IN ADVANCE **6^d.** OUT ON AUGUST 15th.

CONSISTENCY



Corn and Condensers—what a curious combination! Yet, just as corn is a living symbol that nature never fails man—so the T.M.C. HYDRA mark on a condenser is a warrant of consistent, good performance. This unflinching consistency is only possible because T.M.C. HYDRA condensers are made from the finest raw materials, with up-to-date plant under the strictest scientific control, to tolerance figures of the narrowest margin.

Take advantage of these new standards in condenser production. Equip your set with T.M.C. HYDRA condensers—it will be better for your set and better for your pocket. They are made in all standard capacities.

Write to the Distributors if you have any difficulty in obtaining supplies.



T.M.C

BRITISH MADE



HYDRA CONDENSERS

Price List from Distributors:

T.M.C.-HARWELL (SALES) LTD

Britannia House, 233, Shaftesbury Avenue, London, W.C.2
 (A few doors from New Oxford St.)

Telephone: Temple Bar 0055 (3 lines)

Made by TELEPHONE MANUFACTURING Co. Ltd.

An Amazing Improvement on the S.T.400

now, after two years, being replaced by the S.T.300 Star. It represents a big advance over the "300" at no greater cost on current consumption.

The S.T.400 remains unchallenged except by the S.T.500, and although many prefer the latter set with its magnificent output, I would not persuade any reader who already obtains excellent results with his "400" to change.

The "400" is a good job, although if designing it now, I should use resistors of the Ohmite, metallised or similar type. Spaghetis have definitely failed to give good service.

Not My Fault

Likewise, I should prefer an S.T.400 builder who is not sure of himself or his apparatus to take off the '0003 preset and its associated 180 ohms resistance which I used for reaction equalisation.

The circuit will work very well without it but with less convenience. If, however, the preset is dud or wrongly adjusted, you may get unsatisfactory results.

The S.T. Super, of course, is an "ultra" job for those troubled with "local" interference. It is, however, too expensive for construction on a large scale. Pity, but not my fault.

My policy of fewer sets, and progressively adjustable ones, has resulted in none of them becoming obsolete except the S.T.300, and that is now replaced by the S.T.300 Star, and only after two years.

The S.T.600

As regards all my other sets, I am constantly advising one or other to different people who require certain results. The S.T.400 is certain to last two years at least from the date of its publication. I strongly urge anyone who has not obtained full satisfaction to persevere and discover the fault.

Those readers who are experimenters should apply the S.T.300 Star principles to their S.T.400's. The double-reaction method is definitely more simple to apply. But I do not propose to give official instructions. When I can improve strikingly on the "400" I shall issue a new design altogether, rather than a hybrid.

Since writing the above in my notebook, I have produced an amazing improvement on the S.T.400. I am

very busy on it still. It will be known as the S.T.600, and already I am open to challenge any S.T.400 owner who is truculent about the impossibility of beating the S.T.400. In every direction the S.T.600 will beat it by "streets." Never was I so positively certain of a great success. It will equal that of any set I have designed.

And every week it is being improved detail by detail. Would you like to hear it in your own house? Then write me a line offering me the loan of your aerial for an evening—not, by the way, your home for the night.



BROADCASTING HOUSE, BERLIN

I have had one of my periodical letters of encouragement and criticism from a reader-friend in the person of a West-Country doctor.

As in the case of many other readers, his letters touch on personal as well as radio matters. He tells me how the other day he visited an old farmer who was recovering from pleurisy. The farmer's wife who was "the boss" but was deaf, said:

"Doctor, can he have his night-cap of whisky again? I have stopped it while he has been bad."

The doctor replied:

"Yes, it won't hurt him." Whereupon a voice from the bed said:

"Shout, doctor, or she won't hear you!"

Really Press News

The troubles of Carlos are ended. It is a wonderful story, and our Portuguese ally tells it all himself. He has sold his S.T.400 complete with crochets and splitters—the whole caboodle and, reading between the lines, at a handsome profit!

Setubal. "I have fresh and wonder-

ful really press news to communicate but, first I should like you to understand that I am not quite yet up to the neck in it, for I have given it half the heart and am trying to duplicate the whole heartily yet. I don't want to think of you having lake of volition, as the sunstricken to apoplexy W/B's forefathers have said regard their progenitor.

"A. Corpolente Peasantry"

"Seat down please in your deep arm-chair and read this letter, for I don't want you to fall off your legs once more.

"I told you in my last, that my patron had abandoned me. I think am going through a bad zodiac sign influences and, have therefore resolved to put together all my remain nerve forces, to fight valiantly through yet the worse of all odds and, you are going to be the judge.

"Allo! Allo! Attention.

"Last week I was search by a small but corpolente peasantry on an indifferent matter, he was a middle-age man, so I had to entertain him with all imaginaries things, in this consequence I let him hear Radio Paris Victor Pascal Orchestra, he remain astonish, hearing with wide open mouth, after same time when the program had finish, he said farewell and left my studium.

"His Face Brighth Up"

"Two days elapsed then on the third he appear noiseless on the door, I asked him to enter but the man was not the same, something was hanging over him, as he sat down on the divan and said nothing, I was pre-occupied but, didn't what to disturb by invite any conversation, I had apprehension the man was not quite well.

"I remind myself and, went to the S.T.400 and, tune in again Radio Paris as it was midday as last time.

"His face brighth up but no conversation came fram, after more than an hour had elapsed, the concert had

(Please turn to page 186)



SIMPLIFIED SELECTIVITY

ONE of the major problems in radio engineering to-day is the elimination of interference, both from broadcasts on nearby wave-lengths and also from natural and man-made electrical interference.

It is the object of this article to describe a type of tuning circuit which has been designed and protected by the author, primarily for combating all types of interference, but which proves itself to be of great value in problems of selectivity.

Another advantage which it possesses is that reaction may be applied to such a tuned circuit without a reaction wind-

very nearby radio transmitter, by electrical plant, or by "static."

Consider also the case of a series-tuned circuit, as in Fig. 2.

A heavy local signal, whether in

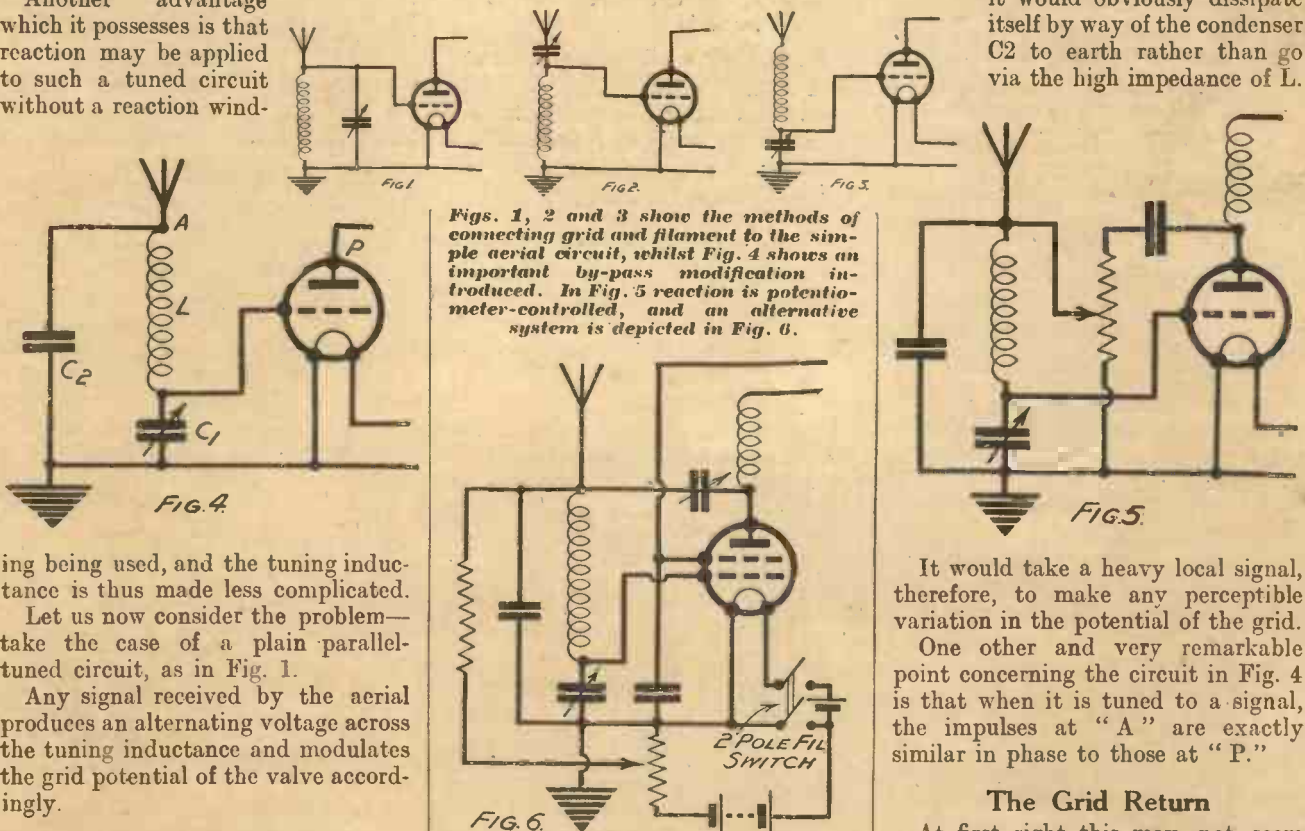
the inductance would act as a kind of buffer or surge absorber to signals out of tune with the circuit.

An arrangement such as this would, however, embody certain difficulties; but by placing a condenser between the aerial and earth, as in Fig. 4, a signal in tune with the circuit will still build up a voltage across the tuning condenser sufficient to modulate the grid potential.

Yet, if a signal were received by the aerial out of tune with the circuit, it would obviously dissipate itself by way of the condenser C2 to earth rather than go via the high impedance of L.

By J. PERRY.

A brief description of the evolution of a very interesting circuit, which gives unusually good station separation.



Figs. 1, 2 and 3 show the methods of connecting grid and filament to the simple aerial circuit, whilst Fig. 4 shows an important by-pass modification introduced. In Fig. 5 reaction is potentiometer-controlled, and an alternative system is depicted in Fig. 6.

ing being used, and the tuning inductance is thus made less complicated.

Let us now consider the problem—take the case of a plain parallel-tuned circuit, as in Fig. 1.

Any signal received by the aerial produces an alternating voltage across the tuning inductance and modulates the grid potential of the valve accordingly.

Arranging a Buffer

Now, if a signal of any kind were received by the aerial at an initial voltage sufficient to modulate the grid potential perceptibly, quite apart from resonance effects, then no amount of tuning would prevent that signal from finally reaching the loud-speaker.

Such a signal could be caused by a

tune or not, will pass through the series condenser and build up a comparatively considerable voltage across the inductance.

Now, in the case of a circuit that is electrically resonant to a given signal, similar voltages are built up across both inductance and capacity.

We could therefore arrange the circuit somewhat as in Fig. 3, so that

It would take a heavy local signal, therefore, to make any perceptible variation in the potential of the grid.

One other and very remarkable point concerning the circuit in Fig. 4 is that when it is tuned to a signal, the impulses at "A" are exactly similar in phase to those at "P."

The Grid Return

At first sight this may not seem very important, but it means that reaction can be applied merely by inserting a small variable condenser between "A" and "P."

Such a system, while giving very selective tuning, has certain peculiarities of its own.

For instance, it will be seen that the grid of the valve is insulated from

Continued at foot of next page.

YOUR LOUDSPEAKER

Here are two useful hints, the first concerning that common difficulty of finding the best connections for two loudspeakers. Additionally, details are given for making an attractive loudspeaker fret.

Two or more speakers can usually be worked together from the same set.

The main difficulty arises from the fact that the usual type of speaker is designed to have an impedance suitable for working singly in the anode circuit of the output valve. So that when two or more speakers are joined

up together the resultant impedance will usually be unsatisfactory.

Where two or three speakers of the moving-coil type each having its own input transformer are to be joined up together, however, a very simple and effective method can be used.

Each transformer can be wired in parallel, the "pentode" tapping being used in each case. Since the primary impedance of each will be higher than it would be normally, and since the primaries are joined in parallel, the effective impedance in the anode circuit will be nearer the correct one than would be the case otherwise.

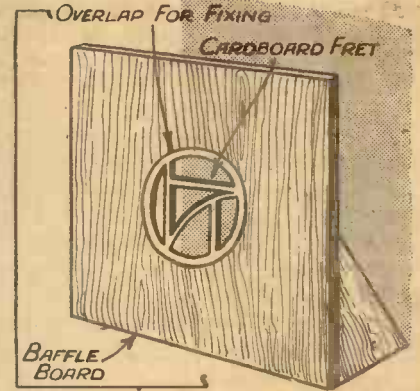
This method, of course, is only effective when an ordinary power output valve is used.

Making a Cardboard Fret

The cutting of a loudspeaker fret in a fairly thick baffle-board is sometimes a tedious task, and the constructor, rather than take the trouble

to complete a design, is often content to cut a hole of the required size and cover it with a piece of gauze.

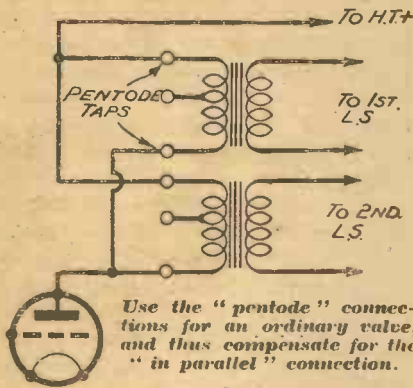
A fret, however, is a much neater arrangement, and there need be no reason for not having one. The diagram illustrates a very simple method in which a suitable pattern can be cut out of cardboard instead of wood, the only tool required being a sharp pocket-knife.



How the fret looks when finished.

When the fret is shaped it is fixed over the hole in the baffle-board, a small overlap being allowed for this purpose. A baffle-ring is finally used to hold the cardboard fret firmly in position.

A.Y.



SIMPLIFIED SELECTIVITY

(Continued from previous page.)

earth, and a resistance *must* therefore be provided to dissipate any static charges which might accumulate on the grid.

This may be accomplished in two ways:

Either by merely connecting a resistance of a few thousand ohms between aerial and earth, or by adopting the method shown in Fig. 5 and using a potentiometer to control the reaction.

This latter may have a value of anything from 10,000 to 50,000 ohms.

Owing to the fact that the grid of the valve is primarily insulated from earth, it is an easy matter to apply bias to it.

In Practical Form

This may be accomplished merely by disconnecting the "grid discharge" resistance from earth and plugging it into a suitable grid-battery tapping.

A variable method could be used as shown in Fig. 6, and in this case it would be advantageous to

employ a variable reaction condenser.

The author has constructed a straight four (S.G., Det. and 2 L.F.) using this method of tuning. The circuit is given in Fig. 7.

The set is screened in the ordinary way, but the tuning coils are not "canned" as they are each built up of three plug-in type honeycomb coils with the plugs removed. (Two 50's and one 200 in each case.)

The wave-change switches have three positions as the band of the wavelengths covered, say by an ordinary .0005-mfd. condenser, is smaller with this type of tuning than with ordinary parallel tuning.

The values of the components given in the diagrams are those found

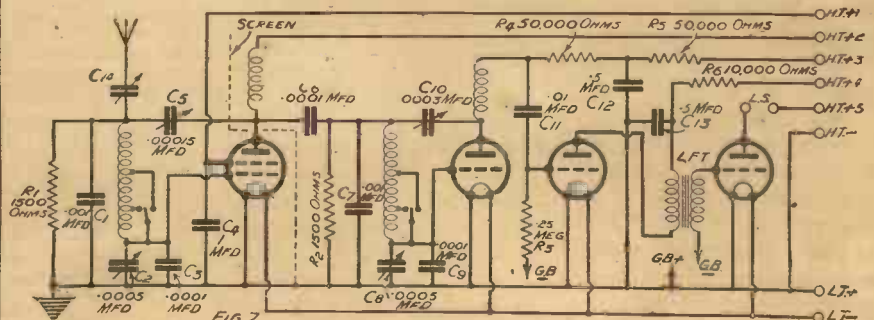
to be best by experiment; for instance, .001-mfd. seems a good all-round value for the condensers C1 and C7.

C3 and C9 are used to prevent too low a capacity obtaining between the grids of their respective valves and earth.

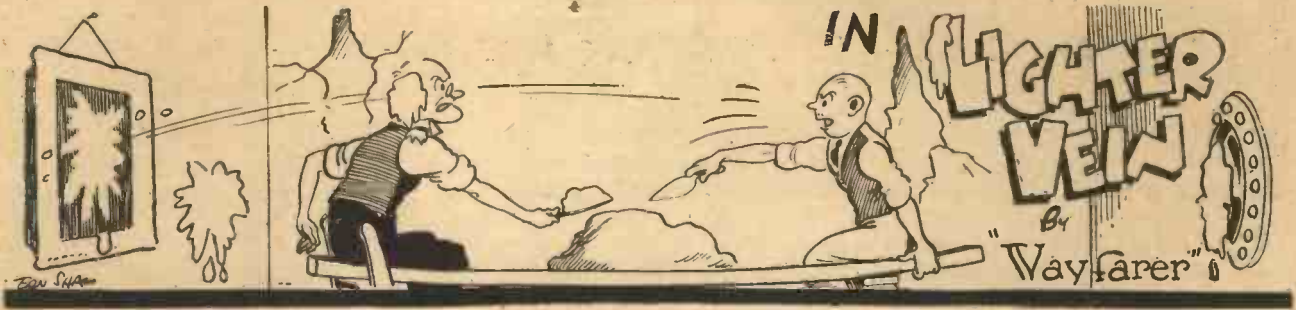
Dual Reaction Control

Such a condition would prevent adequate reaction being obtained.

It will be noticed that reaction is employed on the H.F. valve as well as on the detector, and that the impulses are fed from the anode of the H.F. valve itself, although if desired these could be fed from the detector plate.



The circuit of the receiver referred to on this page by Mr. Perry.



HOW TO RE-WIRE IN THE PROFESS(OR)IONAL STYLE

Mrs. Goop having taken herself and the Gooplets to the seaside; the Professor and I found ourselves in sole possession of "The Microfarads." There is an old saying which you may remember: "When the cat's away the mice play." Not that I am calling Mrs. Goop a cat. I like cats.

In our case the proverb may be adapted: When Mrs. Goop's away the Professor and Wayfarer get down to real and uninterrupted business.

"How," asked the Professor, "shall we occupy our time today? The old . . . that's to say, my dear wife is due back on Thursday. Can't we arrange a pleasant surprise for her?"

We Commence Operations

"Why, yes," I cried; "of course we can. This house of yours has never yet been turned into the all-electric abode that it should be. Let us re-wire it. Let us fix wall plugs in every room. Let us install that beautiful new radiogram and the refrigerator that are waiting in their packing cases in the potting sh . . . that's to say, in your laboratory."

The Professor positively leaped at the idea, and within a few minutes we were hard at work. After a careful examination of such wiring as there was, we found that its insulation was sadly defective, so we decided to remove it all and to start all over again from the very beginning.

Not An Easy Task

Removing wire from the walls of a house is not such a simple job as you might think. The straightforward hints which follow may therefore be useful to you when you come to deal with your own little palace.

Some ass had built most of the wiring at "The Microfarads" into the walls behind the covering of plaster.

Such wire takes some shifting, as we found when we made a start on the drawing-room.

Pick-Axes Assist Matters

Gentleness having proved of no avail, the Professor and I both laid hold of the leads and put our weight into the work. For a moment nothing happened. Then, with a kind of earthquake noise, about half the wall suddenly fell down and we went

Mrs. Goop having departed for the seaside, the Professor and his bosom pal Wayfarer decide to turn "The Microfarads" into the all-electric abode they consider it should be, with somewhat "shocking" results for Mrs. Goop when she returns home.

backwards through the french window. It was a pity that it was closed at the time.

This showed us the only correct method of dealing with such wiring. Pulling is no good. What is needed is a pick-axe. With one of these apiece, borrowed from Captain Bucket and Sir K. N. Pepper, we made short work of the old wiring in the hall,

GENTLENESS NO GOOD!



With a kind of earthquake noise about half the wall suddenly fell down, and we went backwards through the french window.

on the staircase, in the dining-room, in the Professor's den, in Mrs. Goop's bedroom—in fact, all over the house.

Naturally, a speck or two of dust fell here and there upon the carpets and things; I mean, when about half an acre of plaster comes off a wall it's got to go *somewhere*, hasn't it? I mean, the débris really wasn't more than a foot or two deep on the floor of any room.

"We'll shy it out of the windows when we've finished," remarked the Professor; "and even if we don't, Amelia will thoroughly enjoy herself on her return. You know how women love dealing with dust."

Putting in the new wiring was really good fun. We arranged both lighting and power plugs practically everywhere.

It proved a longer task than we had expected, since we had to renew the plaster in all the rooms. Believe me or believe me not, I haven't enjoyed myself so much since the time when I made mud pies in my far-off infancy. For good, clean fun,

plastering is simply *It*.

There we were, the Professor and I, sitting on a plank propped on the tops of two step-ladders and wielding our trowels like men. The good plasterer, as you probably know, takes a trowelful and more or less throws it at the wall. It took us a little time to get the knack of this.

Days of Constant Toil

My first trowelful hit the Professor on the ear. Not realising that the blow was unintentional, he hurled at me a monster blob, which missed me but spread itself all over a bracket clock. Naturally, I retaliated, pretty well blotting out an oil painting of Mrs. Goop's grandmother. The Professor's next shot landed in the middle of a circular mirror, and my reply went splosh on to the keyboard of the piano.

"Pax!" I shouted, thinking that things had gone far enough. "We'd better stop this or we'll be making a mess."

Day in, day out we toiled, and within an hour of the time when Mrs. Goop was due to return the job was finished. We unpacked the radiogram and refrigerator, carted them in and connected them up.

"There is One SOS," Remarked a Voice from the Refrigerator

"Shall we switch them on?" shrieked the Professor.

I shook my head.

"No," I murmured; "we must oil the works first."

The Professor descended to the cellar and returned with two ample bottles of lubricant. We were still oiling the works when the front-door bell rang.

A Slight Delay

Together we went to the front door. Together we observed the pile of old plaster which completely prevented it from opening.

"Just one moment, my dear," cooed the Professor through the letter-box; "we must move something first. Then we'll let you in."

"Get a couple of spades quick," he hissed to me.

I rushed back with the implements, and together we laboured, shovelling the plaster under the hall table. Then at last we were able to open the door, and the Professor advanced with open arms and a beaming smile to greet his spouse.

Mrs. Goop Has a Shock

Her arms were not open. There was no smile on her face.

"We've got the jolliest little surprise for you," said the Professor, somewhat crestfallen at his reception.

shrieks from the bathroom. We fled upstairs and found Mrs. Goop all tied in knots, with her hand apparently glued to the hot-water tap.

"We must have made a slight mistake in our connections somewhere," sighed the Professor. "You'd better run down and open the main switch."

"Not until she has promised to be

OILING THE WORKS



The Professor descended to the cellar and returned with two ample bottles of lubricant.

good," I said. "This is a heaven-sent opportunity. Make use of it."

By this time Mrs. Goop was ready to promise practically anything, and she swore that she would not be annoyed if she did find a little untidiness here and there.

Peace having been made on these terms, I descended to the basement and switched off.

"Everything all right?" I called up to the Professor.

"I wouldn't say that," came the

I flicked over the switch.

"Before we begin the first news bulletin, there is one SOS and one police message," remarked a voice from the bowels of the thing.

"Good heavens," exclaimed the Professor, "we've mixed up the radiogram and the refrigerator! I'm afraid the refrigerator is in the drawing-room. Never mind, it will be jolly handy there for making iced coffee and things. Or, of course, we can change them over when we are attending to the little matter of the hot-water tap to-morrow."

"You will not," snapped Mrs. Goop. "I shall get real workmen in to-morrow to do the job properly."

Real workmen!

CURING HAND-CAPACITY TROUBLES

If hand-capacity troubles persist on a short-wave set, although the usual methods are employed to overcome it, a cure can sometimes be effected by a "capacity" earth.

A sheet of aluminium or copper foil placed under the H.T. and L.T. batteries is very often sufficient. This should be joined to the L.T. negative terminal.

THE WELCOME ON THE MAT, AND WHAT HAPPENED WHEN THE TAP WAS TURNED



"Just one moment, my dear," cooed the Professor through the letter box, "we must move something first. Then we'll let you in."

Next instant there were piercing shrieks from the bathroom. We fled upstairs and found Mrs. Goop all tied in knots, with her hand apparently glued to the hot-water tap.



"So I see," snapped Mrs. Goop, putting up her lorgnette and glancing round the hall.

She remarked that she would go upstairs to wash off the stains of travel, after which she would inspect our surprise more fully.

"Good-bye, Professor," I said, holding out my hand. "I'm so sorry, but I really must be off now."

"No, you don't, my lad," cried the Professor, catching me by the coat collar. "You're going to stay and receive the—er—er—congratulations, too."

Next instant there were piercing

reply in a stage whisper down the well of the staircase, "but anyhow the shocks have stopped. I'm doing my best to calm her down."

"Good luck to you," I breathed, switching the main switch on and off several times.

A Little Bit Mixed

Mrs. Goop revived quickly and consented to come and inspect the new refrigerator and radiogram. We took the refrigerator first. Mrs. Goop said that it looked beautiful.

"Switch on," called the Professor, "and we'll demonstrate its working."

In some cases a metal plate under the receiver itself may be required in addition, and this also should be connected to earth or L.T. negative.

Hand capacity may also cause trouble when using a gramophone pick-up in conjunction with a radio set, if the volume control potentiometer is mounted on the motor board.

The best plan is to screen the connecting leads to the set, the screening being earthed. It is also often of assistance to connect a 50,000-ohms resistance across the pick-up leads where they connect to the set.

How The VALVE GREW UP



A MIDST the showers of high-frequency pentodes, double-diode-triodes, screen-grids, vari-mu's, power valves, super-power valves, and Class B valves that are descending upon us from the valve manufacturer of to-day, it is perhaps rather difficult to realise that it is barely seventeen years since the first triode that can be described as anything like modern-looking made its appearance.

Yet so it is. Previously there had been things such as the Round valve, which was so called not from its shape but after its inventor. (How many readers, I wonder, will recall warming up the Round valve with a lighted match before bringing it into operation?)

An Old Friend

But the "R" valve, the original pattern of which was made at the Osram-G.E.C. lamp works in 1917, had four honest-to-goodness pins (like that on the left in the heading) and fitted into a valve holder exactly like those in use to-day. But it cost some five or six times as much. The "R" valve was a real war baby, for it was designed for military purposes. Even in 1920 the Marconi-Osram Valve Company had little realisation of the future that lay before it. "The valve," they stated in their catalogue of that year, "has almost as much scope in civil life as it had in military affairs." *Almost is good!*

The price of the "R" valve was originally in the neighbourhood of thirty shillings, but by 1922 it had dropped by easy stages to 17s. 6d. It was then just a few months before 2 L. O., the first of the B.B.C. stations, began its transmissions, that Capt. S. R. Mullard created something like a revolution in wireless for amateurs

by giving to an astonished world the forerunner of the long series of valves that he was subsequently to father. This was the first "Ora." (O because it would oscillate, R because it rectified, and A because it amplified).

A Big Step Forward

Not only was it practically given away at 15s., but also it drew no more than half an ampere of filament current, its amplification factor was 10, and its impedance was down to about 40,000 ohms. This meant a

Do you remember the original battery valves? We thought they were wonderful when they first appeared, and likened them to Aladdin's Lamp, but they were almost unbelievably inefficient judged by modern standards, as our contributor shows in this extremely interesting survey.
 By R. W. HALLOWS, M.A.

mutual conductance figure of .25 milliampere per volt. Things were indeed moving!

All of the early valves were, of course, bright-emitters with tungsten or similar filaments. Unless it was accidentally smashed a valve came to only one end in those days: its filament burnt out. Nowadays such a thing hardly ever happens unless we make one of those little mistakes over the connections of the H.T. and L.T. battery.

Greedy Filaments Were Used

The great drawback of all bright-emitter valves was the enormous amount of filament-heating current that they required. The best of them could show no better figures than half an ampere or so at 4 volts. The possi-

bilities of oxide-coated and thoriated filaments were known, however, and the first dull-emitter valve was produced not long after 1920.

This was the D.E.R., whose characteristics were very similar to those of the "R" valve, save that it worked with a filament voltage of 1.8 and drew .4 ampere of current. Dull-emitter counterparts of the V.24 and Q.X. valves were also produced in the D.E.V. and D.E.Q. patterns, which drew only .2 ampere at 3 volts.

Up to the summer of 1927 no valves but triodes were known, though these were by then of many types. Once the dull-emitter had been produced at a reasonable price, it rapidly achieved popularity. The first type that came into anything like general use was the "06" valve, a generic term for a whole series with filaments designed for a heating current of .06 ampere. These valves, however, had a good many drawbacks.

A Marvellous Arrival

Their fine filaments were so easily broken that it was no uncommon thing to find four "duds" out of a batch of six that had come through the post. If they arrived intact they were short-lived and they were nearly always horribly microphonic. It was not until the .1-ampere filament was evolved that the dull-emitter really came into its own.

Shortly before the Exhibition at Olympia in 1927 there were rumours that a revolutionary valve was soon to make its appearance. This was the famous S.625, illustrated in Fig. 2. Old hands will recognise its picture; but can those who have taken up more recently the greatest of all hobbies say what kind of valve it was after an examination of the illustration and without reading further?

The S.G. Valve Revolutionised Reception

In point of fact, it was the first screen-grid valve available in this or any other country.

As will be seen from an examination of Fig. 2, the S.625 was tubular in shape with a cap at either end. The two pins seen at the one end are the plate and screening-grid connections. At the other end there were three pins, the outer ones being the filament connections and that in the middle the control-grid contact. As its name implies, this valve required .25 amperes at 6 volts.

An Epoch-Making Development

It is not too much to say that the introduction of the screen-grid valve, even in this rather crude form, revolutionised the design of wireless sets. Prior to that time stability on the H.F. side could be obtained only in one of two ways. Either the H.F. valves were held down by the application of positive bias to their grids, or neutralising circuits were used to cancel out the effects of plate-grid capacity.

The first expedient gave rise to distortion and was inimical to selectivity owing to the damping introduced by a flow of grid current. The second, though excellent results were obtainable, involved very careful balancing of each H.F. valve by means of tiny variable condensers.

The screen-grid valve provided at once a means of obtaining genuine high-frequency amplification without the hidden, and often unsuspected

battery valves. From quite an early time valves had been made with 6-volt, 4-volt, and 2-volt filaments. For a long while the 6-volt valves were by far the most efficient, though first the 4-volt and later the 2-volt valves began to make headway, mainly because a two-cell accumulator is easier to carry to the charging station than a three, and a single cell is easier still.

One thing stood in the way of the 2-volt valve. For long nothing worthy of the name of power valve could be evolved with a filament of this class. The 4-volt valve went gradually out of fashion in this country, though on the Continent it became more or less standardised. Those who valued efficiency on the high-frequency side and freedom from distortion in the low-frequency stages used 6-volt valves; whilst others who were not so particular plumped for the 2-volters.

The Rain of Two-Volters

Then suddenly there rained down a perfect manna of 2-volt power valves. One of the most surprising of these was the Marconi and Osram P.2, which proved that a valve with a 2-volt filament passing no more than .2 ampere could be thoroughly efficient in the output stage. From that moment the tide turned in the favour of the 2-volt valve. The public showed quite clearly that it was just what they wanted, and manufacturers devoted more and more attention to it.

Until a surprisingly recent date nobody thought of making use of A.C. mains to operate a receiving set requiring no batteries of any kind. The first step towards this much-to-be-desired end was the introduction of the high-tension eliminator, which enabled the plate current for the valves in a set to be derived from the mains by way of a transformer and a

DID YOU EVER USE ONE?



Fig. 2. This is the famous S.625 to which our contributor pays tribute in this article.

rectifier. A battery was still used for supplying the filament current.

Next arrived the eliminator plus trickle charger, which, besides providing the H.T. current, also kept the L.T. accumulator up to the mark. Finally, there came the A.C. valve, with its indirectly-heated cathode, a valve which showed at once that superlative quality and volume were obtainable from the wireless set and moving-coil loudspeaker.

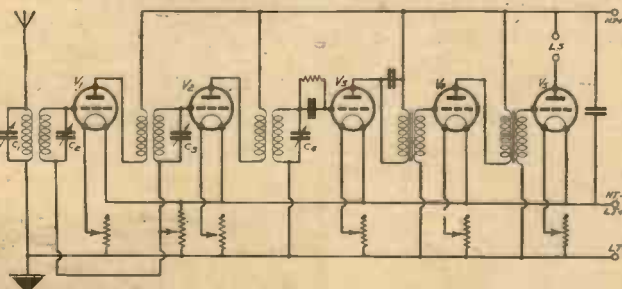
D.C. Mains Valves

The D.C. indirectly-heated valve followed, but the battery set lagged a long way behind in both quality and volume until first Q.P.P. and then Class B showed that results of a kind hitherto undreamt of could be obtained with a modest high-tension voltage and at the expense of an amazingly small number of milliamperes of plate current.

What valves the future has in store for us no one can say. The cold emitter will quite possibly come in time and the efficiency of valves will no doubt improve as year follows year. The story of the valve's rapid development from the crude triodes of 1917 to the wonderful valves that we have to-day is one of the most amazing episodes in the history of applied science.

A FIVE-VALVER OF THE PAST

Fig. 1. This was the kind of circuit which was popular when the "R" valve was in vogue. Note that each filament was separately controlled and there was a total absence of decoupling and of the usual selectivity devices.



reaction effects due to feed back from plate circuit to grid circuit when triodes with comparatively high plate-grid capacity were employed. It simplified the design of receiving sets and, though it wasn't realised at the time, it paved the way for the coming of the modern superheterodyne.

The next three years saw the great battle of the filament voltages in

The decisive factor was the introduction of the battery variable-mu screen-grid valve made in the 2-volt range only. So great were the advantages of the variable-mu valve that even the diehards, who had previously sworn that nothing would part them from their 6-volt valves, had to capitulate. The 2-volt valve henceforward reigned supreme.

A POWER AMPLIFIER

(Continued from page 166.)

load for the output valve of the receiver, approximately the load that would be imposed by a loudspeaker.

This load is provided by the 5,000-ohms resistance across the input terminals of the amplifier and the 50,000-ohm grid leak and the 1-mfd. condensers. Care has to be taken, of course, that the anode input (top) terminal of the amplifier is that connected to the high potential side of the set's output, in case it is desired to earth the chassis of the amplifier—a precaution against hum in cases of "dirty" mains supplies.

Take Care in Construction

About the actual construction there is nothing that need be said; it is perfectly clear from the diagrams and the photographs, but it is advisable to point out that the greatest care should be taken that the connections are made securely and the wire used has good insulation. The rubber- and cotton-covered wire mentioned in the list of parts is advised, for it must be remembered that some sections have to carry well over 500-volts pressure.

The milliammeter for checking the bias resistance is inserted in the lead between the two chokes (the smoothing and output chokes), with the positive side of the meter towards the smoothing choke. The milliammeter should read up to about 100 milliamps, and the required reading when the amplifier is working is 60 to 63 milliamps. (This figure is the same for the PP5/400 or the DO26 valve.)

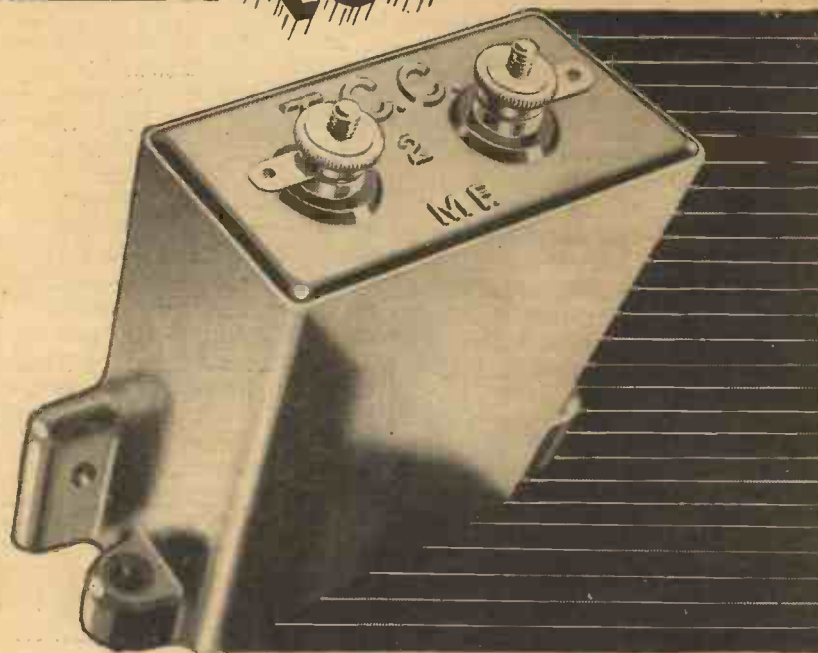
The best method of setting the resistance is to turn the variable control fully clockwise before switching the amplifier on, making sure that it is connected up as shown in the diagram. Remember that the metal bracket holding the resistance makes contact between the slider and the metallised baseboard, so that only one wire connection is required.

A Very Important Point

As with all mains sets, the power amplifier will take a few seconds to warm up after switching on, but it will not take as long as the average receiver, for the valve is of the directly-heated variety. Finally, and most important, owing to the high voltages present, except for the bias setting *no adjustment should be made to the amplifier unless the mains are switched off.* A stout ventilated cover must *always* shield the unit to prevent any chance of a mishap.

SEE THIS?

T.C.C.



it means **SAFETY**

at no extra cost ● Here's a 2 mfd. T.C.C. Type 50 paper condenser—specified for 200v. D.C. Working. D'you see the initials T.C.C.? . . . they mean perfect safety. Use it with 200v. D.C. across it (and, unofficially, shall we whisper?—a little more too!) and you know it won't let you down. The condenser plus this security costs you 3s. 6d.—not much to be sure.

It's the same throughout the T.C.C. range; the Type 141 is specified for 2,500v. D.C. Working—and it will—it bears the initials "T.C.C." Look to it that the condensers you buy are rated at the right voltage—then look to it that they carry the T.C.C. initials—then you've got the world's finest condensers—and at no extra cost.

T.C.C.

ALL-BRITISH
CONDENSERS

There is a new illustrated price list—just ready. If you have not received a copy from your Dealer a p.c. to us will bring you one:

THE TELEGRAPH CONDENSER CO. LTD., WALES FARM ROAD, N. ACTON, W.3.

5092

Underground Aerials

Details of an interesting method of reception which some readers find of great value in long-range reception.

By VICTOR KING.

MY article on the topic of "Weakening Stations" in a recent issue of THE WIRELESS CONSTRUCTOR obviously created considerable interest, for I have received a large number of letters on the subject.

From these one thing at least is clear: the effect is not restricted to definite areas, but has been experienced practically everywhere. And it is also quite certain that neither seasonal conditions nor set failings are always the cause.

The effect has been too noticeable and has been too closely investigated and considered by many intelligent constructors for it to be due to anything so obviously distinguishable.

Some Interesting Data

The following letter from Mr. Eric J. King (no relation of mine!), who lives at Writhlington, Bath, is representative of many, though he brings forward an interesting fact. That is, that while he has noticed general deterioration in the cases of many stations, in others there has been an improvement.

But perhaps that is due to overhauls, improvements or increases of power at the stations themselves. However, this is what he says:

"About 12 months ago I discussed this at considerable length with several of my radio pals, and we came to the conclusion that it was far from being imagination, though no satisfactory explanation could be put forward. I have noticed, however, that in some cases the effect is not permanent. When North Regional first opened I could receive it here with good listening strength at any time of the day, summer or winter; it then began to fall off in strength, and has done continuously till about a month ago, since when I have noticed a decided improvement—particularly in day-time strength—despite the approach of summer.

A Peculiar Instance

Strasbourg, Stockholm, Rome, Trieste, Langenburg, Oslo and others, including even West Regional, our local, have all shown deterioration since opening, whilst, Poste Parisien has actually shown an increase in strength. There is no question of

deterioration of valves, etc., my end, as my set is actually more sensitive now than it was twelve months ago.

"I run an 150-volt H.T. accumulator, and, like my L.T. supply, it is recharged by myself when about one-third exhausted, and valves are renewed about every 6-8 months. I take this trouble because I make it my business to do a good deal of transatlantic medium-wave reception, for which it is essential that everything should be at its best. Please accept my thanks for taking an interest in the weakening question, because so many who ought to know better have said, 'All bunkum,' when I have mentioned it."

Has It Been Re-Adjusted?

Now, it should be noticed that Mr. King mentions an increase with Poste Parisien. This station was, of

EIGHT HUNDRED & FIFTY TONS!



This is the base of Budapest's new aerial mast, one of the highest structures in Europe. The whole weight is taken by the porcelain blocks, the rod to the right being merely for earthing the metal structure.

course, rebuilt about two years ago, and since then its apparatus has no doubt been adjusted.

There is an important point that must not be forgotten when making observations on the strength of stations over extended periods: A wavelength change will react on the strength of the station.

The radiation of a transmitter and aerial of a given power may vary considerably, as with the different wavelengths to which it may be shifted.

A Reading Reader Writes

Yes, there certainly are many things to be considered. But it is a fascinating subject, and I am very grateful to all those who have written to me and added so materially to my knowledge of the matter. In due course I hope to be able to compile some very interesting and useful notes from the mass of material now at my disposal.

Mr. Crook, of Reading, has sent me a long letter about underground aerials. I wish I could print his letter, for it makes the most pleasurable reading. But it is too long to give in full, and if I detached extracts it would spoil it.

It seems that he has been using a buried aerial for six or seven years, and with great success, too. His first one comprised "a length of old electric cable in the earth." But later, when he moved to another house, "a length of old cable" was arranged partly under the ground and in parts ran along the fence to hold some bushes up. An interesting economy, that!

Much Clearer Results

Mr. Crook says he gets less fading and atmospherics with his underground aerial, has no fear of lightning and receives clearly all the stations he wants—just as many, in fact, as others do with ordinary aerials.

He wonders why other people bother to erect poles and run overhead wires.

He ends his letter with a lengthy discussion concerning the theory of radio-wave propagation and reception, but I fear that here, he is not on the firm ground in which he buries his aerial!

No, Mr. Crook, radio waves really are waves, and are not comparable with electrical currents. A radio wave

Continued on next page

UNDERGROUND AERIALS

—continued from previous page.

is set up by electrical currents (in the transmitting aerial), and they can generate electrical currents (in receiving aerials), but they vibrate in space independently, as it were.

They do not require complete circuits to traverse (the air and the earth are alike nothing but obstacles of varying difficulty in their path).

Radio waves pass easiest through a vacuum; the degree to which they can penetrate the ground depends upon the nature of the ground.

They can pass fairly easily through dry soil, but the wetter or the more electrically conductive the soil the more it will tend to reflect radio waves.

Good Results Possible

I think it was General Squier who first suggested the underground aerial some fifteen years ago.

It has been carefully tested by many experimenters in the past, and the general conclusion seems to be that while interference may be lessened, often the loss of sensitivity is too great to make it worth while.

However, very good reception is possible, and it is worth trying.

THE EDITOR'S CHAT

—continued from page 147.

that television has yet reached a degree of perfection which will enable it to compete commercially with the "talkies." Nothing of the sort!

What has happened in the last few months is that "big" brains and "big" money have got together, and therefore progress is likely to be accelerated. Some sort of television service seems to be imminent; we do not mean similar to the television transmissions from Broadcasting House or from the Crystal Palace; but we have reason to think that within the next twelve months we shall see the beginnings of a limited Entertainment Television service.

Accelerating Development

The results, of course, will hardly be comparable with the early cinema results, but nevertheless we feel sure that the radio industry, and the public at large, will be more than interested.

By the continual expenditure of time, energy and brains, the progress of television research will be accelerated, and the day brought nearer

when television will really be sufficiently developed* to take its place side by side with sound broadcasting.

* * *

It was strange that not much publicity was given in the Press recently to the fact that the B.B.C. is becoming rather anxious about licence figures. True it is that there is still an increase, but the rate has dropped pretty severely during the last year or so.

In May, 1932, there was a rise of 45,000 in the licence figures; but in the same month of 1933 there was only an increase of 40,000, whilst this last May the increase was only 28,000.

This drop is significant. It is hardly likely that saturation point is in sight.

We venture the opinion that the drop is in some measure due to the large dose of "anti-broadcasting" propaganda which has appeared in the daily newspapers for some time past.

The remedy—if the B.B.C. wants one—is to take steps to counteract this "anti-broadcasting" propaganda, and secondly, to study popular taste more carefully, and to refrain from listening too intently to some of the high-brow pundits at Broadcasting House, who insist that broadcasting is primarily an educational medium.

OUTSTANDING PAPER CONDENSERS

Prosaic paper becomes of great importance when used with the word 'condenser.' Yet even more important is the name that precedes it. The name Dubilier stands for dependability, consistent service and long life. These qualities give the concrete advantages of trouble-free reception to the listener, and a minimum of servicing to the manufacturer.

Dubilier is the name that should be on every paper condenser you use. Set Manufacturers should apply for special terms.

Type 9200 non-inductive paper dielectric condensers in cylindrical aluminium containers. Working volts 250. Max. peak volts 300. Test volts 650. Prices from 2/-.

Type BB non-inductive fitted into moulded bakelite cases. 250 volts D.C. peak. Tested at 500 volts D.C. Prices from 1/9.

Non-inductive paper condenser in tubular wax impregnated container. Test volts 1,000 D.C. Max. peak volts 400 D.C. Working volts 300 D.C. Prices from 1/-.



DUBILIER

PAPER CONDENSERS

DUBILIER CONDENSER CO. (1925) LTD., DUCON WORKS, VICTORIA RD., N. ACTON, W.3.

PICK-UP TRACKING

A short article describing the oft-overlooked necessity for accurate needle setting in a gramophone pick-up. Unless the angle between the needle and the record groove is sensibly correct, unwarranted wear of the record will take place.

By E. PARKER

ANY reference to "tracking" in an article concerning pick-ups often misleads the beginner into thinking that this term covers numerous calculations and equations far beyond his comprehension. Consequently he usually leaves it severely alone. Although there are various calculations required in the design of a pick-up arm, the final result aimed at is very easy to understand.

Ideal tracking is achieved when the needle is at a tangent with the groove at the point of contact, whether on the outside or the inside of the record. This will be easily understood if we imagine the circular groove to be not a circle but a figure consisting of many straight sides, when the needle will lie along the particular side it happens to be touching.

This tangential setting is easily achieved, even with a straight pick-up arm (as opposed to the off-set variety mentioned later) if we consider only one position in its path across the record.

We could set the needle (and the pick-up arm and head) so that the correct tracking was achieved, say, on the innermost groove of the record, but we should find that elsewhere the setting would be wrong, the degree of "wrongness" being termed the "angle of error."

Judging the Angle

Before proceeding, there is one point which the reader should note: as the needle is so short, it is very difficult to judge its angle with the eye. Consequently, instead of referring to the needle, it is easier to refer to the pick-up head, the front of which is, in the majority of cases, at right angles to the needle.

In the outside position, if the pick-up head could be turned in a clockwise direction viewed from above, the usual "angle of error" would gradually decrease until the pick-up head was parallel with a line drawn from the centre of the record to the point where the needle touched the record, thus getting perfect tracking at that particular point.

The effect of this undesired "angle

of error" is to pull the needle to one side of the groove. Consequently that particular side wears quickly and soon spoils the record, giving rise, among other faults, to excessive needle scratch.

For Even Wear

Many enthusiasts have, no doubt, made up radiograms or electric gramophones with little or no thought of attempting to obtain the best possible tracking, thereby spoiling the records and the reproduction. It would appear that we could reduce record wear by making the pick-up track correctly in the middle of the record; the "angle of error" would then be divided between the outside and inside positions. Consequently, in no position would the "angle of error" be more than half that of the pick-up referred to above.

THE OFF-SET ARM



This H.M.V. pick-up is an excellent example of modern off-set design, giving perfect tracking over nearly the whole of its travel.

Comparing the record wear in these two cases, in the former the record would wear very quickly on the outside, but very slowly on the inside; whereas, in the latter case, although we increase the wear on the inside, we make it more even by reducing the wear on the outside. It is obvious that a record that has had even wear is much preferable to one that is excellent in the centre but "worn-out" on the outside.

In the early days of pick-ups, the record wear due to the bad tracking was so bad that it got about, quite erroneously, that a pick-up must

necessarily be bad for a record. This state of affairs was soon remedied, however.

Straight-Line Travel

If the pick-up is correctly "off-set," the angle of error is reduced to a few degrees; but this, of course, depends on the manufacturer of the pick-up, as it is next to impossible for the average home constructor to attempt any experiments on the pick-up which he normally uses. And the majority of the pick-up arms on the market are as near correct as possible in this respect.

In some cases, however, it is possible to improve the performance by lengthening the arm; with a little thought it will be realised that the greater the radius of the pick-up the nearer will its path of travel approach that of a straight line, which is the result we wish to achieve.

It must not be forgotten that there are pick-up arms on the market which give "straight-line travel," the pick-up, in the majority of these cases, moving along an arm which projects over the record towards the centre. These certainly achieve their object, because, provided they are correctly fitted, there can be no angle of error, and faithful reproduction, within the limits of the pick-up, is assured.

A NEW BRITISH FACTORY

Where Tungram Valves are Made

NOWHERE are there more definite signs of the end of the trade "depression" than in the Radio Industry. And it is most encouraging to learn that a big contribution to the alleviation of unemployment is being made by important radio firms, who are either building new factories or else extending their present accommodation.

A fine example has been set by the British Tungram Radio Works, Ltd., who have built a new factory in Tottenham, where all their valves for the British Market will be manufactured.

A Wide Range

This is not in any way an unexpected development, for Tungram have been steadily forging ahead for many years in the design of radio valves. There is hardly a radio purpose for which there is no suitable Tungram valve!

Readers will be interested, too, to see from the Tungram lists that "value for money" is one of the chief considerations of this go-ahead firm.

A BUSINESS B.B.C.

—continued from page 157

talks, education, and religion should be handled all with the entertainment background, blended and developed in order to be effective.

Broadcasting has many enemies quite ready to cause embarrassment. Therefore its propaganda should be open, efficient, generous, and unremitting, with no tang of Whitehall. Every legitimate field should be explored and developed. The Press, Parliament, exhibitions, public lectures, correspondence with the public, and so on should be given every possible attention.

Financial Control

There remains to consider financial and secretarial control. Obviously, as in the case of a commercial concern, it is necessary to have a good accountant and a company secretary.

Thus, all that is needed departmentally for the B.B.C. is a chief engineer, a director of programmes, a director of propaganda, an accountant, and a secretary. There would

be a manager as co-ordinator, and he would nominate one of his departmental chiefs as his deputy manager.

A Bewildered Bureaucracy?

So far as I can find out, the more the B.B.C. gets tied up with problems of internal organisation the more it gets away from the simplicity and directness of the scheme I have outlined. There is a tendency, perhaps quite human, so to lengthen and disperse the chain of responsibility, so to elaborate and complicate simple functions, that the result is a kind of bewildered and disorganised bureaucracy.

I do not say that this has come to pass as yet, but I believe it is approaching. I hope it is not the inevitable result of a self-complacent monopoly. If so, many listeners will regret with me the failure of an experiment, the welfare of which we all had at heart.

If one still hold faith that the B.B.C. will see the error of its ways in time, and will go back to preserving and developing what once promised to be a great new tradition of British public service.

WIRELESS IN THE GREAT WAR

—continued from page 154

the same list caused the port boats to hang over the decks and thus make it impossible for them to be lowered at all. The old, old story—lifeboats useless when most required.

Apart from the cries from a few hysterical and frightened women everything was calm and orderly; there was no panic. Many of the passengers had been quietly finishing their lunch when the first explosion occurred, and while some had hurried to their cabins to collect a few valuables, the majority had come up on deck.

Boat After Boat Upset

The first lifeboat was quickly filled with women and children, but just as it was about to be lowered into the sea the tackle jammed, upsetting the boat and throwing all but three of its helpless occupants into the sea.

One boat after another became fouled, or upset, or could not be moved. All the time the list to starboard was growing worse; many passengers jumped into the cold sea and endeavoured to swim away from the towering bulk of the liner.

As the bows sank the great stern began to rise out of the water. The

sides were thick with women and children clinging helplessly to the rails. With a roar like thunder the end came suddenly and the gigantic ship disappeared beneath the waves. Mercifully clouds of steam and smoke covered the final and terrible plunge from the view of those in the lifeboats who had managed to get away.

The Tragedy is Complete

At 2.31 p.m., exactly twenty minutes after the first torpedo had struck, the Lusitania had disappeared, leaving the sea black with the bodies and bobbing heads of those of the passengers and crew unable to get into lifeboats. There was little for them to hold on to and, even if there had been, many, by this time, were incapable of effort. No ship was in sight; the ghastly tragedy was over; eleven hundred and ninety-eight souls had perished.

Of the U20, the German submarine which perpetrated this awful crime, and her commander, Kapitan-Lieutenant Schwieger, there is not much to tell. That he was not appalled is inconceivable; in his official report he merely said that he saw what he took to be a number of vessels on his horizon and promptly fired his torpedo into them, and then, on seeing it was a large liner, he dived "with mixed feelings." Two years later he met his fate in the Submarine U 88, destroyed by the British mystery ship Stonecrop.

PILOT AUTHOR KITS
Exact to Specification
S.T.300 STAR

KIT "A" Author's Kit of First Specified Components, including Ready-Drilled Panel, Terminal Strip, with METAPLEX Baseboard, Cash or C.O.D. Carriage Paid, £4/7/6. Balance in 11 monthly payments of 8/3. **SEND 8/- ONLY**

KIT "B." As for Kit "A," but with Set of Specified Valves only. Cash or C.O.D. Carriage Paid, £5/18/9, or 12 monthly payments of 10/9.

KIT "CT." As for Kit "A," but with Valves and P.E.T.O.-SCOTT S.T.300 Star Table Cabinet, Cash or C.O.D. Carriage Paid, £6/18/3, or 12 monthly payments of 12/9.

KIT "C.C." As for Kit "A," but with Valves and P.E.T.O.-SCOTT S.T.300 Star Console Cabinet with Shelf and Baffle, less Speaker. Cash or C.O.D. Carriage Paid, £7/7/3, or 12 monthly payments of 13/6.

S.T.300 STAR MARK II

KIT "A" Author's Kit of First Specified Components, including Ready-Drilled Panel, Terminal Strip and METAPLEX Baseboard, Cash or C.O.D. Carriage Paid, £4/0/0. Balance in 11 monthly payments of 7/3. **SEND 7/3 ONLY**

KIT "B." As for Kit "A," but with Set of Specified Valves only. Cash or C.O.D. Carriage Paid, £5/11/3, or 12 monthly payments of 10/3.

KIT "CT." As for Kit "A," but with Valves and P.E.T.O.-SCOTT Table Cabinet, Cash or C.O.D. Carriage Paid, £6/10/9, or 12 monthly payments of 12/-.

KIT "C.C." As for Kit "A," but with Valves and P.E.T.O.-SCOTT Console Cabinet with Shelf and Baffle, but less Speaker. Cash or C.O.D. Carriage Paid, £6/19/9, or 12 monthly payments of 12/9.

IF P.E.T.O.-SCOTT P.M. SPEAKER REQUIRED WITH ANY OF ABOVE KITS, add 19/6 to Cash or C.O.D. Price, or 1/9 to Deposit and each Monthly Payment.

CONVERT your S.T.300 to the S.T.300 STAR or the S.T.300 STAR MARK II

P.E.T.O.-SCOTT Conversion Kit comprises Mr. John Scott-Taggart's Kit of Specified Parts for converting the S.T.300 into the S.T.300 STAR* or the S.T.300 STAR MARK II** complete down to the last screw.

*IF POLAR CONDENSERS and NEW PANEL required, add 2/3 to cash price. Or complete, yours for 8/-; balance in 9 monthly payments of 5/-.

**IF ORMOND CONDENSERS and NEW PANEL required, add 18/3 to cash price. Or complete, yours for 8/-; balance in 9 monthly payments of 4/6.



CASH or C.O.D. 25/-
Carriage Paid.

Or 5/- deposit and 5 monthly instalments of 4/6.

YOURS FOR 5/-
BALANCE IN 5 MONTHLY PAYMENTS OF 4/6

STILL A FIRM FAVOURITE
S.T.400 BATTERY MODEL

KIT "A" Author's Kit of specified parts. Ready-Drilled Panel and foil-covered baseboard, but less Valves and Cabinet. **CASH or C.O.D. CARR. PAID. £4 : 12 : 6** or yours for 8/6 deposit. Balance in 11 monthly payments of 8/6.

KIT "B." As Kit "A," but with Valves, less Cabinet. Cash or C.O.D., £6/10/9, Carriage Paid, or 12 monthly payments of 12/-.

KIT "G." As Kit "A," but with Valves and Table Cabinet. Cash or C.O.D., £7/7/9, Carriage Paid, or 12 monthly payments of 13/9.

SCREEN-PACK 4

KIT "A" Comprising Author's Kit of first specified parts, less Valves and Cabinet, Cash or C.O.D., Carriage Paid £6/9/0. Or 12 monthly payments of 11/9. **2 1 6**
1 Set of 4 Specified Valves
1 Peto-Scott Universal Table Cabinet 1 0 0

PETO-SCOTT CO. LTD.
Clerkenwell 9406/7.
77, CITY ROAD, LONDON, E.C.1
West End Showrooms: 62, High Holborn, London, W.C.1
EST. 1919

**ELECTRICALLY
SOLDER
YOUR
RADIO
CONTACTS**

Electric Soldering is
**SPEEDY, CLEAN,
EFFICIENT, RELIABLE
AND ECONOMICAL**

Every Handyman
should use a

SOLO
TRADE MARK
**ELECTRIC
SOLDERING
IRON**

7/6

VOLTAGE
200/220, 230/250

125 watt, 22/6: 1 lb. 1 oz. If unable to obtain, send us the name of your nearest dealer.
240 watt, 37/6: 2 lb.

W. T. HENLEY'S TELEGRAPH WORKS COMPANY LTD.
Dept. T.K. 16 HOLBORN VIADUCT—LONDON—E.C.1

MADE IN ENGLAND

for the
**POWER
AMPLIFIER**



**RESISTANCE
10 WATT TYPE**

VARLEY mains transformer - E.P.24 50/-
VARLEY resistance (10 watt type) -
1,000 ohms 3/-
VARLEY potentiometer (power type) -
1,000 ohms 7/6

All specified for the 'Wireless Constructor' Power Amplifier. Write today for full particulars of Varley Components.

Varley
(Proprietors Oliver Peil Control Ltd)

Advertisement of Varley (Oliver Peil Control Ltd.), Bloomfield Road, Woolwich. Telephone: Woolwich 2345.

FROM MY ARMCHAIR

—continued from page 174.

finish, he said goodbye inviting me to next day visit his country farm outside the town, for which he should come and fetch me in his donkcart and so it was done.

Next day he call again asking I should like to follow, if I hadn't anything which would disturb me, I replied that I was desponsible and with great pleasure should like to have a look through his Eden, he showed satisfaction and happiness on his sympathetic face; he is old soldier and lives with his wife on the farmstate.

It is a Little small but petty farm inbeth between large corkwood trees, about an hour way time from the town, it is country in every sence.

We arrived there and made a long walk around the propriety, but the thing he most call my attention, were the birds specially the Sparrows in large flocks flying up as we approach, any culture, particularly pea-beths.

After same time he invited to enter the state-building, composed of a large room, which in each corner had it's section, one his work-shop, another the dinning room, the other comprise the kitchen and, the forth, which had the door to yard, the sitting Hall.

On the right hand as his bed room on the front side and, back of this his son's bed room.

"Noisely Town Life"

We took chairs in the dinning room, where his wife came and offer some fresh water and white wine to drink, with cheese bread and fruits.

The conversation started about the farm, the birds the modern noisely town life, the quiet life on the country, out from the traffic noise of the cities and so on, when he arose from his chair, saying: in here is our bedroom; asking without previous descussion; I have touth we could place here the T.S.F. apparatus, to my absolutely astonishment (as he meant my S.T.400). It made me ask if he was thinking to purchase from me and, also ask him if he known, I would be willing to transfere the apparatus to his pcession.

Of course, he replied immedeatly but, I ask again; are you willing to pay for it; certainly I am, up to . . . ; well my dear friend I answer, there is nothing—sure there is, he said, what do you mean?

Oh am sorry to say that your statement is under the value.

And we separate latter without being in concordance.

The follow day he came to my office-studium, seat down and anxiously turned to me sajing; I am resolutod to raise my proporsition.

To which I can't fall in, for less than that, I have told you, do you will I shall present it to you—Oh! no, no . . .

Well, why do you, after you are so interested to buy a wireless apparatus, go around and see with your-eyes as well hear with you own ears, certainly you can encounter samething which will satisfy you and, be in the statement you have touth.

He replied, I think you don't want to sell yours apparatus to which I answer, certainly not for the few skillings you are willing to pay for it.

"Never Ending Descussion"

Same days elapsed I encounter my man down town and, the conversation came back to the S.T.400, now it was a never ending descussion rate. I had to manufacture all kinds of conversation for four hours time, all about the matter he related but, we remain where we was. He went and next day he came early once more saying, I will give you what you want for yours apparatus and accessories.

Last Sunday with a friend to accompany I took a carriage having proceed to the desmount of my installation and after an hour we were in front of him, his family and many invited guests.

We beggan immedeatly taking despositions to set up the lewcos aerial etc. etc., it was a good job as we had to do everything but after a straineous working day, at last music was tune in, in strength loudspeaker.

He took my arm in a jerk and force me to the door. . . . where he said: do you see? yes I saw a enormeous flock of sparrows flying away from his land of peas and continued: now I can cultivate peas on my farm, as well other things.

Portugal is Richer

I confess was intricated on what he meant so I had to ask him, who gave the answer: your friend's formula, Barkles and Histles, has now it's full and aproprate practical effect, do let him know it soon—Oh. certainly I replied him."

And so that is the ultimate fate of Carlos' S.T.400. The crockles and splitters, the barkles, the histles, the sardining noises, the hoping of the electrones, and, no doubt above all, the hoppers, have been capitalised.

Portugal is richer for having the S.T.400. For my star design is being used not for entertainment, but to keep sparrows off the crops of a small corpolente peasantry!

J. S.-T.

 * "SLEEPING SICKNESS" *
 * Details of puzzling experiences. *
 * By ERIC O'MAHONY *

I AM getting very suspicious of wireless sets. The other day a lady, whose set I keep in running order, sent word that it was not functioning.

It turned out that she had been away for a couple of months, and had stored the set with a kind neighbour who knew nothing and cared less about wireless.

I gave the set a trial run, and it was certainly next door to dumb. It was connected correctly and the accumulator and H.T. were in working order. I carried it off to my own den for investigation.

The Loudspeaker Suspected

After a few lightning adjustments which produced no tangible results, some instinct made me suspect the loudspeaker. I attached another speaker, and although results were still disappointing, the set began to show signs of life. I was on the point of testing the valves, when I was called from the house for a short time, and inadvertently left the set running.

On my return, some fifteen minutes later, I found the loudspeaker in full blast, so much so that I had to throttle the set down hurriedly. It had awoken from its slumbers. Of course, there was still its own loudspeaker.

Here another perplexing thing occurred. As it gave only a faint, wheezy, distorted rattle, I wired a pair of phones in series with the unit, and tested the winding with an H.T. battery, gradually increasing the voltage. Faint scratching noises came through, and I was about to abandon hope, when almost unconsciously I stroked the 100-volt tapping with the phone tag. At the third or fourth touch there was a loud plonk.

Two Theories

The unit was back to normal. I tried it on my set, and it gave first-class volume without a trace of rattle. I screwed it into place in its own set, and it was equally efficient. How to account for it? Frankly, I don't, but I have two theories. First,

sleeping sickness. Secondly, since discovering that the glass bulb of the S.G. valve is wobbling in its holder, I have become just the least bit suspicious of kind neighbours who know nothing and care less about wireless.

Apropos of sleep, a local farmer had rather a curious experience. As most people know, farmers are a race of hard-working men, whose motto is "early to bed."

A Dream Musician

This particular individual turned in one night as usual about eight o'clock, and presently dreamed he was operating a saxophone in a dance band. It gradually dawned on him that the dance band was altogether too realistic to be a dream. The music was coming from downstairs.

He slipped on some things and went down. The wireless set was going full out. He had switched it off himself shortly after eight, with a symphony in full cry, and he had been the last person in the house to retire.

Problem: How had the set got switched on again? His solution, and it is both ingenious and simple, is rats. Most old farmhouses harbour a number of these creatures, and in their innocent gambols they must have knocked against the tumbler-switch and thrown it over.

 * NEW PREMISES FOR *
 * BATTERY CONSTRUCTION *

THERE are welcome signs that the the radio trade is adding its quota to the rising tide of commercial prosperity. In the North, for instance, new premises are being brought into service, an excellent example being the new factory at Birtley, County Durham.

This has been equipped by Northern Batteries, Ltd., with the very latest and most modern plant, to produce the Precision Unit Cell H.T. Battery as well as ordinary H.T.B.'s and other electrical equipment.

The floor space at present being used is some 3,000 square yards, and the further ground available for extension is some 20,000 square yards. So even if licence-holders go on increasing at unparalleled rates Northern Batteries are ready for their demands.



SPECIFIED AGAIN!

Yet another sole specification for J.B.! This time the DHecon reaction condenser for the 'Wireless Constructor' "Screen-Pack" Four. Use specified components and ensure the best results.

Type 0002-mfd. - - - **2/6**


Advertisement of (London) Ltd., Street, S.E.1. Telephone - - -  Jackson Bros. 72 St. Thomas Street, London, E.C.4. Hdb 1837.

ILLUSTRATED LIST of RADIO-GRAMOPHONE CABINETS at BARGAIN PRICES; and descriptive literature of the **HOWE BOX BAFFLE**, recommended by the B.B.C. POST-FREE **GILBERT, Cabinet Maker, SWINDON.**

CHARGING WITHOUT MAINS!
 The "TONIC" (FILTER) self-generating trickle-charger outfit enables everybody to keep their 2-volt accumulators fully charged at home. Ideal for remote districts. Full particulars, Stamp.
"TONIC" CHARGERS, 96 Stourbridge Road, Halesowen, Birmingham.

All applications for Advertising Space in "Wireless Constructor" must be addressed to the Advertisement Department, John Carpenter House, John Carpenter Street, London, E.C.4.

PLEASE be sure to mention "Wireless Constructor" when communicating with Advertisers. THANKS!

ANOTHER AMAZING ADVANCE 

 * THE STAR *
 * OF THE MONTH *

BROADCASTING in itself has no permanence; it exists in only the moments of time we style "the present." A tune is heard, voices emerge from space and are gone.

But they can create impressions, sometimes indelible, in our minds.

Ernest Jay was no more to me than a printed name in the radio programme, a name barely noticed because of its unfamiliarity. His voice has now been heard, one of a number engaged in the broadcast version of that Edgar Wallace play, "The Calendar."

If this Ernest Jay voice had spoken its piece clearly and competently it would by now have been forgotten. It would have been as transitory as an individual wave in a broken sea.

Yet if this voice had failed badly, that would have engendered a memory for the future.

We remember with less difficulty that which is different because it is either better or worse than the common run of things.

A Superb Example

I shall remember the voice of Ernest Jay, for in that Edgar Wallace play he presented a superb example of microphone characterisation.

His was the part of Hillcott, the rudely familiar but loyal butler and ex-burglar. A grand part that, and one full of opportunities—for the right artist. In selecting Ernest Jay for it the B.B.C. either used wisdom or experienced great good fortune.

After having heard so many of the "stock" B.B.C. voices, including the "enthusiastic" gentlemen who are always tripping over their words, the always-irritable and exaggeratedly-intolerant young man, the miscast men and women whose too-similar voices overlap the lines and confuse, I have great pleasure in choosing

Ernest Jay as being, in my opinion, fully as worthy a recipient of our "starship" as any of his predecessors.

All I can find out about the man himself is that he lives in North London. North London should be pleased.

V. G.

AS WE FIND THEM

—continued from page 169

for the use of the Hans Vogt patents are Colvern, Ltd., Mawneys Road, Romford, Essex, the coils incorporating these patents, being known by the name of "Ferrocart."

Messrs. Colvern's latest Ferrocart coil is the Type F5, and it is one which lends itself in particular to receivers of the det., and L.F. type.

 * CAR RADIO *
 * An enterprising British firm *
 * prepares for a "big push." *

IT is rather surprising how slowly the use of radio as a fitment to a motor-car is spreading. Unlike other branches of wireless, car radio cannot be said to have developed quickly in this country, whatever it has done in the United States of America.

But the big push is coming, and Lissen, Ltd., well-known in the past for the remarkable value of their components, are going to be well in the forefront. They have decided to enter the car radio market in a big way, and have produced an installation that will attract large numbers of motorists.

It is easily fitted, and its operation from the steering column is simple and definite. Moreover, the receiver will work on the long waves, a feature that is not always considered by people in the car radio business.

Three H.F. stages are incorporated, and automatic volume control is included. A "Class B" output is supplied, giving about 2,000 milliwatts

The F5 is a remarkably high-efficiency job, and is capable of endowing a set with quite exceptional selectivity. Moreover this selectivity is not achieved at the expense of amplification. The volume is there too.

Another point is that long-wave "break through" is negligible—a feature of considerable importance.

As can be seen from the photograph the F5 coil incorporates a wave-change switch and is fully screened. The base is suitable for chassis construction, and we have no hesitation in stating that it is in every way an excellent coil.

Those readers who require details as to circuits, etc., should write to Messrs. Colvern at the address already given.

of power, while a battery or a generator model can be obtained.

The wavelength indicator is illuminated by means of a special non-dazzle system of scales, a red one being used for the medium wavelengths and a green for the long. The set fits neatly away out of sight in the car, and the loudspeaker can be placed in any convenient position.

The receiver is contained in a waterproof steel case so that it can be fitted below the body of the car, on the chassis if desired, while the aerial is either built into the roof (in a saloon model), or taken along under the running board.

NEXT MONTH
A Magnificent Number
 containing
Special Radio
Exhibition Articles.

At the moment of writing preparations are nearly complete for the marketing of the set, and those interested should write for full details to Lissen, Ltd., Worples Road, Isleworth, Middlesex.

INDEX TO ADVERTISERS	
	PAGE
"Answers" Football Annual ..	Cover iii
Colvern, Ltd.	146
Dubilier Condenser Co. (1925), Ltd. ..	183
Gilbert, J. C. (Cabinets) ..	187

	PAGE
Henley's W. T. Telegraph Works Co., Ltd.	186
Jackson Bros. (London), Ltd.	187
Peto-Scott Co., Ltd.	185
Printers' Pie ..	145
Telephone Manufacturing Co., Ltd.	173
Tonic Chargers ..	187
"Thriller" Library ..	Cover ii
Telegraph Condenser Co., Ltd.	181

	PAGE
Varley Products ..	186
Westinghouse Brake & Saxby Signal Co., Ltd.	145
Whiteley Electrical Co., Ltd.	187
Waverley Book Co., Ltd.	Cover iv

All communications concerning advertising in "Wireless Constructor" must be made to Advertising Department, John Carpenter House, John Carpenter Street, London, E.C.4.

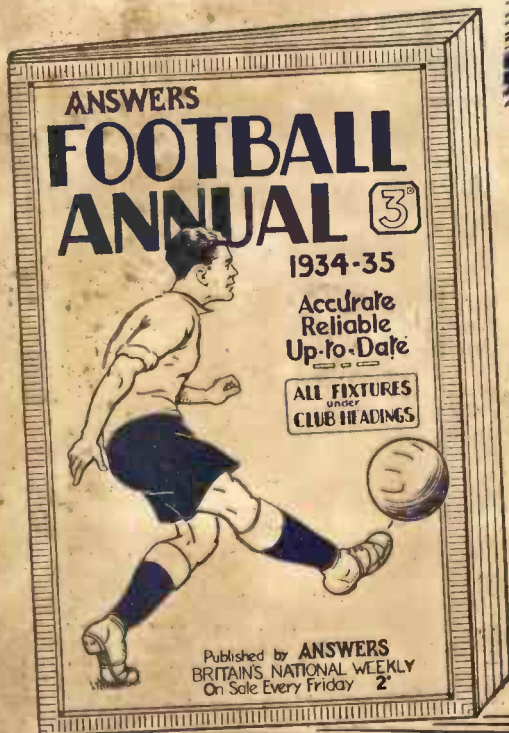


**All you want to know
about the New
Football Season!**

In ANSWERS Football Annual you will find all the facts and figures that are indispensable to the "Soccer Fan." Here are all the English League Fixtures arranged under Club Headings, Cup-Tie dates, International Matches and interesting details about new players.

The book is so arranged that the match results of your favourite team can be filled in throughout the season.

Buy Your Copy To-day!



**ANSWERS
FOOTBALL
ANNUAL**

At all Newsagents **3**^{D.} and Bookstalls

AN OFFER YOU CANNOT AFFORD TO MISS

Get these Splendid Volumes of
Practical Knowledge for All

Sent to your Home FREE on approval for 7 days

A UNIVERSITY IN THE HOME

The six volumes of PRACTICAL KNOWLEDGE FOR ALL contain Twenty-Nine specially graded courses carefully prepared for home study. These include the following subjects:

- ACCOUNTANCY
- AERONAUTICS
- ART & ARCHITECTURE
- BIOLOGY, BOTANY
- BRITISH HISTORY
- CHEMISTRY
- DRAWING & DESIGN
- ECONOMICS
- ENGINEERING
- ENGLISH LANGUAGE
- ENGLISH LITERATURE
- GEOGRAPHY
- HISTORY
(Ancient and Medieval)
- MATHEMATICS
- FOREIGN LANGUAGES
Latin, French, German, Spanish
- SHORTHAND

No matter what your position in life, whether you be old or young, married or single, at the outset of your career, in the heyday of prosperity or the twilight of achievement, there is ever a need to acquire more and more knowledge. Knowledge makes for social advancement and enables the ambitious man or woman to qualify for a position of greater scope and responsibility in any trade, business or profession. These volumes form a key to knowledge. Never before has a work of such value and importance been offered to the public in such a handy form and on such easy terms. PRACTICAL KNOWLEDGE FOR ALL provides practical instruction, by the latest and

most approved methods of education, in an immense variety of subjects essential to all who wish to keep abreast of modern knowledge. The courses are arranged in carefully graded and consecutive lessons and have been prepared by recognised authorities, each course being the work not only of one, but of several experts. The volumes are just the right size—not too big and not too small. Easy to carry about with you, ready to dip into at any odd moment. The illustrations in this work are most important. There are over 2,000 of them, ranging from simple shorthand symbols, maps, scientific diagrams, etc., to beautiful reproductions of works of art and antiquity.

SEND NO MONEY NOW
YOURS for 2/6 DOWN
if kept after examination

PRACTICAL KNOWLEDGE FOR ALL is available in two beautiful bindings, the Standard edition being bound in a very attractive terra cotta shade of art cloth over British boards, decorated in a most elegant fashion with real gold lettering on the spine. The De Luxe edition, which costs a few shillings more only, gives value such as has rarely been offered before. The volumes are bound in the well-known Roxburgh style and have green leather backs out from specially selected paste grain skins, the sides being of fine quality art cloth in a shade to match. The spines are, of course, lettered in real gold leaf, as is the case with the Standard edition.

Take advantage of this great opportunity NOW

SEND TO-DAY

We will send you, carriage paid, the six volumes of PRACTICAL KNOWLEDGE FOR ALL, in whichever binding you select, for examination for 7 days without the slightest charge or obligation to purchase. You can either return the books to us, at our expense, within 8 days, or keep them on the very easy terms outlined on the Free Examination Form below. Send in this form without delay.



Illustration shows the Beautiful De Luxe Edition

Fill in this form and post it TO-DAY

POST THIS AT ONCE

Special FREE Examination Form

To The **WAVERLEY BOOK Co., Ltd.**,
96-97, Farringdon Street, LONDON, E.C.4.

SIRS—Please send me, carriage paid, for Seven days' Free Examination, one complete set of "PRACTICAL KNOWLEDGE FOR ALL" in six volumes, in the binding indicated below. It is understood that I can examine the work for seven days from its receipt by me, and if I do not wish to keep it I may return it on the eighth day, and there the matter will end. If I then decide to keep the work I will send you, on the eighth day, a first confirmatory payment, and commencing thirty days thereafter, I will send you further monthly payments, thus completing the purchase price as under.

(A) The set in cloth binding (standard edition). First payment 2/6 eight days after delivery, and eight further monthly payments of 2/6, making a total in all of 22/6. CASH PRICE WITHIN 8 DAYS 21/-

(B) The set in leather binding (de luxe edition). First payment 3/- eight days after delivery, and nine further monthly payments of 3/-, making a total in all of 30/-. CASH PRICE WITHIN 8 DAYS 27/6

PLEASE STRIKE OUT BINDING NOT WANTED

Name.....
Address.....
Occupation..... Parent's signature required if under 21.....
State if Householder..... Date.....
W. Con. E. 1934 PLEASE FILL IN ALL PARTICULARS ASKED