POPULAR WIRELESS, March 11th, 1933. REGISTERED AT THE G.P.O. AS A NEWSPAPER.

LADY SNOWDEN ON SUNDAY PROGRAMMES

Popular Wireless

Every Wednesday PRICE 3d.

No. 562. Vol. XXII. March 11th, 1933.

THE P.W. "AIRSPRITE" FOUR

Anyone can build it!

Also Inside:

RADIO SIMPLIFIED
—A SPECIAL SUPPLEMENT
FOR BEGINNERS
etc., etc., etc.

POPULAR WIRELESS

THE FIRST AND FOREMOST RADIO WEEKLY

Scientific Adviser : SIR OLIVER LODGE, F.R.S. Chief Radio Consultant : Capt. P. P. ECKERSLEY, M.I.E.E.
Editor : N. F. EDWARDS.
Technical Editor : G. V. DOWDING, Associate I.E.E.
Assistant Technical Editors : P. R. BIRD and K. D. ROGERS.

The Paper that Made Wireless Popular

WAVELENGTH PLAN
A POWER INCREASE
GREAT NEWS
RADIO YOUNGSTERS

RADIO NOTES & NEWS

BEST WAY OUT
MEMORIAL CONCERT
EDUCATING ADULTS
A RICH VOICE

The Lucerne Plan.

THE International Broadcasting Union met at Brussels last month to consider the re-allotment of wavelengths under what will be known as the Lucerne Plan. Admiral Carpendale of the B.B.C. presided, and three other B.B.C. officials represented Great Britain.

All European countries (except Soviet Russia), and Egypt and Morocco were represented. Possibly, before this note appears the Conference may have issued a communiqué.

More Power to "P.W."

SO many of you have expressed that kindly wish in one way or another that I am glad to be able to say that it has come true. For our Research Department is having a new series of power lines run in, including a 400-volts D.C. supply, in addition to the normal 200-volts D.C. lines.

Already we have two A.C. supplies, one being obtained through a 5-kw. rotary converter giving various frequencies and voltages, and the other a smaller set by way of emergency supply. When Mr. Rogers hears his 5-kw. machine singing, he says that he knows how those mythical mariners felt when they heard the Sirens calling.

What Do You Think of This?

AND now, here's a surprise for you. Well, it was almost a surprise for ourselves—let alone the technical chaps whom we have had to batten down on ice. We are actually installing a very modern crystal-controlled *transmitter* here, with which certain long-distance tests are to be carried out. After divulging that much to me, Mr. Dowding himself had to be carried out, and I am still neurotic with curiosity myself. Oh, yes, Mr. Hemingway, the transmitter is fully licensed by the P.M.G.

A Fair Offer.

I SUSPECT that somebody has had the temerity to listen to some B.B.C. Chamber Music, for a reader writes to inform me that if the B.B.C. cares to install a microphone in a certain garden on any moonlit night, they can broadcast an hour's Chamber Music—the exact replica of a recent concert—without money and without price.

I observe that my correspondent is a lady—a clear case of an angel rushing in where fools such as I dare not to tread!

These Children.

A CHALLENGER to the Hardy Norseman (N. B., of Grimsby—to whom I referred three weeks ago) appears in the shape of E. McC. (Fleetwood), who claims to have been Lord High Wireless on a Fleetwood trawler at the age of 14½. He says that as he was under age, his firm had to get a special permit from the Board of Trade to allow him to sail.

E. McC. claims also to be the smallest operator, being only 4 ft. 8 in. long. Cheers for Little Tich the Wee Key-puncher!

Any more counter-claims? Babies in arms not eligible. What a race of sea-pups we are, to be sure!

RADIO ON THE ROAD

On one of the coach services between South Wales and London radio entertainment is provided for the passengers by a super-het, fitted at the rear of the coach. The conductor is shown tuning-in.

A Frightful Dilemma.

I HAVE a new neighbour who commands my sincere sympathy. An ultra-enthusiastic gardener, he became interested in radio this winter. Now this wretched fellow has been saving up for hundreds of years for a real hot-house, complete with pipes and Latin names!

Radio-mania diverted his desires somewhat in the direction of an all-wave, do-everything. I asked him what he was going to do about it. As a reply he showed me a few National Savings Certificates and burst into tears. He had chosen the safe way. He will not get America, but then he will not lose orchids through forgetting to stoke up the hot-house furnace.

Results of an S O S.

YOU may remember that some time ago the B.B.C. Advisory Committee on Spoken English confessed itself unable to pronounce the word "Joule"—which is not English, by the way—and asked for advice. Replies have been received from twenty-seven relatives and friends of Joule and forty-nine other people named Joule.

The near relatives rhyme the word with "cool." Six relatives rhyme it with "coal," and nine others plus thirteen who own the name rhyme it with "cowl."

Frost's Hard Luck.

IT is unfortunate for the Empire, the B.B.C. and Mr. Malcolm Frost that the last-mentioned has fallen sick in Cape Town and must, on doctors' advice, give up his trip round the Empire to demonstrate the B.B.C.'s recorded programmes. When illness overtook him he was going strong and doing well. Another representative will take up his work and, it is hoped, carry out the scheduled programme.

In Memory of Percy Pitt.

A SPECIAL concert in commemoration of Percy Pitt, once Music Director of the B.B.C., is to be held at Broadcasting House, on March 10th, when the B.B.C. String Orchestra will be conducted by Sir Henry Wood, Adrian Boult and John Barbirolli.

Artistes who have promised their services include Essie Ackland, Miriam Licette, Norman Allin, Dennis Noble and Walter

(*Continued on next page.*)

ARIEL CONTINUES HIS RUNNING COMMENTARY ON RADIO

Widdop. The programme will include several of Percy Pitt's own compositions.

An Unofficial Performer.

A GOOD story is told about Herbert Menges, the conductor. He was conducting the Society of Symphonic Players of Brighton in Beethoven's "Emperor" Concerto, with Arthur Schnabel as soloist. During that very quiet moment preceding the finale, Menges' alarm watch began a performance on its own account and resolutely continued despite the conductor's frantic efforts to stifle it. The orchestra enjoyed the situation to the full, and Schnabel, after a spasm of pained surprise, eventually saw the humour of it.

Concerning Smethwick.

THE Smethwick Wireless Society (Hon. Sec. Mr. E. Fisher, 33, Freeth Street, Oldbury, Nr. Birmingham), which numbers Sir Oswald Mosley, Bart., amongst its Vice-Presidents, has for its motto, I presume, "Advance, Smethwick."

By all means let Smethwick and its Wireless Society advance. No doubt what Smethwick says about our "Airsprite" will echo round the world. Anyhow, joking apart, here's a very "live" society, and I wish it an embarrassing number of applications for membership.

Rare Bits of Welsh.

THE B.B.C. has accepted the recommendation of the Central Council for School Broadcasting that two special courses be given in Welsh for the benefit of Welsh schools. Hence it is expected that from September next experimental courses on the Welsh Language and Literature, Welsh History, etc., will be given from the West Regional and North Regional transmitters.

I hope that this will give satisfaction to our Welsh compatriots, even though it is not the same as a Welsh national station.

Any Old Books.

THERE is not much connection between book-collecting and radio. Nevertheless, you might do worse than keep your eye open for early wireless and electrical books. Science has her classics no less than literature and art. For example, here are a few books which I believe are of value—first editions, of course: "Elementary Treatise on Electricity," by Clerk-Maxwell (1881); "History of Wireless Telegraphy, by J. J. Fahie (1899); "The Principles of Electric Wave Telegraphy and Telephony," by J. A. Fleming (1906); and "Signalling Across Space without Wires: being a description of the work of Hertz and his successors." by O. Lodge (1898). I should think that the first edition of Oliver Heaviside's "Electromagnetic Theory of Light" should command a good price. Rummage the attic!

Penang Forward, Too.

THE President of the Penang Wireless Society has sent me a copy of the Guide to a Radio Exhibition held in that town, from which I see that despite the fact that Penang has, to my personal knowledge, a temperature of boiling-point and mosquitoes as big as humming-birds, the Britishers there insist on carrying on as usual. What a race we are!

When I was in Penang all I could do was to perspire and talk bad Malay to natives who answered in good English! The Vice-President of the Society is Mr. Khoo Sian Ewe, J.P. I should love to know his reaction to Grandma Buggins.

Adult Education.

ANOTHER letter from Penang, signed "Skyhawk," very interesting and informative, has left some of us feeling as though we have been slippered.

SHORT WAVES

It is reported that a Chinese soldier tried to bump himself off because he thought he was too ugly.

He has now presented the opposing army with a television set and advanced five miles to date.—"Pictorial Weekly."

* * *

"Another time a technician was setting a microphone in a tree at night when a leopard investigated, and the technician was saved only by the prompt shooting of—— the director."

Hard luck, but he was only a director.—"Punch."

* * *

We understand that a broadcast is to be given of the repairing work on a certain main road near London.

It is to be hoped that the workmen will be careful not to enter into a "friendly" argument while the microphone is switched on.

* * *

PYROTECHNIC ARRIVAL FROM THE BLUE.

"DR. ADRIAN BOULT. Famous conductor's lightning visit to Belfast."—Belfast Paper.

* * *

EVERYBODY CALLING!

On every hand, in human form,
Are wireless sets to our own choosing;
Some transmit wave as in a storm
With crashing force; some are amusing.

And some such human sets, I've found
Just oscillate and make me furious.
What they emit is mostly sound—
The message which they send is spurious....

"News of the World."

I got a good portion for having referred to Malaya as the Malay States, and W.L.S. has a whole page to himself.

Our correspondent with the slightly adjectival prose style states that in Malaya the Post Office will not issue a receiving licence unless the set's first valve is an S.G.! Write some more, "Skyhawk."

The Mystery Broadcaster.

C. L. (Sunderland) writes to express his indignation at having been accused of being the perpetrator of those mysterious broadcasts signed "Sunderland S G 6." So, be it known that C. L. is innocent; he is the proprietor of a battery charging station, a charming wife and *several* children—and good luck to him.

By the way, the charming wife doesn't seem to like having the house filled with "P.W.'s"—but that is better than empty bottles, anyway. C. L. is an ex-Writtle fan, loves W.L.S., and has made every set which "P.W." has designed. We ought to have him at the next Radio Exhibition. Well, C. L.—bung ho! from us all.

What's In a Voice?

NO doubt many a humble, imaginary romance has been built up in the minds of some listeners by the silver tongues of radio announcers, but to Announcer T. F. Smith, of station K J R, Seattle has fallen, according to the "Christian Science Monitor," the glory of inspiring by his voice sufficient confidence in a British Columbia listener to cause that listener to send him 100 dollars to be invested in reliable stock. The story is prettily completed by the fact that subsequent correspondence revealed that both men come from Britain.

Japanese Radio.

I HAVE recently received from Japan a fine review of that country's radio history. I have not enough space to tell you very much about it but here are a few facts. In 1896, a year after Marconi revealed his system, the Department of Communications opened a wireless research section.

In 1897 study in wireless telephony began and in 1902 the T Y K system was evolved; this could communicate over a distance of 30 miles. In 1916 what is claimed to be the first practical wireless telephone station in the world was installed in Iso Bay.

Fat Stock Prices.

JAPANESE broadcasting began in 1925 (March). In August, 1925, there were 100,000 listeners. By September, 1928, this number had risen to 500,000.

At the end of October, 1932, there were 1,280,320 listeners. (The population of Japan is about 84 millions.)

Programmes are very much to the point. They begin at 6 a.m. with physical exercises. On weekdays there are five weather reports, eleven market reports, and five lectures, the odd moments are occupied with menus, music and news.

We March to Georgia.

IT is very nice to receive a letter from J. W. (Atlanta, Georgia, U.S.A.), who is a Scot, gets "P.W." every week, and has done so ever since the good old "Sydney Two" days. If I know anything of Scotsmen I'll wager he is pining "for the heather and the deer." On the other hand, perhaps he left Glesca on a wet November day, and doesn't care. He sports a seven-valve superhet and 83 scalps (stations). The subject of the clipping which he enclosed has already received notice.

ARIEL.

The P.W. "AIRSPRITE" FOUR

AND now we come to the aristocrat of this season's battery sets—the "Airsprite" Four. An aristocrat that is, in everything *except* cost. It is true that its cost may be a little above that which some can afford in these days of depleted bank accounts, but it is still a long way from being an expensive set, either to build or operate.

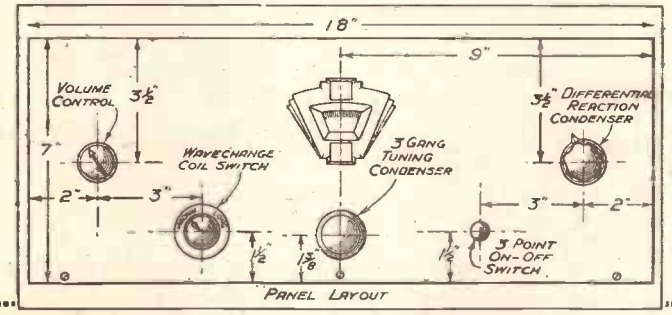
In regard to the former, a glance at the current prices of four-valve kits of parts will show you at once that the "Airsprite" Four by no means heads the list in *this* regard; on the contrary, it is definitely cheap!

But, of course, it gives a performance greatly superior to any other receiver in its class. And yet it has only the one tuning dial! Does that surprise you?

As a matter of fact, we could just as easily have provided half a score of knobs and dials for operators to juggle with, but there would have been no technical advantage in introducing a large number of adjustments; they would be useless complications in the "Airsprite" Four.

You see, there are two variable-mu S.G., H.F. valves with which colossal amplification is built up. They seldom, if ever, have to be given full rein, so that slight mis-trimming on the three-gang tuning condenser cannot eat up the margin of magnification which is provided.

Featuring:—
THE NEW A.T.B.
TWO S.G. STAGES.
ONE-DIAL TUNING.
PROVISION FOR PICK-UP.
PRE-DETECTOR VOLUME-CONTROL.



PANEL LAYOUT

With one S.G. there is a lot to be said for a multiplicity of adjustments because of the proportionately smaller H.F. amplification. But when the effective magnification of one stage is multiplied by that of an additional one not carrying the damping influences of the aerial system, control simplification not only becomes possible but actually advantageous, simply because not more than a few experts can handle a big bunch of adjustments to give as good results as a beginner is able to get with ganged controls!

New Invention.

I expect that most of you realise that a straightforward four-valver of modern design using a couple of S.G.'s is capable of amazing performances, but even so, I will wager anything you'll be surprised when you hear an "Airsprite" Four.

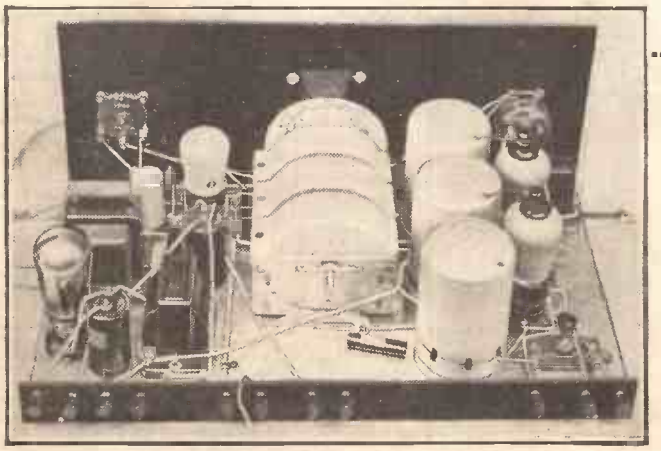
FIRST FOUR-VALVER TO USE AUTOMATIC-TONE-BALANCE

- 1 Panel, 18 in. × 7 in. (Goltone, Peto Scott, Direct Radio, Permcol, Becol, Wearite).
- 1 Baseboard, 18 in. × 10 in.
- 1 Cabinet to fit 18 in. × 7 in. panel and 18 in. × 10 in. baseboard (Gilbert, Peto Scott, Pickett, Camco, Direct Radio, Lock, Osborn).
- 1 ·0005-mfd. three-gang tuning condenser (Polar Star, Radiophone, Telsen).
- 1 ·0003-mfd. special self-shorting differential reaction condenser (Ready Radio, Telsen, Ormond, J.B., Lotus. See text.)
- 1 ·0003-mfd. max. preset condenser (Goltone, Ready Radio, Ormond, Telsen, Polar, Colvern, Sovereign, Formo).
- 2 2-mfd. fixed condensers (Dubilier 9,200, T.C.C., Ferranti, Telsen, Goltone, Igranic).
- 1 1-mfd. fixed condenser (Igranic, or see above).
- 2 1-mfd. fixed condensers (T.C.C. type OF, Dubilier Telsen).
- 1 ·01-mfd. fixed condenser (T.C.C. type 34, Telsen. Graham Farish, Dubilier).
- 1 ·0003-mfd. fixed condenser (Telsen W. 242, Graham Farish, Ferranti, Dubilier, T.C.C., Bulgin, Goltone, Ormond, Ready Radio).
- 1 50,000-ohm wirewound potentiometer (Lewcos Standard, Ready Radio, Telsen, Tunewell, Magnum, Colvern, Watmel, Igranic, Varley, Sovereign, Wearite, Bulgin).
- 1 2-meg. grid leak with wire ends or terminals (Goltone, Graham Farish "Ohmite," Dubilier 1-watt type, Tunewell, Igranic).
- 1 ·25-meg. resistance and vertical holder (Graham Farish "Ohmite").
- 1 20,000-ohm resistance and horizontal holder (Graham Farish "Ohmite," Watmel, Telsen, Sovereign, Ferranti, Wearite, Colvern Strip).
- 1 Reaction choke (Wearite H.F.P., Telsen, R.I., Graham Farish L.M.S., Slektun, Lewcos, Keystone, Dubilier, Ready Radio, Varley, Tunewell, Lotus, Goltone, British General, Bulgin H.F. 8).
- 1 Three-point push-pull switch (Ready Radio, Bulgin, Telsen, Tunewell, Sovereign, Goltone, Wearite).
- 1 set of triple matched screened coils (Telsen W288)
- 4 Four-pin valve holders (W.B., Telsen, Lotus, Igranic, Tunewell, Clix, Bulgin, Benjamin, Wearite, Peto Scott, Ready Radio, Ferranti, Goltone).
- 1 Output choke (Ferranti B. 8, R.I., Audirad, Varley, Nichoke II., Telsen W. 71, Tunewell, Wearite H.T. 15, Bulgin L.F. 14).
- 1 Compensating L.F. transformer (Telsen Audioformer, Varley D.P. 35, R.I. Varitone, Lewcos L.F.T. 6A).
- 1 Fuse holder (Belling & Lee type 1,034, Telsen, Goltone, Bulgin).

Screws, flex, etc.

- 1 Terminal strip, 18 in. × 1½ in.
- 11 Indicating terminals (Bulgin, Belling & Lee, Igranic, Goltone).
- 7 Wander plugs (Clix, Belling & Lee, Bulgin, Goltone, Igranic, Eelex).
- 2 Accumulator spade terminals (Eelex, or as above).
- 2 S.G. anode connectors (Belling & Lee type 1,030).
- 5 yards of insulated sleeving and 8 yards of 18-gauge tinned copper wire (Goltone, Wearite).
- 1 150-ma. fuse (Belling & Lee type 1056, Goltone, Telsen, Bulgin).
- 1 Piece of ·004 in. copper foil, 20 in. × 12 in.
- 1 7-in. length of screened connecting wire (Goltone).
- 1 Disc drive (Polar)

ANYONE CAN BUILD IT!



Simplicity of construction as well as operation makes the "Airsprite" Four very attractive to all constructors who want super results from local and distant transmissions.

And your surprise will be due to A.T.B. This new invention was the cause of practically the whole radio industry acclaiming the famous "Airsprite" Three. It appeared in the "Airsprite" Two, and gave that virile little outfit a marvellous power over programmes.

But in the "Airsprite" Four, Automatic Tone Balance transcends all its previous achievements. This time it has been moulded to function with the great selectivity of the set instead of being so closely coupled with reaction. (Of course, tha

(*Continued on next page.*)

THE "P.W." "AIRSPRITE" FOUR.

(Continued from previous page.)

is fundamentally similar in general principle to the original application.)

Therefore, the "Airsprite" Four can pierce through congestion and collect the weak programmes from behind really solid masses of mush. But instead of these weak stations coming through the loudspeaker in boomy mumbles, as is usually the case where of necessity there is considerable selectivity and big magnification, you hear them clearly, for A.T.B. re-equips them with a composition of the higher audio-frequencies.

Easy to Construct.

The abnormal selectivity of the "Airsprite" Four is due to the fact that both S.G. stages are transformer coupled. (This method of coupling is not possible with many of the coils on the market.)

The variable-mu valves are controlled by the one potentiometer and the control is both wide and flexible.

The set is a particularly easy one to construct. No one, however slight his previous experience, need be afraid to tackle it. Also, it is wonderfully stable; that kind of set which works straight away the moment its batteries and so on are hooked up to it.

Some of you may visualise a tricky operation in the trimming of the gang condenser. But this is as simple as A.B.C. (or A.T.B. !), as you will see later.

Don't wander outside the makes of parts specified in our list though. These component lists of ours are framed up for constructors, and are not merely advertisement glossaries! No coil, condenser or other component gets a chance of inclusion in a "P.W." component list unless it is, in our opinion, perfectly satisfactory for the set.

Therefore, it is most inadvisable to try and use unspecified parts. They might be quite good parts—in other sets!

The compensating L.F. transformer is an integral element of "Airsprite" design. But it can be included with advantage in any very selective receiver. I add that because we always endeavour to employ perfectly standard components in all our sets.

This makes it possible for them to be employed again and again in future "hook-ups." That is where the constructor scores over the man who buys a commercial set.

When a factory-built outfit becomes obsolete the whole thing has to be scrapped; it cannot be pulled to pieces and its parts re-assembled in accordance with current technique. At least, only a skilled mechanic could do that and the process is likely to be almost as expensive as purchasing a new instrument.

This is all in addition to the fact that the constructor *starts* ahead of the factory. Even as I write, receivers for the 1934 market are being designed by manufacturers!

The first step in the construction of the "Airsprite" Four is to get all the materials together. If you have bought a kit of parts the panel will be drilled ready for you. If not, I would advise you to ask your dealer to do the drilling although, if you have a drill and a file, it is not a difficult task, as ebonite is a soft material—compared with metal, that is. But you want metal-working tools for it. A drilling template for the condenser will be found in the carton in which it is sold.

Fixing the Foil.

The baseboard foil is lapped over the baseboard at the front and back instead of being merely tacked down on the top surface as is usually the case. This makes a much neater job of it. The foil is stretched over the top of the board and bent over and tacked down underneath. About an inch is lapped over. No tacks at all will be

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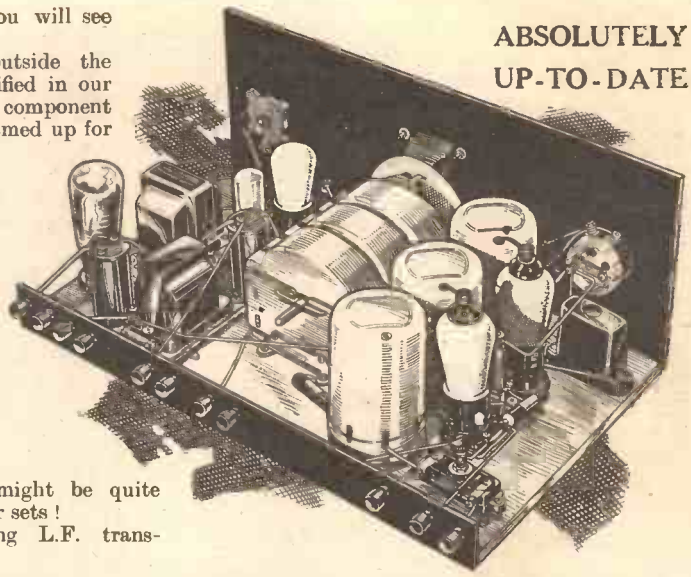
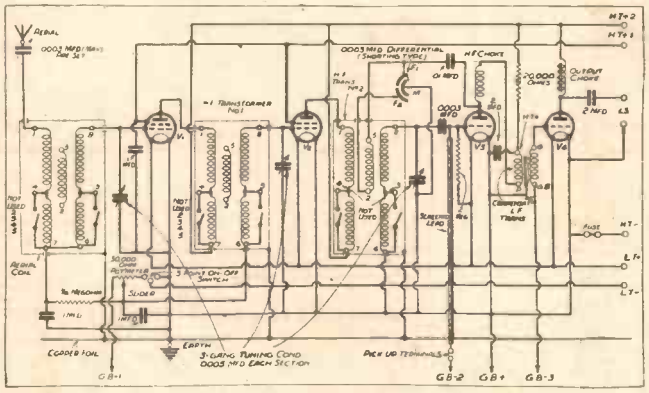
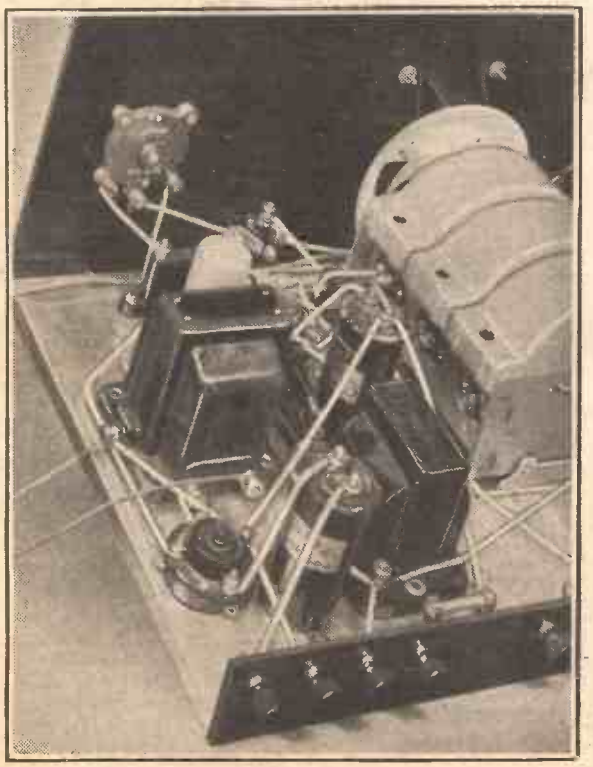


HIGH SELECTIVITY FROM THREE TUNED STAGES



ONE WAVECHANGE SWITCH CONTROLS ALL COILS



The illustrations on this page show the latest "P.W." design in various aspects of its theoretical and practical design.

ACCESSORIES FOR SUCCESS

LOUDSPEAKER.—R. & A., Amplion, Marconiphone, Celestion, B.T.-H., Blue Spot, G.E.C., Epoch, Clarke's Atlas, Igranic, Baker's Selhurst, Ferranti, Lanchester, Ormond, H.M.V., W.B.

H.T. BATTERY.—120 to 150 v. Super Capacity Silver Knight, Ediswan, Ever Ready, Siemens, Pertrix, Marconiphone, Drydex, Lissen, Magnet, Oldham.

G.B. BATTERY.—16½-volt Ever Ready, or see above.

L.T. BATTERY.—Exide, Ediswan, G.E.C., Oldham, Pertrix, Block, Lissen.

AERIAL AND EARTH EQUIPMENT.—Electron "Superial," Goltone "Akrite," Graham Farish "Filt" earthing device.

MAINS UNIT.—This should have 2 positive tappings with outputs to suit valves chosen (Clark's Atlas, Ferranti, Ekco, Regentone, R.I., Heayberd, Tunewell, Formo).

THE "P.W." "AIRSPRITE" FOUR

(*Continued from previous page.*)

needed on the top providing the foil has been fairly tightly laid.

The screws for holding the panel and terminal strip and the baseboard components are driven through the foil holes being pierced for them with the bradawl or other such tool. The foil is thin and it is easy to do this.

The Ready Radio reaction condenser will not need modification so long as you make sure you ask for the "self-shorting" type. But if you have one of the other specified makes, a slight alteration is necessary in order to introduce this self-shorting property.

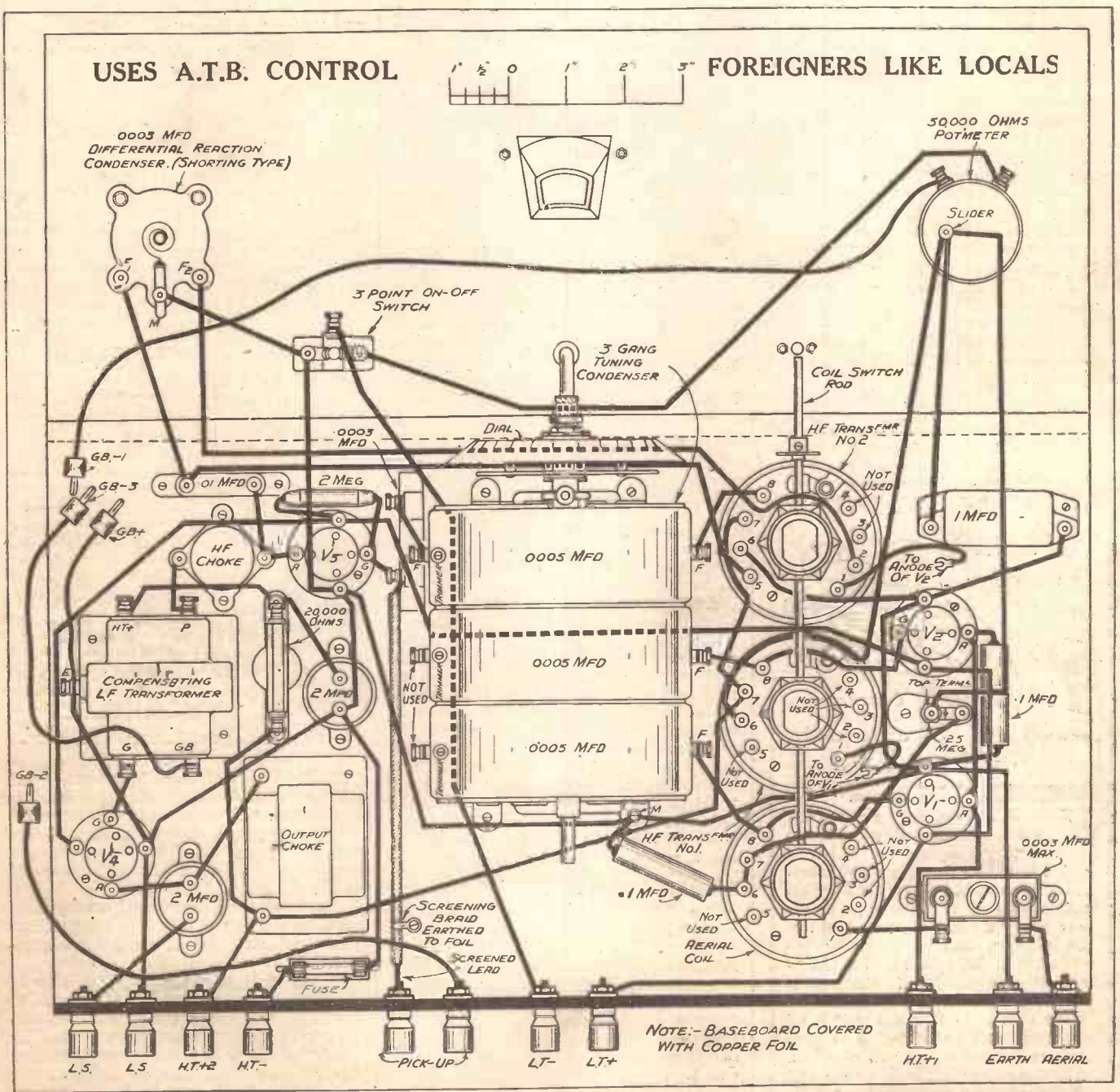
Full details of the modification were given in our February 11th issue, and our "Radiotorial" column's next week will refer to the matter again.

You will notice that we have taken the S.G. anode leads through the top holes of the coil cans. The procedure is to join the wires to their coil terminals and then thread

(*Continued on page* 1396.)

VALVES WE RECOMMEND YOU TO USE

Name	H.F. Stages	Detector	Output	Output Mains Unit
Mullard	2 PM12V	PM1HL	PM2A	PM202
Cossor	2 220VSG	210HL	220PA	230XP
Marconi	2 VS2	HL2	LP2	P2
Mazda	2 S215VM	HL2	P220	P220A
Osram	2 VS2	HL2	LP2	LP2
Tungsram	—	H210	P220	SP230
Eta	—	BY1815	BW604	BW602
Micromesh	—	HLB1	PB1	PB1
Clarion	—	H2	P2	P2



In the assembly of the three Telsen coils only one stop collar is used (between the panel and the first coil unit), and the coils are brought close together. The wave-change spindle is cut short at the back so that it is kept within the 10-in. limit of the baseboard, and does not project beyond the small collar that is used to prevent the spindle being withdrawn.

THE MIRROR OF THE B.B.C. By O.H.M.

THE PARLIAMENTARY AFTERMATH

New Organ for Broadcasting—A Railway Programme—First Time in England—Elaborate Play—Easter Holidays.

I AM surprised to note the persistence of an attitude of disdain and condescension with regard to Parliament on the part of some B.B.C. talks people. Not to stress the point, it is no under-statement that they have been saved only by a terrific effort on the part of Sir John Reith and Mr. Gladstone Murray. In one way the triumph was just a little too complete.

Parliament has the habit of reacting against the feeling of such suffocating majorities as the B.B.C. got in the Commons. Also, there is the point that the real malcontents were not admitted by the Speaker, which makes them only angrier.

Therefore, I conclude that now is the time the B.B.C. should be more careful than ever; by this I do not mean less adventurous in artistic matters, but I certainly do mean special care in anything pertaining to politics or current interest.

It will be a great day for the British listener and for the B.B.C. when the servants of the B.B.C. content themselves with forwarding the policy and interests of the Corporation and abandon the numerous "will-o'-the-wisps" that have recently engaged their fancy. Incidentally, the supporters of the B.B.C. were skilful enough to stifle any really unpleasant suggestions.

St. Luke's, Chelsea.

It is good news that Mr. Stanton Jeffries has reported favourably on the organ of St. Luke's, Chelsea. This exploration is part of the general move of the B.B.C. to find further facilities for the broadcasting of organ music in addition to those provided by the cinemas.

The Picturesque Side.

The acid test of all broadcast talks and discussions, apart from what educational advantages they may afford, is public interest, and surely few subjects are of such outstanding consequence at the moment as the future of our railroads and the lines upon which our roads are to be used in the conveyance of passengers and merchandise. A lucid exposition of the situation as it concerns the Government, vested interests and, more important still, the community at large, could very well be made the subject of one of the most important series of talks the B.B.C. has ever given. And I should not be at all surprised if, from what I hear, plans are not already in hand to bring it about.

Meanwhile, what might be described as the more picturesque side of transport operations is to be incorporated into a series of programmes arranged for Northern listeners under the general title of "Communications." Railways, steamship services, and the P.O. will all be represented.

From the West Riding.

The first broadcast is on Thursday, March 30th, when a sound picture will be presented of the work which goes on every night in the L.N.E.R. goods marshalling yards at Ardsley, near Leeds. During the last few years the railways have given far more attention to the running of express goods trains than ever before, and the slow-moving and often-shunted freight train is almost a thing of the past.

Ardsley is the spot at which trains from all over the West Riding of Yorkshire are gathered and divided up into other trains, which run on closely timed schedules to all parts of the system. To do this no time must be lost in shunting, which is all carried out under the direction of traffic controllers who work to plans giving indication of the exact location of every truck.

During the broadcast listeners will hear instructions given by telephone to various parts of the huge marshalling yard, the orders to shunters, the working of signals and points, levers, and the sounds of moving trucks and puffing engines.

A First Performance.

The first performance in England of Hindemith's oratorio, "Das Unaufhörliche" will be heard on Wednesday, March 22nd, when the choir boys of St. Margaret's, Westminster, and St. Mark's, North Audley Street, will take part in the Symphony Concert at Queen's Hall. The B.B.C. Symphony Orchestra will be conducted by Sir Henry Wood, and the B.B.C. Chorus will be in charge of Chorus-Master Cyril Dalmaine. The text of "Das Unaufhörliche" has been translated into English by Rose and Cyril Scott.

Castle on the Hill.

It is a long time since anything so elaborate as the musical melodrama, "The Castle on the Hill," was included in the broadcast programmes, and no fewer than three bands will be used during its performances for National and Regional listeners on Tuesday and Wednesday, March 14th and 15th, respectively. There will be the B.B.C. Theatre Orchestra, the tzigane band from the Hungaria Restaurant, and the Gershom Parkington Quintet.

The story, which is by Denis Freeman, promises plenty of excitement with the kidnapping of beautiful heroines by mad barons, not to mention a train of death mowing down oppressed peasants in post-war Hungary. The music by Mark Lubbock is of the romantic type.

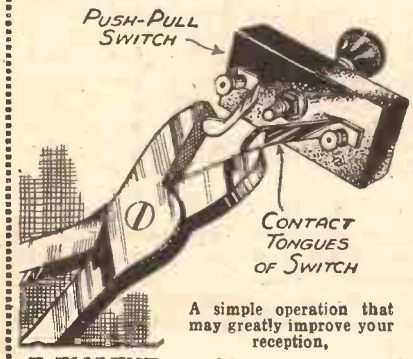
The Easter Arrangements.

It is rather too early to go into details of the Easter holiday programmes, but listeners will be interested to learn that on Good Friday evening the concert at Queen's Hall will be devoted entirely to excerpts from Wagner's "Parsifal," and will include the Prelude, the scene between Kundry and Parsifal in Klingsor's Enchanted Garden (Act II), Good Friday scene, Entrance to the Castle of the Grail, Amfortas' Prayer and Closing Scene (Act III) and Transformation Music and Closing Scene (Act I). Oda Slobodskaya, Walter Widdop, Harold Williams and Horace Stevens will be the singers. Sir Henry Wood will conduct the B.B.C. Orchestra.

A B.B.C. Romance.

There is impending a B.B.C. romance of unusual interest and significance. Watch this feature for first news of it.

CURING A NOISY SWITCH



A simple operation that may greatly improve your reception.

VIOLENT crackling noises and artificial fading may be due to a very simple fault. After a period of use, or through rough treatment, the contact tongues of the push-pull type on-off switch may no longer bear firmly against the metal end of the plunger, and consequently the contact will be good and bad intermittently, especially if the set is subjected to slight vibration.

The cure is to take the switch off the panel and to bend the contact tongues inwards with a pair of pliers, until the connection between the end of the plunger and the tongues is perfectly firm.

Weekly Jottings of Interest to Buyers.

THE radio industry in general—and particularly that section of it which is concerned with the manufacture of sets—has enjoyed such a meteoric rise to popularity that the question of service-after-sales facilities has been apt to slip out of the picture.

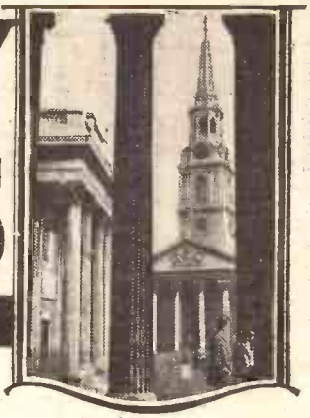
But with the present tendency towards stabilisation of the industry, the question, in my opinion, is one of increasing importance.

While it is true that the majority of British set manufacturers have attached so much importance to the question of reliability in the first case that the need for efficient service-after-sales organisations has never seriously arisen, with radio one can never be absolutely sure.

That is why I look with favour upon any

(*Continued on page* 1391.)

B·B·C SUNDAY PROGRAMMES



BY THE VISCOUNTESS SNOWDEN

THE daily newspapers announce that the B.B.C. will include a Shakespearean play in its Sunday programme once a month. If this be true, it will be welcome news to a great many people.

It will not affect me. I like Shakespeare, and I know many of his plays almost by heart, but it is rarely I enjoy a broadcast play.

Too Great an Effort. —

In my case, where the drama is concerned I must see as well as hear. When I have to concentrate all my attention on hearing, the declamatory effect is one of exaggeration and over-emphasis. When the play is new and the voices of actors are not unlike each other, the effort of following the plot is great; and, personally, I do not care for the twiddly bits of music which are often made to interlard the scenes or provide a running accompaniment to them.

The same play quietly read by someone with a good voice and a sense of the drama gives me more pleasure and is not so much of a strain.

But a great and growing number of listeners like broadcast plays. There are those who think them the most attractive part of the programmes. For these, a play from Shakespeare performed by first-rate actors will give them something to look forward to on those monthly Sundays.

I read that, with a few omissions, all the plays are to be given in chronological order. The omissions will be those plays which are thought not to be entirely Shakespeare's, or those, like the "Merry Wives of Windsor," which are thought not to be so well suited to the day as the others.

The logical person will say: "If Shakespeare's plays can be broadcast on Sundays why not other plays?" I can see no reason, provided they are of good quality and suitable in character.

Delights for the Play-lover.

I would be in favour of broadcasting from such a theatre as the Arts Club Theatre or the People's National Theatre (the Little Theatre) on the condition that the Censor had not banned the plays from production in the ordinary way.

What delights for the play-lover are conjured up at the thought of Marlowe and Sheridan, Ibsen and Strindberg, Snitzler and Tchekov, Shaw and Galsworthy, Masefield and the young dramatists of our own day.

Incidentally, a translation by Masefield from the Norwegian, called "The Witch," is eminently suitable for Sunday broadcasting, and has been beautifully produced recently by the People's National Theatre. Every word would be heard from that small stage.

During her tenure of office as a Governor of the B.B.C., Lady Snowden proved herself to be the most "live" member of the Board. One day the full story of all she did for British Broadcasting will, we hope, be made public, and then listeners will realise how much they owe her. Meanwhile, we take great pleasure in publishing the first of a series of articles which Lady Snowden has agreed to write exclusively for this journal.—*The Editor.*

This new and excellent departure of the B.B.C. will do much to mitigate the criticism of those who say the Sunday programmes are dull, too rigid and too short.

A DISTINGUISHED GOVERNOR

The critical formative years during which Lady Snowden was a Governor of the B.B.C. not only proved her administrative qualities, but gave her a unique insight into problems of broadcasting, with which she deals in this article.

The criticism has not always been just, though with some of it I have always sympathised.

I agree, for instance, that Sunday is the best listening day for the great mass of the people, despite the competition of motor-cars and fine weather; and I agree that every effort should be made to provide the best talent that can be had on this supreme day.

I question the value of a continuous programme from early morning till midnight on Sundays. Think what this would mean to people anxious to rest after a week of hard work!

There are some people who use their loud-speakers mercilessly. They turn on their wireless set before taking off their gloves when they come into the house, and they keep it on all day.

It does not disturb their conversation; they do not listen nor let others listen; they are utterly deaf to the loveliest music or the finest talk, but they must have the thing on. I suppose they think that in this way they get their money's worth!

Abundance of Good Music.

One such thoughtless person can distress and disturb a whole street, and often does. A quiet Sunday morning is the least that every working citizen is entitled to expect.

The afternoon programmes have been lengthened for a considerable time past, and there is now an abundance of good music to be heard both then and on Sunday evenings. If broadcast plays are to be added, and more variety is ultimately introduced into the Sunday talks, there can be little excuse for grumbling except for those who frankly want what they call a "Continental Sunday," and with these people I just as frankly disagree.

I think there should be no broadcasting between six and eight on Sunday evenings. These are the hours when Christian worship is taking place all over the country. This is, nominally at least, a Christian State. This respect to the Christian ministry is the least that a Christian State can show. During these hours there should be no secular competition of theatre, cinema or microphone.

Guarding Sunday.

What lesson would the intelligent young draw from a condition in which the State permitted, through its wireless service a secular competition with its religious observance which would place both in the same category?

There are in the country sufficiently large numbers of listeners who want Sunday observance guarded to warrant the present policy of the B.B.C. Some years ago a census of the number of people attending church services on one date at the same hour was taken and the number was found to be 40 per cent of the population. To this number could have been added another 10 per cent for those who belonged to Ethical Societies, Christian Science Churches and other religious bodies; the sick and infirm and those absent because occupied in domestic and other labours.

But if, in these days, that total of 50 per cent were halved, it would still mean a population of from 12 to 13 millions, more

(*Continued on page* 1390.)

THE TELSEN "SUPER 6"

Details of a fine superheterodyne receiver which is available in kit form for the home-constructor. It is battery driven and employs an all-metal chassis assembly.

NECESSITY, we are told, is the mother of invention. The saying was never more true than of the superheterodyne receiver.

A few years ago, the superheterodyne receiver was all but abandoned on account of difficulties which at that time were considered insuperable. The advantages of amazing sensitivity and selectivity were deemed to be more than off-set by the parasitical disadvantages of I.F. instability, bad quality and enormous current consumption consequent upon the type of valves that were then in vogue.

In the Front Rank.

Little did we then think that within a few years the superheterodyne would stage a come-back which would have such far-reaching effects as to place it in the very front rank of modern receiver practice.

Yet that is undoubtedly what has happened. To-day, the superhet is included in the ranges of nearly every set manufacturer in the country. It represents one of the few completely satisfactory solutions to the receiving problem of an ever-increasiug number of stations in an already over-crowded European ether.

But it is a very different proposition from its prototype of a few years ago. The advent of screened-grid valves and super efficient components has banished the bugbears of complicated tuning, instability and distorted reproduction, and in all important respects the modern superhet is beyond reproach.

Intensive Research.

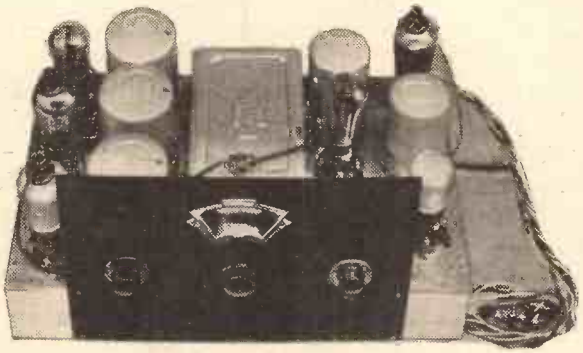
This potted perusal of superhet history has been attempted not because it is likely to provide absorbingly-interesting reading, but because it throws up into brilliant relief the latest achievement of the Telsen Electric Company.

The technical brains of the country have combined to make the modern superheterodyne what it is. Years of intensive research work have brought it to a state of perfection which it would seem difficult to surpass, and that makes it all the more to the credit of the Telsen engineers that they should have succeeded at this late stage in making still another advance in the design of their latest kit-set.

The Telsen "Super" Six compares favourably in appearance with the most elaborately-built factory instrument, yet it can be assembled with ease even by the layman with a gross disregard for technicalities. Its method of presentation, its clear and concise blue print instructions, its carefully prepared point-to-point wiring details bring it within the reach of every home-constructor who is not primarily concerned with initial cost and ultimate upkeep.

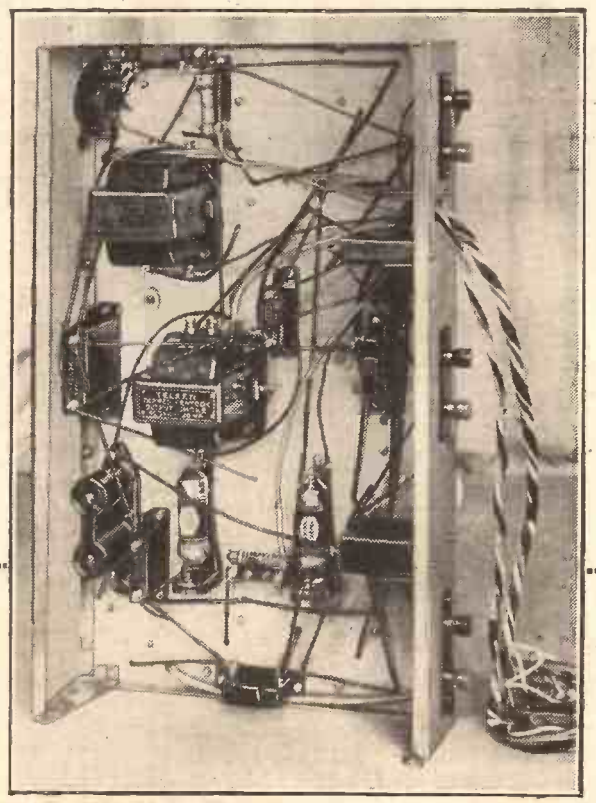
A cursory glance at the circuit reveals much that is of interest apart from the arrangement of the first detector, which is the new Telsen development and which is the subject of a provisional patent application.

An inductively coupled band-pass filter, for instance, is used in the grid circuit of the first valve—which is a "straight" high-frequency amplifier—for coupling the aerial to the set. But band-pass coupling alone tends to show a falling-off in efficiency as the frequency is decreased, or, in other words, as the wavelength is increased.



ONE DIAL GIVES EASY TUNING

The three tuned circuits, for oscillator and band-pass coils, are all ganged to one knob. Altogether there are only three panel controls.



The base of the chassis is well raised and many components are accommodated beneath it, as this "under-baseboard" view shows.

Noteworthy Departure.

Thus in the Telsen circuit, to offset this decreasing-efficiency effect, an H.F. choke is used for coupling in the anode circuit of this first valve, since as the frequency is decreased the efficiency of the choke coupling is *increased*. The combined effect is to produce a radio-frequency response that is reasonably linear.

As we have previously indicated, it is in the arrangement of the first detector circuit, which, of course, is the second valve in the set, that a noteworthy departure is made from standard practice. This "mixer" valve, which is of the screened-grid variety, is connected in circuit in such a way that signals are applied to what is normally the screening grid, while the normal "control" grid is joined through a ¼-megohm leak to a point on the biasing battery.

Great Success.

Results show that without a doubt there are certain advantages in this unconventional method which are not apparent in the standard arrangement, but it is necessary to point out that the great success of the scheme is dependent upon the use of the valve specified, and no other.

The arrangement of the oscillator, intermediate-frequency amplifier and second detector follows along conventional lines, but the use of a one-to-seven transformer between the second detector and the pentode output valve is commendable,

(*Continued on page* 1396.)

TECHNICAL DATA

GENERAL DESCRIPTION.—A superheterodyne receiver for battery drive, obtainable as a kit set.

CIRCUIT DETAILS.—Six valves in following sequence: Var.-mu. S.G.H.F. stage, S.G. oscillator, 1st Det., Var.-mu intermediate stage, 2nd det., and pentode output.

CONTROL ARRANGEMENTS. — The band-pass aerial circuit tuning and the oscillator tuning are ganged and operated by a centre disc drive. To the left of this knob is a long-medium wavechange switch and to the right a volume control with "off" position for set. Pick-up terminals are provided at the back of the set.

SPECIAL FEATURES.—(1) One-watt undistorted output. (2) Double variable-mu volume control. (3) Band-pass tuning. (4) One knob control. (5) Special patented first detector circuit.

PRICE.— £5 18s. 6d. Cabinet extra.

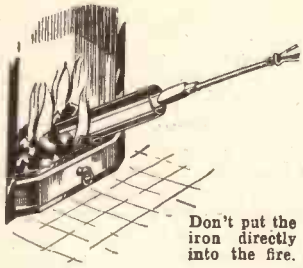
MAKERS.—Messrs. Telsen Electric Co., Ltd., Aston, Birmingham.

ABOUT THE SET

KEEPING A SOLDERING IRON CLEAN.

A CLEAN soldering iron is essential for speedy and neat soldering, yet a large number are coated with scale.

To heat up the iron whilst keeping it absolutely clean is quite easy if the iron is inserted in an 8-inch length of iron or brass tubing. This is not so essential to cleanliness with a gas-heated iron as it is when the iron is heated from the fire.



Don't put the iron directly into the fire.

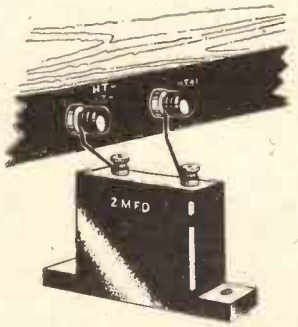
The tubing is then inserted between the bars of the grate. The extra cleanliness will be well worth the little extra time involved.

H.T. NOISES.

READERS may be interested to know how to cure, to a big extent, noises caused through a running-down H.T. battery.

A 2-mfd. fixed condenser is wired between H.T.+ and H.T.−.

An H.T. battery of, say, 120 volts will often cause a crackle when only run down to about 100 volts, and it seems a pity to scrap it so soon. Since it is the first H.T. tapping which has the full load of the set upon it the crackle is often confined to, say, the first 60 volts, especially if the battery is not well made.



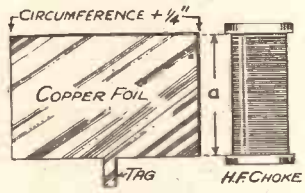
Don't throw away an H.T. battery because it crackles.

The 2-mfd. condenser will carry most of the trouble to earth without any detriment to the battery's general health. The condenser may be wired outside the set quite conveniently, as in the illustration, if there is no room inside the set.

USES FOR COPPER FOIL.

COPPER foil, such as is generally used for baseboard screening, is adaptable to many purposes in the modern set, chiefly in the screening of individual components.

H.F. chokes of the ordinary cylindrical type can be very simply screened. Cut a piece of foil of the correct breadth for the height of the choke and of length equal to its circumference, plus



Foil for choke screening is quite efficient.

a quarter of an inch overlap, leaving a "tag" at the bottom which can be soldered to the baseboard screening or otherwise attached to earth.

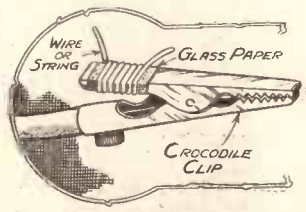
By fitting the foil round the choke and running solder down the joint a neat and effective job results. But, of course, one risks to some extent upsetting the characteristics of the component.

CROCODILE CLIPS.

THERE is the danger, when moving crocodile clips, of them springing out of one's fingers and perhaps dropping on a "live" wire and shorting the batteries and valves.

A much better grip can be obtained by cutting a small piece of fine glasspaper about ½ in. + ¾ in. long and glueing to the end of the clip opposite the screw connection.

The metal should be made rough



A better grip can be obtained in this manner.

IDEAS WHICH MAY BE PROFITABLE

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

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

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

Our Guinea this week is being sent to Mr. R. H. Thomas of Hutton Lowcross, N. Guisborough, Yorks.

Where a screened lead is required as, for example, to the anode of an S.G. valve, a rigid tube can be made by bending foil round a nail of the required thickness and soldering the joint.

Other uses will occur to the constructor, and will be easily executed owing to the convenient pliancy of the material.

RADIOGRAM HINT.

A VALUABLE record, if it has not broken into more than three or four pieces may be repaired by sticking the parts together with ordinary glue, and after it has dried putting some melted candle grease along the crack on the groove surface of the record, and after solidifying allowing the needle (in sound-box) to scrape away the exterior wax.

Candle grease stops "jumping" over cracks.

This grease then effectively helps to cut out the "rap," "rap" as the needle traverses the crack. Either a metal or fibre needle may be used, but results are better with the latter.

first of all. Seccotine or Croid glue will be found very suitable to stick the glasspaper with.

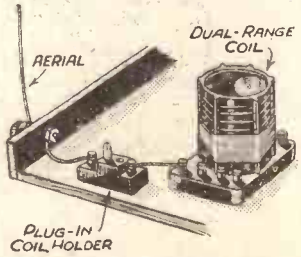
A small piece of string, or better still a piece of wire, can be wound round to keep it in position whilst it dries.

The screw side may be treated similarly.

FOR SHORT AERIALS.

IN these days of selectivity we have to put up a short aerial, but alas, it sometimes happens that we cannot put up more than 50 ft. of wire!

The standard dual-range coils are generally made for aerials about 70 ft



Easier and quicker than erecting a new aerial.

That means to say, with 50 ft. of wire or less we cannot reach a sufficiently high wavelength.

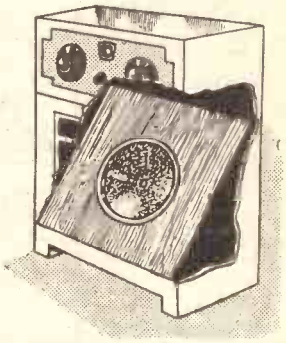
Instead of lamenting our fate when we tune the set and, grind our teeth, thinking that we shall have to erect another aerial, it is quite simple to wire a plug-in coil holder between the aerial terminal on the set and the aerial terminal on the dual-range coil.

By placing in the holder coils of various sizes we can increase the length of our aerial to suit our exact requirements without disturbing our outside wire.

TOP NOTE DISTRIBUTION

IT is an unfortunate characteristic of the moving-coil and other classes of cone speakers that sound waves of the upper frequencies tend to be concentrated, or focussed, along a comparatively narrow beam projecting directly from the cone surface.

Proof of this can be afforded by placing the ear near and directly opposite the speaker, when the reproduction of the very high notes will at once appear to be greatly exaggerated



A sloping baffle makes a deal of difference.

This defect is most noticeable in the popular radiogram type of cabinet where the speaker is placed near the floor, the upper frequencies being thrown away from the ear and becoming absorbed by the furniture in the room. In extreme cases reproduction may be muffled and lacking in brightness.

This state of affairs, however, can be easily rectified by arranging the actual baffle board of the speaker at an angle of from 20 to 30 degrees from the vertical as indicated in the diagram.

The result will be better distribution of sound and greater clarity of reproduction.

The design of the covering fret should be as large and open as possible to afford free egress to the sound waves.

SPRING CLEANING DIALS.

REMOVE dial, or knob, from panel, and then with the aid of an old nail or toothbrush scrub gently in warm soapy or soda water, working the bristles well into the engraving, wipe dry and replace; the effect will be the same as new.

Should, however, the engraved filling suffer too much under this treatment, that is, come out altogether, it can easily be replaced by smearing some white lead or paint (white lead is best as it has more body in it) all over the engraved portion, and then wiping off with a clean piece of rag, working in a circular direction only.

Care must, however, be taken not to let any of the white lead get into the milled edge of the dial (or knob), otherwise it will have to be cleaned out with turps, or the desired effect will not be obtained.

Engraved panels lend themselves well to this treatment.

(Continued on next page).

RECOMMENDED WRINKLES

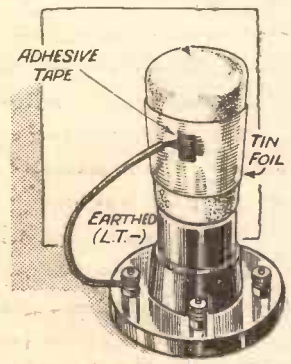
(Continued from previous page.)

MAINS HUM.

A LOUD hum in a mains set was found to be associated with the detector circuit, but the usual decoupling devices proved quite ineffective.

As an experiment, the detector valve was removed, and the bulb coated with adhesive and covered with tinfoil (from a cigarette packet).

Three inches of flex were bared at each end, one end being spread out and attached to the tinfoil by means of



Hum in a mains set cured by earthing the detector.

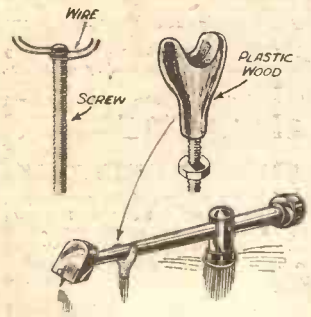
adhesive tape, and the other end looped for attachment to filament terminal (earth). On replacing the valve in its socket, and earthing the tinfoil covering as described, the hum had completely disappeared.

Valves in other positions can be "metallised" in the same way with little trouble and at no cost, and this simple alteration will often cure mysterious and objectionable interaction.

TONE-ARM SUPPORT.

MANY pick-ups are sold without any rest for the tone-arm when not in use, and apart from the inconvenience resulting from the absence of this fitting there is always the possibility of damaging the pick-up or record if the tone-arm is left to swivel about its pivot when not actually playing.

The following support can be made by the veriest novice and has the advantage of being strong, neat, needs



Easily made at home for a few pence.

no tools whatever in its construction, and costs no more than twopence.

A screw (or piece of screwed brass such as was used in the old straight-line-capacity condensers to clamp the vanes together) has a couple of pieces of stiff wire (or small hair-pins) twisted about one end.

Over this is moulded plastic wood, leaving a length of the screw projecting at the bottom. It is advisable to build up the plastic wood in thin layers, allowing each layer to dry before moulding on the next; it dries very rapidly and the whole job can be finished in a couple of evenings.

When the support has attained the shape shown in the sketch and is quite hard, fine sandpaper will remove any roughness and it can then be polished.

If available, french polish is the best, but ordinary floor polish gives quite a good finish.

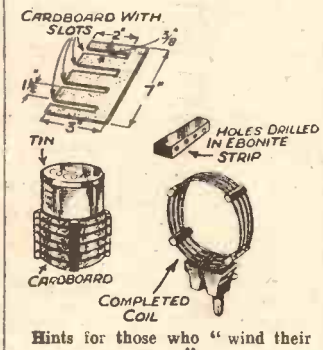
The support is then screwed into the turn-table board for the pick-up tone-arm to rest on, as is shown in Fig. 3.

SHORT-WAVE COILS.

HERE is a useful hint when constructing short-wave coils of the plug-in type.

The materials required are a ¼ lb. cocoa tin or some similar object, 2½ in. diameter; a strip of cardboard, ⅛ in. thick, 2½ in. wide, 7½ in. long. Cut out four slits in the cardboard, ⅛ in. wide by 1½ to 2 in. long (as shown in sketch) then tie this strip of cardboard around the end of the tin with the slits facing the edge, cut out four strips of ebonite 1 in. long, ⅛ in. wide, about ¼ in. thick.

Drill a number of holes to correspond with the numbers of turns required on the coil, 3 turns 3 holes, 4 turns 4 holes, and so on. Then take a length of No. 18 gauge tinned copper wire, slip on the strips of ebonite and place ebonite in position around the former, one in each slot of cardboard.



Hints for those who "wind their own."

Thread the wire through the holes of the strips to complete the coil.

It is an easy matter to fasten the plug to the coil, also the coil will slip easily off the tin. Making the coils this way, the turns are nicely separated and the coil rigid.

If desired, hacksaw cuts can be made in the strips instead of drilling holes. The coils may be wound quicker this way, but is not such a sound job as the first method.

Any number of coils can be made by the first method, as it is an easy matter to take one coil off the plug and replace with another if short of plugs.

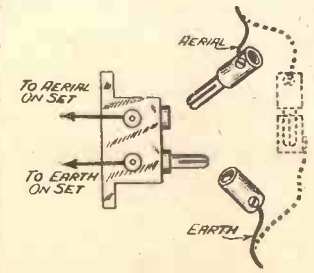
EARTHING THE AERIAL.

A SIMPLE and most efficient way of earthing the aerial when not in use consists of using two old coil-plugs in the following manner.

Screw one plug to the inside of the window frame. Connect "E" on set to socket and "Earth" to plug.

The plug is taken from the other coil-base and attached to the aerial, the socket being connected to earth.

To earth the set simply plug aerial into earth.



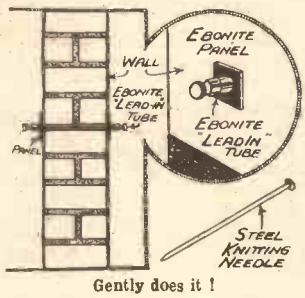
Old coil plugs come in handy here.

AVOIDING LONG LEADS.

WHEN it is required to run either an aerial, earth or loudspeaker wire from one room to another, long leads round corners and doors can easily be avoided by the following method.

Take a steel knitting needle and tap gently in approximate position in wall. By inserting two or three times, the position between bricks and cement can be easily felt.

Then drive the needle, little by little,



Gently does it!

into cement making a cavity about the size of a shilling. Then insert a square-headed punch tap by tap, at the same time turning and twisting with the aid of a spanner so that a neat hole is made, which can be plugged with the usual ebonite lead-in, bolted to two ebonite panels on either side.

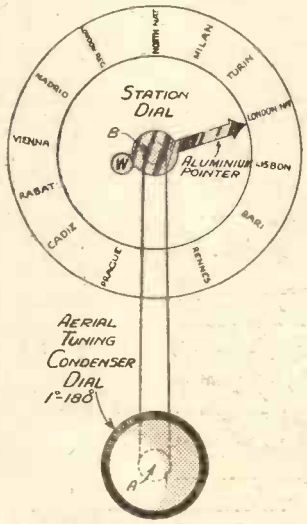
Avoid driving punch or needle in too far, requiring leverage to extract, as damage to plaster may result. Let the needle precede the punch and work from one side of wall until right through with needle.

A wall one brick thick should take one hour to work through carefully.

A QUICK STATION FINDER.

THE sketch illustrates the idea I use for finding stations.

My condenser spindle "A" is connected to the station dial spindle



The station pointer works from the tuning dial.

"B" by strong black thread, the parts of the spindles used for this purpose being wound round first with insulating tape until the diameters are in the ratio of 2 : 1, that is $\frac{A}{B} = \frac{2}{1}$, so that the 180° range on the condenser dial carries the pointer over the complete circumference of the station dial.

The thread is wound twice round "A," and then carried on to "B" and wound twice round it, to ensure no slipping.

By means of the above the stations can be put on the dial in large letters, well separated and very easy to read. My own station dial is 18 inches in diameter.

A DRILL GAUGE.

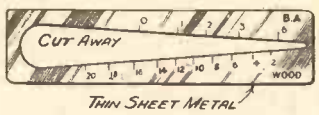
READERS who do a great deal of constructional work will find a simple drill gauge as described here of great utility.

Take a piece of thin sheet metal about 1½ in. by 4 in. long. At one end drill a ¼ in. hole and at the other, the smallest size available. Now rule two lines to pass through the circumferences of these holes and cut out the metal between them, and file up as straight as possible.

Slide into this slot screws of different gauges, and scratch marks against the edge at the points where the screws jam against the sides.

One side may be used for ordinary wood screws and the other for screws of B.A. standard.

Thus, when it is required to drill a hole for, say, a No. 6 wood screw, it is only necessary to select a drill which stops against (or just above) the figure 6 on the gauge.



For drills or B.A. screws.

This saves memorising the different size drills required for small parts, and also saves trouble when the size marked on the drill is not easily decipherable.

FLEXIBLE AERIAL LEAD

WHEN experimenting with sets, particularly short-wave ones, it is often necessary to connect the aerial lead-in directly to some point, an aerial series condenser, say.

Ordinary 7-22 aerial wire is very awkward to handle, however, for its stiffness prevents it being easily bent around a terminal shank, and on screwing down the terminal the wire springs away.

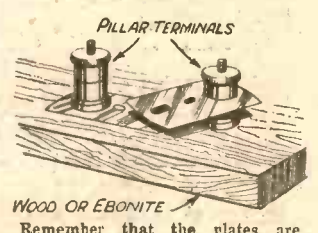
A very simple solution to the difficulty, however, is to obtain a short piece of fairly thick insulated wire, which is of the flexible variety, and, baring both ends, attach one to the end of the lead-in.

This connection should preferably be made by soldering, and then covered with insulating tape. The other end may then easily be looped and firmly fixed under the terminal.

A CONDENSER TIP.

THE small capacity variable "neutrodyne" condenser has been almost driven off the market by circuit modifications in the last few years, but one may easily be made for experimental purposes from a pair of old Gillette blades and a couple of terminals.

These are assembled as shown in the sketch, and variations in capacity over a large range may be obtained: (a) by turning either plate or both; (b) by varying their distance apart by the use of spacing washers; (c) by clamping them both *under* their respective terminals and insulating them with a fine sheet of paper, ebonite or mica, which is slipped between them and



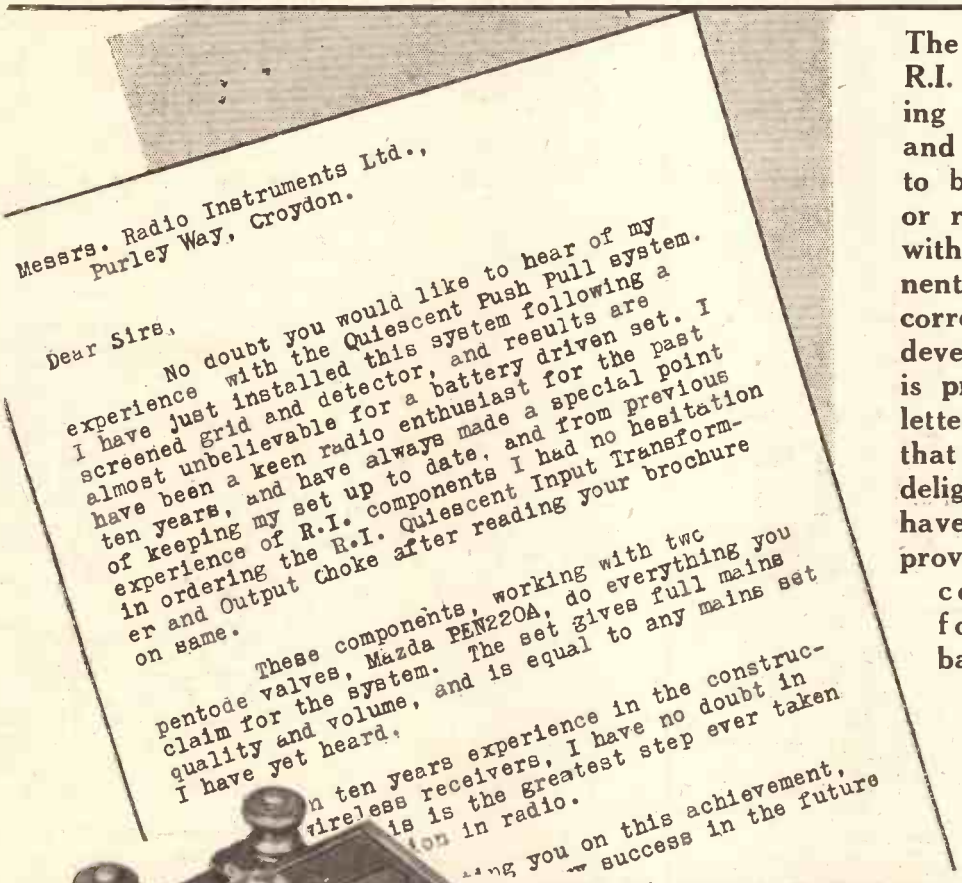
Remember that the plates are sharp!

acts as a dielectric with a much higher specific inductive capacity than air.

Such a condenser proves most useful for short-wave work owing to its small minimum capacity.

RESULTS ALMOST UNBELIEVABLE

R.I. QUIESCENT COMPONENTS



Messrs. Radio Instruments Ltd.,
Purley Way, Croydon.

Dear Sirs,

No doubt you would like to hear of my experience with the Quiescent Push Pull system. I have just installed this system following a screened grid and detector, and results are almost unbelievable for a battery driven set. I have been a keen radio enthusiast for the past ten years, and have always made a special point of keeping my set up to date, and from previous experience of R.I. components I had no hesitation in ordering the R.I. Quiescent Input Transformer and Output Choke after reading your brochure on same.

These components, working with two pentode valves, Mazda PEN220A, do everything you claim for the system. The set gives full mains quality and volume, and is equal to any mains set I have yet heard.

[illegible] ten years experience in the construction of wireless receivers, I have no doubt in saying this is the greatest step ever taken [illegible] in radio.

[illegible] congratulating you on this achievement, and wish you every success in the future

The enormous response to R.I. announcements concerning the "Quiescent" system, and the amazing advantages to be gained by constructing or reconstructing battery sets with R.I. "Quiescent" components, indicates the value and correctness of this revolutionary development. Public enthusiasm is proved by the hundreds of letters (one is shown above) that continue to pour in from delighted constructors, who have applied the system and proved that R.I. "Quiescent" components give the following advantages to battery receivers.

MORE POWER—BETTER QUALITY—50% SAVING in H.T. Current. ALL ELECTRIC SET PERFORMANCE

HOW TO APPLY QUIESCENT TO YOUR BATTERY SET

The R.I. "Quiescent" Brochure describes the "Quiescent" Push-Pull system in detail with diagrams. It shows also how to apply the system to the following famous circuits: P.W. "Comet 3," "Magic 3" and "Cosmic III," Osram "Music Magnet," Cossor "Empire Melody Maker" and Mullard "Master 3."

Full-size blue prints showing how to convert the above circuits are available. Send 2d. stamp to R.I. stating which circuit is required.

RI Q.P.P. TRANSFORMER

LIST No.D.Y.34. Primary Inductance 30 henries without D.C., 20 henries with 1 m.a., 16 henries with 2 m.a. (Royalty 1/6 extra.) **15/-**

RI Q.P.P. OUTPUT CHOKE **12/6**

LIST No. D.Y. 35. This choke acts as a highly efficient auto-transformer coupling. It is more efficient in use than any ordinary push-pull output transformer.

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Radio Instruments Ltd., Croydon, Surrey.

SHORT-WAVE NOTES

BY W. L. S.

All the interesting news and views of current short-wave practice.

I DISCOVERED in this morning's post an interesting letter from Capt. Wilmot (Z D 2 A), the only active amateur transmitter in Nigeria. Funnily enough, it was from Nigeria that the first suggestion came about making a superhet for publication—the "Empire Super," in the February "M.W." Z D 2 A tells me that he doesn't like supers a bit in a country where atmospherics are bad!

He uses a screened-grid detector, choke coupled to an "L" type valve, as first "note-magnifier," that being transformer-coupled to a pentode. He finds that by over-biasing the middle valve he can reduce atmospherics quite a lot, although it still gives quite enough output to operate the pentode.

Grid Leak Connections.

As a test Capt. Wilmot has been listening on the medium waves with this set, and has logged, through the static, Poste Parisien, two or three German stations, Rome and North Regional. In conclusion he asks me to say that he would appreciate reports on reception of Z D 2 A. (Here's one's—thanks for the chat on February 19th at 16.25 G.M.T. !)

Latest entries on the roll of the "H.A.C." Club include "H. P." (Handsworth), "J. W." (Newtownards), and "R. W. S." (Little Wakering). R. W. S. used to be an active participator in all the tests, but has had the bad luck to be ill for a long time. I hope you are on the mend now, "R. W. S."

Readers may remember that "R. C. W." (Liverpool), raised a query about the best position for the grid leak in a short-wave detector circuit. "F. J. F." (Raynes Park), points out that the best position is nearly always across the grid condenser, as we then do away with the damping effect of a leak across the coil.

He also suggests that I should make it clear that when the leak *is* across the condenser, the bottom of the coil should be taken to L.T. positive, not negative. I shall probably show the various positions in a diagram with next week's notes.

I haven't covered this point recently, because it is one that I have always passed by as being too obvious. I am inclined to think now, however, that only one man in a hundred (like friend "F. J. F.") really appreciates its importance. Some quite unbelievably silly suggestions have reached me from time to time.

The great receiver discussion goes on. While most people living in noisy locations agree with me that the single-valver is the most pleasant set to listen on, "E. J. W." (Portsmouth) finds consolation in a detector and pentode rig, using a loudspeaker for everything. It certainly is more merciful to the eardrums.

In the recent B.E.R.U. tests I got a little fed up with one valve and 'phones after twenty-four hours straight off, and added a pentode, wearing the 'phones well down on my cheek-bones. I don't think there is much to choose between the two arrangements on weak signals, but the detector-and-pentode set is quite hopeless if you try to wear the 'phones properly.

Thanks for your list, "E. J. W." One of the best.

"C. T." asks, "Shall we *ever* get over the bugbear of unreliable conditions on short waves?" I think we shall, "C. T." Think of almost any difficulty that was encountered in the early days of radio, and see how it has been overcome. Surely the greatest brains of the world aren't going to remain inactive while we suffer.

Revolution in Reception?

There *must* be some way of overcoming the comparative unreliability of short-wave propagation, and surely it won't take more than another ten years to find it out.

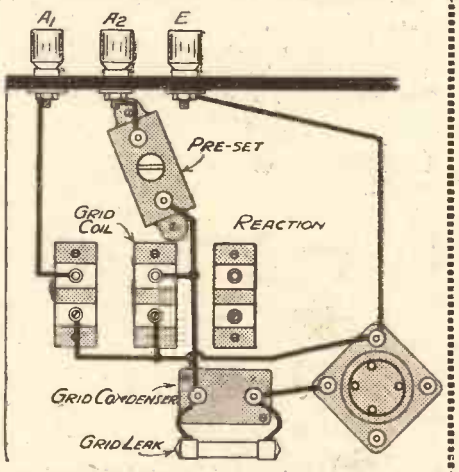
But then we probably shan't recognise the apparatus we are using now in ten years' time. Who knows when the next revolution in methods of reception is due to arrive? I suppose the coherer *was* once looked upon as the last word; no one could have conceived the whole thing was to be dropped in favour of something completely different. The same thing may easily happen to the thermionic valve.

Enough of that. Last time I wrote in this mood someone told me not to imagine that I could rival Old Moore. So let us be content to wait and see.

ALTERNATIVE AERIAL COUPLING

IT is always worth while to provide for alternative methods of aerial coupling in a short-wave set. Very often inductive coupling may be found preferable to the capacity variety on a night when stations are coming in well, and when conditions are good, although the capacity coupling forms a good stand-by when a little extra signal strength is needed.

It is perfectly easy to arrange a small adjustable condenser on the base-board as well as a third coil-socket, and to take the respective leads out to two separate aerials terminals, A1 and A2, as shewn in the sketch.



THE LISTENER'S NOTEBOOK

A rapid review of some of the recent radio programmes and the tendencies they have been showing.

AN unsuspecting highbrow, had he switched on by accident to hear the "Princess of Kensington," must have been struck by the really beautiful singing of both principals and chorus. Rarely, I think, has an item of this sort had such a success.

It was flawless in every department, the B.B.C. orchestra and Bobbie Comber both contributing to the success of what I think was one of the finest comic opera broadcasts I've ever listened to.

* * *

Other recent efforts have not been so apt. "The Captain of Köpenick," for instance, didn't quite come up to expectations. This wasn't the fault of the "persons represented," however. They spoke their lines perfectly, and Wilhelm Voigt (Lawrence Hanray) kindly obliged by having a voice unlike anyone else's. One always knew when he was speaking.

But one peculiarity struck me. Why was it that certain members of the cast exploited a Germanised English accent, while others, especially Wilhelm Voigt, didn't? It was a curious mixture of Teutonic and plain unvarnished English. What was the point of this mixture?

In an essentially German play like this, I can quite see the argument for a German-English accent provided *all* the actors speak it. On the other hand, I can quite see that a general use of pure English would not be amiss, but any compromise must be a mistake.

The play was neither German nor English as a result. And the whole spirit of the play was that it was a dramatic Chronicle of a Historic *Prussian* Hoax.

The adapting, too, wasn't as clear as usual. The hoax was too long coming off. I began to despair of it's ever coming off at all.

It did come off eventually, and from the moment it began to take shape right to the fall of the curtain, the story held us. There was much to commend in the play, in spite of these defects.

* * *

I wish Henry Hall would always keep to its old-style arrangement when he plays an old-time song. His programme of popular numbers of the last dozen years was spoilt because by giving them, or some of them, an up-to-date arrangement, they ceased to be old-time songs.

His "Tea for Two," for instance, was only just recognisable, and, incidentally, not a patch on his old "Tea for Two." "Horsey, Keep Your Tail Up," on the other hand, played as it was originally played, was more acceptable as an old favourite, because it brought back memories, which a modernised old favourite couldn't possibly do.

Surely the point of a programme of old-time songs is that it recalls the past. If it doesn't (or can't), then such a programme is no more significant than an ordinary programme of dance music.

One fact that was brought home to me by this programme of old-time favourites was that the development of the cheerful, simple tunes of the early twenties into something that sometimes beggars description is a cause for regret.

* * *

Mr. J. B. Priestley (holding on tight to his manuscript this time) found Miss Bondfield an aggressive opponent in their discussion on Alcohol. It would seem that stanneh teetotallers haven't wavered a jot in their allegiance to their cause in spite of the fiasco of Prohibition in America.

Mr. Priestley dealt devastatingly with the point always put forward by teetotallers—the cruel waste of money annually on alcoholic drinks. Will the point ever be raised again, I wonder?

Miss Bondfield ignored it; she had no other alternative; and the fade-out, which occurred almost immediately, rescued her from a very uncomfortable position. It was typical of the debate as a whole that Miss Bondfield should have the last word. She died fighting.

For all that Miss Bondfield scored over her opponent, as a broadcaster. Mr. Priestley hasn't a pleasing broadcasting voice. From this point of view I think

(*Continued on page* 1392.)

Capt. ECKERSLEY'S QUERY CORNER

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

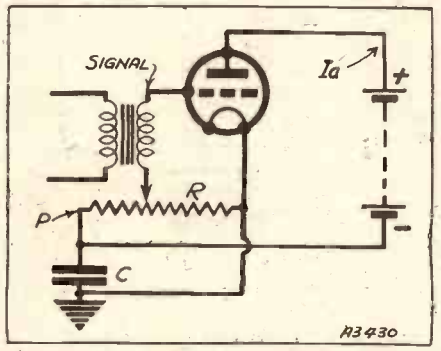
AUTOMATIC GRID BIAS.

A. C. G. (Cardiff).—"I understand that by incorporating a resistance between H.T.— and L.T.— it is possible to obtain automatic grid bias, and thus discard the battery.

"Would you like to explain whether this system is satisfactory, and how the value of the resistance can be calculated?"

Here you have a circuit showing automatic grid bias in principle. A current Ia flows through the valve. A little consideration shows that the point P is more negative than earth, i.e. than filament, and so, in the *static state* if you increase the current

ELIMINATING THE BATTERY



Inclusion of a resistance in the H.T. negative lead enables grid bias to be obtained without a battery.

by any means the negative on the grid increases and the current will not increase.

Thus, *if it were not for C*, a signal varying the grid potential would not vary the anode current, and no amplification could take place. But if the signal variations are rapid and C is large enough the point P does *not* vary in potential, a steady negative bias is applied to the grid, but the signal voltage on the grid varies.

It is as if you had a steady negative grid bias, provided always C is a big condenser which prevents the current variations in R from varying, suddenly, the grid bias.

A VALVE GUIDE.

A. T. (Tavistock).—"I notice that valve makers often give figures such as impedance, amplification factor and mutual conductance, in respect of the various valves they list.

"Can these figures be used as a guide to the suitability of the valves for the different positions in a set? If so, how does one read them?"

It seems to me that you want me to write an article on the whole theory of valve amplification, and space is somewhat limited. Without going into the reasons at all, the following is a very rough sort of guide.

If you have a valve impedance equal to Z ohms, then it is necessary to have an anode impedance which has an effective value at all frequencies something like two or three times the valve impedance. This is not so important where you have screen-grid valves. The amplification factor is a number, but it has two meanings. (a) It can be a figure which when multiplied by the input volts between grid and filament gives the maximum possible theoretical voltage which would be obtained from the anode of the valve. It is never theoretically possible to obtain the amplification factor of the valve, and so we should also think of another amplification factor (b), which is the maximum possible practical amplification obtainable in a valve. The actual formula is to divide the impedance of the anode by the sum of the impedance of the valve and the anode impedance, and multiply this by the theoretical amplification factor and the grid volts, when you will get the anode volts.

Mutual conductance of a valve is in a way bound up with the amplification factor and is usually expressed as the current change through the valve without anode impedance for a given change of grid volts.

CURE FOR MOTOR-BOATING.

A. C. T. (Chelsea).—"I understand that true motor-boating can only occur when the low-frequency amplifier is capable of responding to frequencies below 50 cycles. If this is so, I take it that a set could be made proof against this trouble by arranging matters so that no amplification occurred at frequencies below the limiting figure.

"Of course, this would not remedy L.F. oscillation at other frequencies, would it?"

I think perhaps the generality that you have made is a little bit misleading. What you have really said is that you understand that if a receiver will not amplify at the motor-boating frequencies it will not motor-boat, which is, of course, true.

It is true to say that the motor-boating of an amplifier is more liable to take place if that amplifier efficiently amplifies lower frequencies. The essence of the thing could, I think, be put a little more clearly. Why does motor-boating occur? It occurs because there is a common coupling between the stages of amplification. That common coupling must have impedance. This impedance is less in common practice the higher the frequency. Therefore, the reactive effects take place at low frequency. If the amplifier was made unresponsive at low frequencies in terms of the common impedance, then it does not motor-boat. Therefore, taking your final sentence, if you made the amplifier inefficient at low frequencies, the tendency to motor-boat would certainly disappear but would not reappear at higher frequencies. But it would be a bad amplifier!

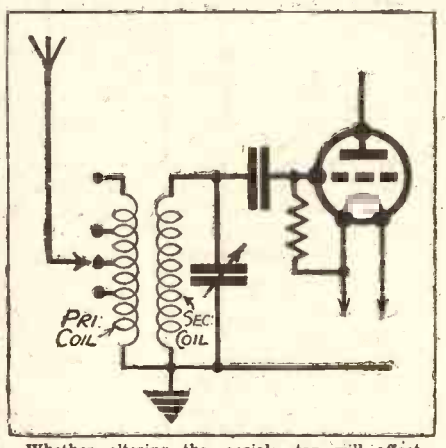
AERIAL COIL DIFFERENCES.

K. P. G. (Birmingham).—"I have recently obtained a tuning coil in which the aerial is connected to tappings on a winding which is inductively coupled to the main tuning winding.

"I find that by changing the aerial connection from one tap to another, the signal strength and selectivity is varied in inverse proportion. I quite realise this is normal, but cannot understand why the tuning dial setting is hardly altered with different tappings.

"With a similarly arranged coil of different make which I had previously, the

COUPLED INDUCTANCES



Whether altering the aerials tap will affect tuning or not depends on how closely the coils are coupled together.

tuning dial setting was considerably altered when using different tappings, although the change of selectivity and signal strength was about the same."

The "tune" of the circuit you show will be determined by the effective inductance of the coil. If the aerial coil is only loosely coupled, there will be little or no mutual inductance added to or subtracted from the inductance of the main tuning coil, and the "tune" of the circuit will be unaffected by the presence of the aerial coil.

If the aerial coil is tightly coupled there will be mutual inductance added to or subtracted from the inductance of the coil, and the "tune" of the circuit will be affected by the tightly coupled aerial coil.

MAGNAMARA

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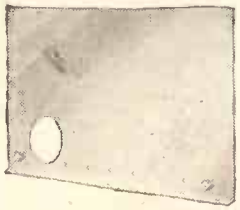
MODEL 312. In a plain oak-framed (unstained) cabinet, produced for those who desire to refit the receiver in a cabinet to their own particular tastes and requirements.
WAS **12** GNS
NOW **10** GNS.

MODEL 315. In a beautiful superbly finished solid walnut cabinet of restrained modern design.
WAS **15** GNS
NOW **11** GNS

TELSEN METAL SCREENS



Plain, was 2/- Now **1/3**

with Screen Grid hole, was 2/6 Now **1/3**

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10,000 ohms and 50,000 ohms
were 3/9 Now **3/-**

50,000 ohms with mains switch
were 5/6 Now **4/9**

TELSEN GRID LEAKS

were 1/- now **6**D

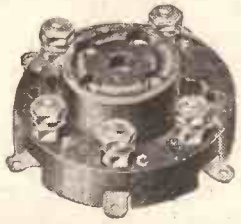
TELSEN FIXED MICA CONDENSERS

were 1/- Now **6**D

TELSEN TAG CONDENSERS

were 6D Now **4½**D

TELSEN VALVE HOLDERS



Rigid Type

4 pin, were 9D Now **6**D

5 pin, were 1/- Now **8**D

Anti-Microphonic Type

4 pin, were 1/- Now **8**D

5 pin, were 1/3 Now **10**D

Universal Type

were 1/- Now **9**D

TELSEN DIFFERENTIAL CONDENSERS

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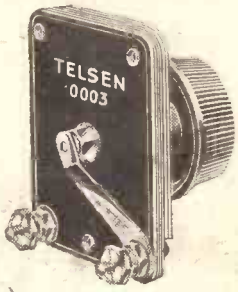

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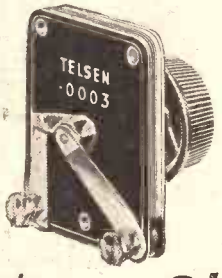

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EVER mindful of the needs of the home constructor, Messrs. Ward and Goldstone have once again produced a line which should prove of the very greatest interest to the vast army of enthusiasts who delight in "rolling their own."

It comprises a series of chassis for Goltone screened coils. These chassis enable constructors easily to build up their own screened-coil units, using the standard Goltone coils. And this is, of course, a most economical as well as interesting procedure.

A Goltone 3-coil Chassis.

The prices for the 2, 3 and 4-coil chassis are 1s. 6d., 2s. and 2s. 6d. respectively.

Each coil is fastened to the chassis by means of only two screws and these are supplied. The chassis itself can be mounted either vertically or horizontally, and underbase wiring is possible.

"SILTIT" CARTRIDGE

There is no doubt at all about the importance of a good earth; it is one of the first essentials of good reception with most receiving outfits.

And the "direct" or "buried" earth is indisputably superior to other types so long as it is efficient. In an attempt to increase the efficiency of the average home-radio buried earth, the "Siltit" Co.. of Birkenhead, have produced the "Siltit" Cartridge. This is a cartridge of chemicals which is buried close to the earth tube or plate, and is said to "impregnate the soil with high conductance metals and hygroscopic chemicals."

The compound in the cartridge is certainly hygroscopic, and as it changes its composition under the influence of moisture it rendered analysis a tricky operation.

Anyway, it appears to comprise about fifty per cent Calcium Chloride, twenty per cent copper powder, some magnesium chloride, sufficient caustic soda to render the compound alkaline and a hydrated copper oxide.

(This last may be formed by the action of the caustic soda on the copper powder.)

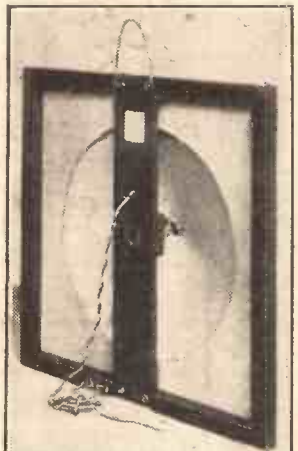
I have said that "Siltit" is hygroscopic, that is, it attracts moisture. Additionally, it does deposit metallic copper in the earth, as a simple experiment reveals. Of course, if in prolonged contact with soldered joints, copper wires, etc., it would no doubt rot them away, but it is not intended to be used so that it is in conjunction with anything but the main body of the earth tube or plate.

From all this it emerges that the claims made for "Siltit" are based on solid foundations. It retails at 1s.6d. per cartridge.

CLEARY "BASSO" LOUDSPEAKER

The lowering of moving-coil prices and their consequent widespread popularity must not make us forget that there *are* other types. For example, there is the Cleary "Basso" Loudspeaker which sells complete for eleven shillings and is, as you can probably guess, not one of these wonderful moving coils.

Yet I am not at all sure but that this "Basso" would suit many a listener much better than almost anything else. He would not expect it to work miracles, and would therefore feel reasonably elated by its clean, pleasant performance instead of the tinny mushiness he might have anticipated.



The "Basso" Loudspeaker.

I think it might be quite a good idea for "P. W." readers to make a point of asking the next radio store they enter to produce and demonstrate a "Basso"—if in stock. They will, I believe, be rather pleasantly surprised at what can be done for such a small outlay by modernised and carefully arranged "electro-magnetics."

FOR EASY SOLDERING

I have received a sample of S.M.E. from Andrew R. Findlay, of Glasgow. S.M.E. is a combination of flux and solder in the form of a paste and is sold in tubes at 7½d. each.

It is a useful material and is very easy to use. That is providing the all-important soldering rule of "clean surfaces" is not forgotten.

All that has to be done is to clean the work, and then apply a small quantity of S.M.E. When this is heated by the application of a fairly clear flame or an ordinary soldering iron, it almost immediately "runs" and fashions the necessary joint very rapidly.

The makers claim that "no soldering bolt is required. The heat can be applied in any convenient way—by match, candle, poker or blow lamp."

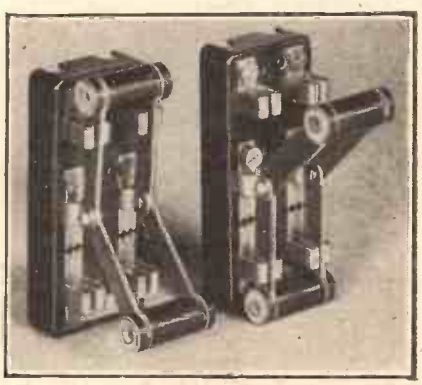
In my opinion, the unskilled user will not easily do his soldering if he takes this claim too literally. I personally tried to solder two leads together with S.M.E. and a box of matches and made rather a mess of it!

But S.M.E. and a nice hot, clean soldering iron makes soldering a delight, and in this manner I have accomplished some excellent work with a minimum of time and material.

THE W.B. KNIFE SWITCH

For good contact, negligible self-capacity and a positive, robust action a well-made knife switch stands out well above the majority of other types.

But the operation of an ordinary knife switch is clumsy. The lever has to be swung



Here you see the two positions of the W.B. Knife Switch.

right over through 180 degrees in order to affect a change-over.

Whiteley Electrical Radio Co., Ltd., have, however, removed that snag in an ingenious manner. Two levers are fitted to their W.B. Knife Switch and they are set at a wide angle so that each stands over its appropriate contacts.

The levers are actually fashioned from the one piece of metal so their positions in relation to one another are fixed. The change-over is therefore affected by a rocking motion which is easy to effect and every bit as efficient as the clumsy 180 degrees swing.

The particular W.B. Switch under review is an aerial earthing switch, and it is equipped with lightning arresters which provide constant protection even when the aerial is not earthed.

It is a well-made component and at the modest price of 1s. is really excellent value for money.

RADIO SIMPLIFIED

A PRACTICAL OUTLINE FOR BEGINNERS

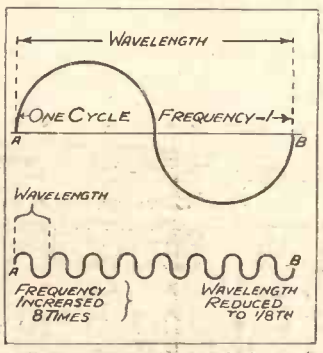
WAVELENGTH AND FREQUENCY

ONE of the sketches on this page shows a listener's aerial, with several powerful "waves" from different broadcasting stations reaching it. We know that in practice the listener will be able to listen to one station, and cut out the others, by tuning to the correct wavelength. What is this all-important **wavelength?**

We can understand it best by considering the large wave shown in the upper part of the sketch in this column.

It is not intended to represent a water-wave, though it certainly bears a superficial resemblance. But it is a wave showing how an alternating current

AN INVERSE LAW



As the frequency is increased, the wavelength is reduced.

behaves. How it rises and falls in regular sequence.

Starting at A, **current first begins to flow in a positive or above-the-line direction;** and after a moment quite a big current is flowing. But the increases do not continue, the positive (above-the-line) current flow gets less and less, until—at a point half way along the sketch—it stops, and we are back on the zero or no-current line.

A moment later **current flows again but this time in a negative or below-the-line direction.** And here, too, it soon reaches a maximum, falls off, and finally, at B, returns to its original level, where it commences to repeat the whole cycle of operations continuously, as shown in the lower curve.

If the time taken from A to B is one second, we have "a frequency of one cycle per second," or, as it would always be abbreviated, "a frequency of one." But if, as in the lower part of the sketch, 8 complete cycles are performed in the second, we have a frequency of 8. (These are unusually low frequencies. Most alternating current supplies have a frequency of 50 per second.)

Now we come to the ether waves which the alternating current in the transmitter aerial creates. And the sketch clearly shows that the total length of a wave is necessarily bound up with its frequency. **The greater the frequency the shorter the wavelength.**

If 8 waves are formed between A and B (as in the lower sketch), the wavelength is one-eighth of what it is above. And obviously the more waves (greater the frequency) the shorter is the wavelength. In fact, they are inversely proportional—double one and you halve the other.

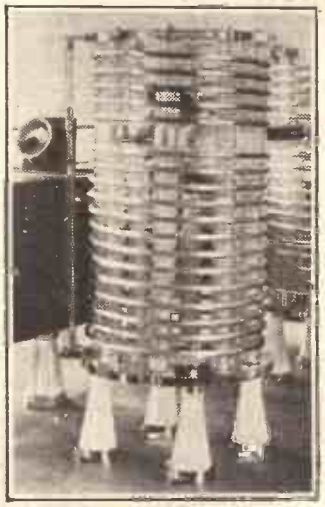
That is why in wavelength tables you will notice that the shorter the wavelength of a station the greater is its frequency.

Let us now consider the wavelength of a particular B.B.C. station—say the North Naional, which works on 301·5 metres. And let us suppose that instead of 301·5 it obligingly worked on exactly 300 metres to make things easy for us. (It could easily do so by altering its coils and condensers slightly, but "neighbouring" stations would strongly object!)

The waves it sends out are of the alternating type that we have been discussing, the type that rise and fall in regular sequence all the time. And the first fact to note is that **all wireless waves travel at the same speed, namely 186,000 miles per second.**

186,000 miles is approximately equivalent to 300,000,000 metres per second. So if North National started at 6 p.m., by one second past six his first wave would be 300,000,000 metres (186,000 miles) away!

AT THE TRANSMITTER



The coils (and condensers) determine the wavelength of the transmitter, just as they do in the receiver.

And here we come to the gist of it. Suppose North Regional puts out exactly 1,000,000 waves in that second (each on the others heels, as in our sketch), obviously each one must be exactly 300 metres long, because 1,000,000 of them stretch for a distance of 300,000,000 metres.

So we see that the frequency with which the waves are created governs the wavelength. For the sake of convenience the frequency is generally expressed in thousands of cycles (kilo-cycles).

In practice, the frequency of the radio wave depends on the tuning circuits. Large condensers across big coils mean that the currents will take appreciably longer time to oscillate back and forth in the circuit than if the coils and condensers were smaller. And the long time means the waves are formed comparatively slowly, which, as we have seen, means long wavelength. And so we see large coils and capacities used for long waves.

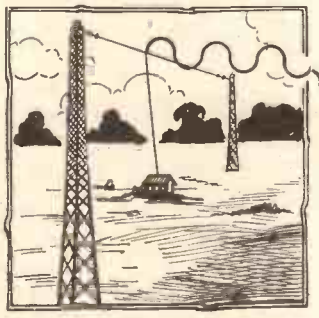
For very short waves (or high frequencies) on the other hand, we have very small coils—just 3 or 4 turns perhaps, round which the oscillations occur at enormous speeds. And so we get on short wavelengths, as used by amateurs, such enormous frequencies as 10,000,000 cycles per second (i.e. 10,000 kilocycles), which represents a wavelength of 30 metres.

While on ultra short waves of 1 metre we must deal with a frequency of 300,000,000 cycles per second, a staggering figure as compared with the 50 per-second alternations of the ordinary A.C. we use for lighting.

At the receiving end we can choose different wavelengths by altering the tuning of the receiving circuits. These circuits will always respond vigorously only to the exact wavelength to which they are adjusted.

So if we adjust them first to one wavelength and then to another, they will respond accordingly. And first the one station will be heard, and then the other, as we change the receiver's tuning to match the different transmitters.

And thus the selection of one transmission in favour of the others occurs. Many waves are present simultaneously in the aerial, but the receiver can only respond properly to one at a time—the one to which it is tuned.



WAVES TRANSMITTED FROM LOCAL STATION.

Special Beginners' Supplement. Page 2.

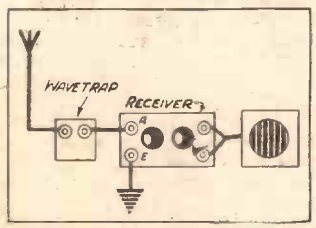
WAVETRAPS

ALL listeners who live within a dozen miles or so of a big radio station will have realised that if their set is to pick up foreign programmes the local programme may need to be "trapped."

For however much more sensitive their set is made, in order to get the foreigners, it is necessarily going to pick up that local station still better! And, failing a splendidly selective and up-to-date set, there are many attractions in the idea of a "wavetrap" for removing the too-loud local programme in order to listen for foreigners.

The most effective way of shutting out a nearby local station on a simple set is with a wavetrap or rejector, several forms of which are described on this page.

WHERE IT COMES



The wavetrap is interposed in the aerial lead to the set.

All the methods evolved depend on providing a separate circuit, consisting of coil(s) and condenser(s), tuned exactly to the local station's wavelength. Being precisely suited to it, such a circuit tends to "intercept" the programme, which then spends most of its energy in this spare or trap circuit, leaving the set comparatively free.

The essence of "trapping" is to use first-class components, good wiring, of low resistance, etc., so as to encourage the trapping action. And the success with which this is done, and the degree to which the trap is connected or "coupled" to the set, will govern the results obtainable from the wavetrap.

Any good tuning condenser and any good coil of size to tune to the wavelength in question can be used. And the one shown below, wound on a 3½-inch former, illustrates how a very successful home-made trap circuit is connected.

The primary of 12 turns, wound over the main coil, may be insufficient or a little too much (depending on the aerial, distance from station, etc.), so this number of turns should be taken only as a guide, the final size of winding being determined by experiment.

Quite simple apparatus can be used for a wavetrap; and one sketch shows a plug-in coil, with "pre-set" type condenser to tune it, the whole being connected direct into the aerial lead without a separate coupling coil.

Such a simple arrangement is nothing like so satisfactory as the large, home-made coil with separate aerial winding, but it is quite effective in mild cases where the local station's "spread" over the tuning dial is not very large.

Instead of adjusting coil size for different degrees of aerial coupling, condensers may be used on the famous "Brookmans Rejector" principle. One dual version of this for trapping two local stations (*e.g.* a Regional and a National) is shown in schematic form on this page.

ALWAYS—

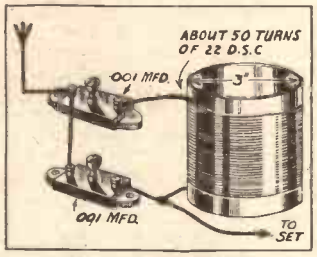
Use good quality components for making a wavetrap.

* * *

Always see that its terminals are screwed down tightly.

* * *

Take particular care with the first "setting."



A REJECTOR

The simplest form of the popular Brookmans rejector.

NEVER—

Place the trap's coil too close to the set's coil.

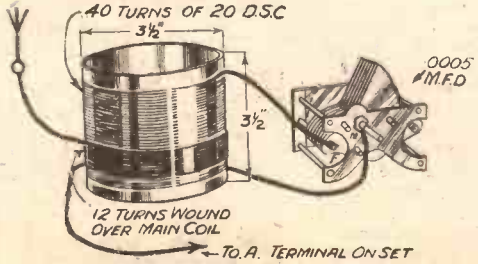
* * *

Never allow the switch contacts (if used) to become dirty.

* * *

Never adjust the trap's tuning hastily.

SUITABLE COIL DETAILS



Many constructors will have the necessary parts and materials on hand for making this wavetrap.

In this dual design either one or both traps can be worked or cut out at will, an on-off switch wired to each coil bringing it into circuit only when the switch is in the "push" position. Or with both switches pulled out the whole "Brookmans Rejector" is out of circuit.

The method of "setting" the instrument is quite straightforward. If the Regional programme is found to be too loud and preventing the reception of some station on an adjacent wavelength, and the complete wavetrap is joined up in the aerial circuit, the set's tuning should first be arranged to bring in the Regional programme as strongly as possible.

The switch (lower) which is wired across the 50-turn coil is then "opened," and the ·0005-mfd. condenser is adjusted to about its half-way position.

Now slowly turn the adjusting knob of the ·00075-mfd. condenser (the one to which the aerial is joined) until the adjustment is reached which suddenly cuts down the Regional programme to a whisper. **You will find you can bring it back when desired merely by operating the adjacent switch.**

The 60-turn coil and other switch and condenser will look after the National or other lower-wavelength interfering station in the same way, but in this case there is only the one tuning condenser (·00075 mfd.) to adjust. **The success of the trapping action will depend to some extent upon the choice of the best tapping point on the X coil, in the latter case, and on the correct mid-way setting of the ·0005-mfd. variable condenser in the case of the Regional programme.**

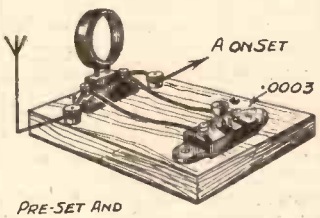
It will be found that the two adjustable condensers to which the aerial wire goes are to some extent interdependent, and the re-setting of one will have to be compensated for on the other.

Various adjustments of the ·0005 mfd. can be tried, each re-arrangement calling for the re-setting of the adjacent ·00075 mfd. until a perfectly satisfactory trapping action is achieved. When once these preliminary settings have been decided the only operation that is called for is to switch on or off either circuit, as required.

A simpler form of "Brookmans Rejector," for removing only one instead of two programmes, is also shown; and, if desired, an on-off switch may be wired across its coil also, to bring the trap instantaneously in or out of action.

Although up to now we have dealt chiefly with the good points of the wavetrap, it must not be forgotten that there are several disadvantages commonly experienced with even the better types.

VERY SIMPLE



PRE-SET AND PLUG IN COIL ON BASE

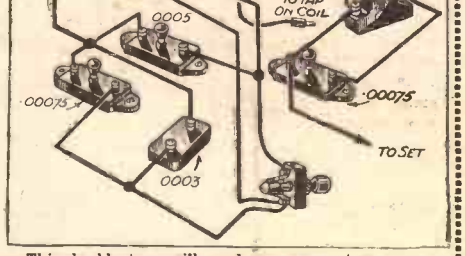
For mild cases of interference a coil and condenser can be connected as shown.

Probably the worst defect is that, although the wavetrap is supposed to intercept only that station to which it is tuned, it nevertheless does weaken the reception of stations on neighbouring wavelengths to some extent.

Moreover, any re-adjustment or alteration to the wavetrap is liable to affect the condenser-readings of the main set. This may lead to confusion in the identification of foreign stations — the very thing which the wavetrap is supposed to assist. And another drawback is that wavetraps are seldom any use on long waves.

Remember, too, that wave-trap coils need to be well-spaced from other coils in the set.

FOR LOCAL REGIONALS



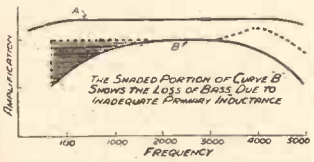
This double trap will work on one or two transmissions at once, and is provided with switches to cut out the trapping of either at will.

LOW FREQUENCY COUPLING

LAST week we dealt with the principle of the L.F. transformer, and described how the impulses in the primary circuit were transmitted to the secondary, appearing in amplified form across the secondary winding.

The design of an L.F. transformer is a highly complicated

GOOD AND BAD



The curve A shows the response of a good transformer at various frequencies, and B that of a bad one.

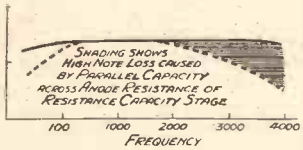
business, and many are the factors that have to be taken into consideration in proportioning the turns ratio, method of winding, and the type and size of the core.

Transformer cores are laminated, that is to say, they are made up of a number of stampings, and not just one solid piece of metal. The stampings are normally insulated from each other by some method, such as a coating of varnish, a layer of thin paper, etc.

By adopting this method of construction, the losses in the core are reduced to a minimum and a transformer with a laminated core has a much higher efficiency than if the core were solid.

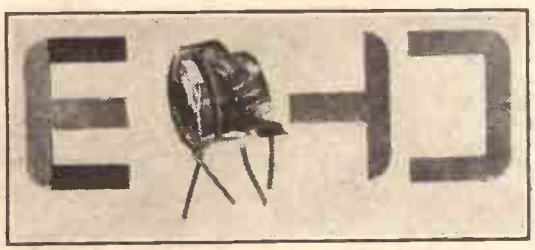
In passing we may mention that transformer cores are sometimes the cause of mystifying

DUE TO CAPACITY



It is very important with resistance capacity amplification to avoid stray capacities.

effects; occasionally it is possible to hear faint broadcasting even when the loudspeaker is disconnected from the set. This phenomenon is due to the mechanical vibration of the core



The core laminations, in two shapes, are fitted from either side of the bobbin

laminations when the set is working, these vibrations being in exact sympathy with the impulses passing through the transformer windings. The effect only occurs when the core laminations are slightly loose, such as for instance might be the case if the nuts on the bolts holding the core together required tightening.

Now we said in the last article, that it was essential for a transformer to have a primary winding of high inductance. This very fact makes the task of the transformer designer a difficult one. A high inductance means a large number of turns of wire, and if N is the step-up ratio, then

In this transformer the laminations are held together by the bolts at the corners of the instrument.

for every primary turn, there are N turns on the secondary.

For example, supposing the primary has 10,000 turns and the ratio is 1 : 3, then the secondary would have 30,000 turns.

This brings us to the question of capacity. It is unfortunately impossible to wind insulated wire on a former or a bobbin without the adjacent turns acting as very small condensers. All these little capacities when added together are equivalent to a small condenser across the secondary winding.

Various methods are employed with a view to keeping the capacity as low as possible, but however good the design, a certain amount of capacity must always exist even though it is reduced to a very small magnitude, and added to this there is also the capacity due to the valve itself.

We have drawn two curves in an attempt to show graphically how the two factors—inductance and capacity—affect the response given by the transformer.

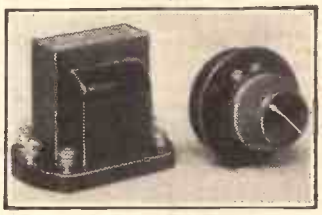
Along the base horizontally are various musical frequencies, and the vertical scale represents the amplification given by the transformer. (No specific units are used here, since the curves are purely explanatory, and do not depict any particular transformer.)

Curve A is a very good one, and it will be seen that the amplification drops off a little just below 100 cycles, and again at about 4,500 cycles. This loss of amplification is, however, slight and would not be audible in practice.

Curve B is that of a bad transformer; the shaded portion shows how the amplification of frequencies below 2,000 falls away, thus giving a very poor reproduction of the bass notes, due to insufficient primary inductance. Turning to the other portion of the curve, we see that at 4,000 cycles the amplification is rapidly dropping away as the frequency gets higher. This is caused by the capacity of the secondary winding plus that of the valve, the condenser so formed acting as a by-pass to the higher musical frequencies.

We would point out at this stage that the impedance or "resistance" of a condenser

TONE ADJUSTMENT



By means of a potentiometer tone can be controlled with some transformers.

to varying impulses gets less as the frequency becomes greater. Hence the by-passing effect of the capacity is more marked at 5,000 cycles than at 4,000.

You will also notice a dotted curve, which upon examination reveals the fact that the amplification gradually increases from 3–4,000 cycles, and then decreases. This effect is caused by leakage inductance, which is the inductance associated with the magnetic lines of force that do not link with the primary and secondary turns.

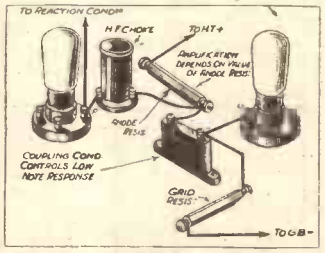
Leakage inductance may delay the loss and actually produce a temporary increase of amplification of the higher frequencies. On the other hand it may, in certain circumstances, be detrimental to reproduction.

Transformer coupling is undoubtedly the most popular method of L.F. amplification, but resistance-capacity coupling is often employed in conjunction with transformer coupling when two L.F. stages are employed. The scheme consists of a resistance connected between the high-tension supply, and the anode of a valve, which in a two-stage amplifier is usually the detector.

L.F. impulses in the anode circuit of this valve produce varying voltages across the anode resistance, and these are transferred to the grid of the following valve via a coupling condenser with grid resistance.

The coupling condenser allows the L.F. impulses to pass, but

CONTROLLING BASS



The value of the coupling condenser is an important factor in control of low-note response.

acts as a barrier to any H.T. that would otherwise take this route.

The size of the coupling condenser must be chosen with due regard to the value of the grid resistance, and the reproduction of the low notes is dependent upon the correct proportioning of the condenser and grid resistance values.

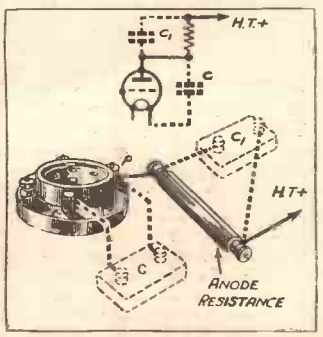
For example, a common value for the grid resistance is ·5 megohm, and for the coupling condenser ·01-mfd. This combination gives a degree of amplification at 50 cycles equal to about ninety per cent of the total, or in other words a ten per cent loss at this frequeney.

By doubling the grid resistance value the coupling condenser could be reduced to approximately ·007-mfd. and the same bass response achieved.

The choice of values is, however, by no means as simple as it appears at first sight, and various other factors have to be considered.

For instance, stray capacities across the anode resistance all tend to reduce the amplification of the high notes.

LOSS OF TOP



Capacity in the positions shown will cause loss of high-notes in R.C. coupling.

Special Beginners' Supplement. Page 4.

H.T. FROM THE MAINS

BEFORE constructing or purchasing an H.T. mains unit it is necessary to know how much current will be required by the anodes of the valves.

This will depend upon the number of valves used and their types. For example, the set may have one S.G. stage, a detector and one or two low-frequency valves.

Perhaps the output valve is a super-power, in which case it will take more anode current than a valve of the small-power type. As an instance of this, if you look up the P.M.2A. and P.M.202 valves in the Mullard Company's catalogue you will find that at 150 volts H.T. the former consumes approximately 8 milliamps, and the latter 14 milliamps. Both of these figures are based on the assumption that the appropriate grid-bias values are applied.

So whereas one three-valve set may consume a total of, say, 15 milliamps, another may need 20 milliamps.

Hence, in choosing a mains unit we must first of all obtain advice regarding the current output necessary, or alternatively look up the valve-maker's list and see what the anode currents are for the particular types we are using.

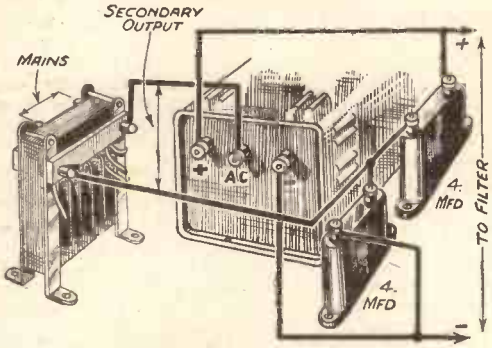
Having arrived at approximate figures, we are then in a position to choose a suitable unit.

In the case of commercial mains units a perusal of the maker's catalogue will reveal the fact that the current available from each tapping is usually given to simplify the purchaser's task in making a choice.

To quote actual figures, a well-known manufacturer gives the following outputs for one of the units in his range: 70—80 volts at up to 1½ m/a for the screening grid, 50—80 volts at up to 3 m/a, and 120 volts at 21 m/a or 150 volts at 11 m/a

From the current output given by these three tappings we immediately know that this particular model is capable of running a set with an S.G. valve, a detector, and one or two L.F. valves, and that a super-power valve can be used in the output stage provided we are content with between 120 and 150 volts on the anode.

VOLTAGE DOUBLING SCHEME



One plain secondary winding only is required with this full-wave dry rectifier.

Those who prefer to make their own units can readily do so by choosing one of those which are described from time to time in POPULAR WIRELESS.

The valve rectifier and the metal rectifier both have their adherents, and each is capable of satisfactorily supplying the required rectified output.

On this page are pictorial diagrams of the connections for both valve and metal rectifiers.

The valve connections are those for a full-wave rectifier and it will be observed that the mains transformer has two separate secondary windings. Each of these is centre-tapped.

The H.T. secondary might have a voltage rating of 250—0—250, i.e., 250 volts between either end of the secondary and the centre tapping, or 500 across the whole winding.

The filament winding is joined to the filament terminals of the rectifier valve holder, and might be rated at 2—0—2 volts (a total of 4 volts across the whole winding).

The actual voltages across these windings will depend upon the rectifier valve chosen, and those given above are suitable for a valve of the Mullard D.W.2 type. This valve has a maximum rectified output of 60 m/a at 250 volts.

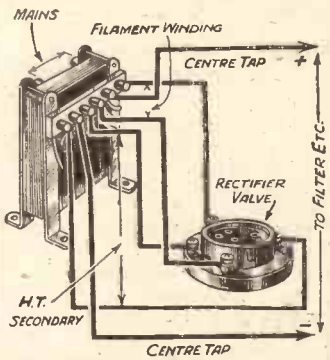
Another diagram shows the Westinghouse voltage doubler scheme, which virtually consists of two half-wave rectifiers each operating on opposite half cycles.

One terminal of the mains transformer secondary is joined to the centre terminal on the rectifier, and the remaining secondary terminal is connected to the junction of two large condensers in series.

Only one secondary winding is needed, and the construction of the mains transformer therefore differs from the type used with a valve rectifier.

With the voltage doubler system the transformer secondary voltage can be lower than the output voltage from the rectifier. The Westinghouse style H.T.5 rectifier, for instance, requires a transformer secondary voltage of 80 and gives a current of 60 milliamps.

FULL-WAVE RECTIFIER



Two centre-tapped secondary windings are needed with a full-wave rectifier valve.

The smoothed output from the rectifier is 120 volts at 20 milliamps.

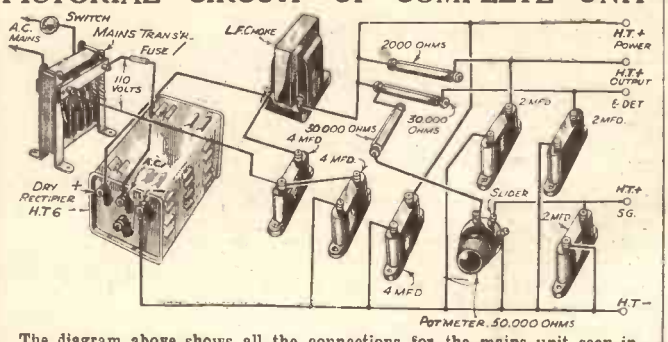
It is impossible to show the complete circuit arrangements for both H.T. units utilising valve and metal rectifiers, so we have chosen as an example a mains unit described in the January 21st issue of this journal.

This will serve to illustrate the smoothing circuit and the method of breaking down the voltages to suit the valves.

If a valve rectifier were employed in place of the metal type, instead of the two 4-mfd. condensers in series there would be a single 4-mfd. condenser joined between + and — on the rectifier side of the L.F. choke.

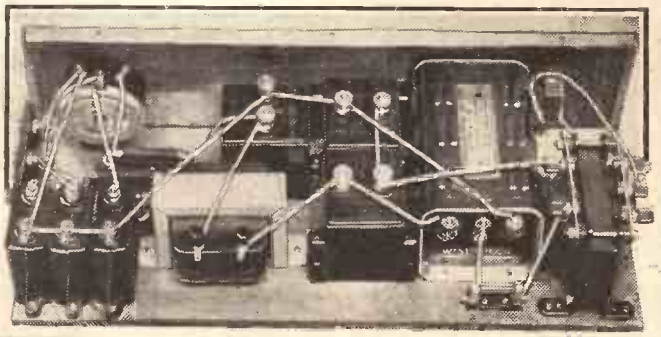
From this point the rest of the circuit would be the same, although the resistance values might be different, depending upon the voltage output of the rectifier.

PICTORIAL CIRCUIT OF COMPLETE UNIT



The diagram above shows all the connections for the mains unit seen in complete form in the photo to the right.

HOW IT LOOKS IN PRACTICAL FORM



NEXT WEEK:

Wiring Loudspeakers. Looking after the L.T. More about Low-Frequency. Power from the Mains.

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SNIPS

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AIRSPRITE 4

Described in this weeks issue.

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1 Peto-Scott Table Model Oak Cabinet	17	6
1 Peto-Scott Ready Drilled Panel, 18 x 7 in.	5	6
1 Peto-Scott Baseboard 18 x 10 in.	1	3
1 Polar Star 3-gang ·0005-mfd. condenser with disc-drive	1 10	6
1 Set of Telsen Triple-matched Coils (W.288)	1 8	6
1 Telsen Audioformer Compensating Transformer	11	6
1 Set of Specified Valves	2 8	9

PILOT AUTHOR KITS—Exact to Specification

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3 valves £1:12:3. Peto-Scott Cabinet 15/-

AIRSPRITE A.C. MODEL KIT "A"

Author's Kit of Specified Parts including **FREE BLUE PRINT**, ready-drilled panel and terminal strips, but less valves and cabinet.

Cash or C.O.D. Carriage Paid.

£9:15:0

or 12 monthly payments of 18/-.

KIT "B." As Kit "A" but with valves less cabinet. Cash or C.O.D. **£12:15:0** or 12 monthly payments of 23/4.

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SEE PAGE 1271, POPULAR WIRELESS, FEB. 18

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RADIOGRAM REMINDERS

Some interesting details for radio-gramophone and pick-up users.

THE history of a popular recording artiste is usually interesting, but that of Marek Weber is particularly so. He is one of the most famous H.M.V. orchestral leaders, and though he has made large numbers of records for this country he had never been over here until recently.

It was in 1927 that the first H.M.V Marek Weber record was made, subsequent to a hearing by the recording manager of a German record of one of Strauss' waltzes played by Weber's orchestra.

After two years Weber's records were selling more in England than Germany where he was already well known and appreciated.

In Germany Marek Weber has three orchestras, the largest comprising forty players, and Marek Weber pays £20,000 a year in income tax in Germany alone, apart from the English tax or royalties he receives for H.M.V. recordings. It is indicative of the excellence of his orchestras that the widow of Strauss stays each year at the Eden and Bristol Hotels in Berlin solely to hear Weber play her late husband's waltzes with his orchestra of fifteen or so instrumentalists.

Recently he arranged to broadcast from Broadcasting House, the first time he has been largely heard other than on discs in this country.

BETTER PICK-UP REPRODUCTION.

The question of tone correction for radio-gramophones is one that has received considerable attention. There can be no hard and fast rule of correction, for not only do records and loudspeakers vary in the emphasis or otherwise they give to high or low notes, but pick-ups are by no means standard in their characteristics.

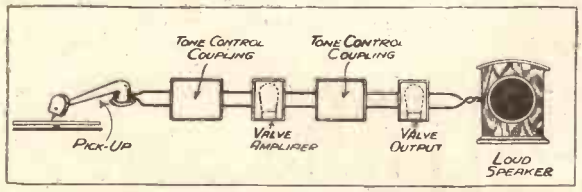
Consequently if I were to say to you: You need such and such a filter circuit to prevent too much high-note reproduction with your pick-up, and this or that device to bring the bass up to standard, I should be badly off the track in ninety-nine cases out of a hundred.

The only way to cover everybody's needs is to make such control variable, and one of the best ways of doing this is by the Multitone transformer. This enables variable tone control to be carried out unusually well, and I find that with two of these transformers—one between the pick-up and the amplifier, and the other in the set—one can do almost anything.

One can "raise either end" of the musical scale, depressing the middle, or raise the middle and depress either end—a valuable thing in some cases where the pick-up booms and peaks at both bottom and top frequencies.

A small unit for use between the pick-up and the set—just the transformer and its associated potentiometer control, with four terminals—is easily constructed, and the results it gives are very gratifying.

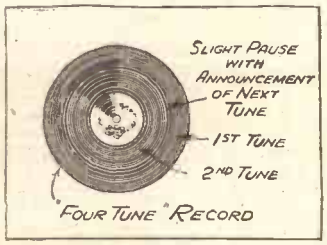
"UP" AND "DOWN" TOGETHER



A method of double tone control that is very useful.

FOUR IN ONE

How the new Broadcast Four-Tune record is played. The third and fourth tunes are, of course, recorded on the other side of the disc.



"UNDERNEATH THE ARCHES."

Flanagan and Allen, the comedians, are bewildered because the public will regard them as singers, when they themselves know only too well they have no singing voices.

Bud Flanagan told the story recently at the Columbia gramophone studios at St. John's Wood.

"We are not singers and never claimed to be," he said. "It's all a mistake, and I don't know where it will land us. Allen and I are comedians—Oi! —we aim to make people laugh. But when we've done that and start to sing, they take us seriously, and if we're not careful we shall be regarded as fine singers. This is how it happened.

"We always finish our comic act with a little chorus, and I wrote 'Underneath the Arches' as a scena to close our 'broken-down swell' act.

"To our surprise, it always took encores and the public got so excited about it that I had to write some verses round the chorus, and have it published. That's how 'Underneath the Arches' was born—it was never intended to be anything more than a chorus, but the public thought otherwise.

"Then I wrote 'Dreaming' and 'Wanderer,' also as choruses for our acts. And the same thing happened. The public insisted on having some verses added to them. And they want us to sing, all the time. But we're not singers; we're comedians.

"Now the public's proved too strong for us, and here we are, making our first complete singing record. We don't want to, but what else can we do? I've just written two more songs—verses and all this time—'Can't We Meet Again?' (and Let's Be Sweethearts)' and 'Do You Recall?'" And we're going to sing them ourselves.

"What the result may be, I can't imagine," Bud Flanagan added. "But I'm so certain that we are not meant to shine as singers that we're going to put some funny stuff in the records between the verses. If the public likes to think we're singers, they've got to be reminded that we are funny men first of all. We're not going to break up our act because the public seems to think we should aim for Covent Garden—the opera house, I mean."

And Flanagan and Allen turned to the microphone to satisfy—or disillusion—that exacting public which will insist upon hearing them as singers.

FOUR IN ONE.

Have you tried any of the new Broadcast "Four-Tune" records yet? They are quite a departure from the usual practice of the makers of this well-known record, though four-tune records by Sterno have been on the market some time.

The Broadcast "Four-Tune" disc gives about 10 minutes of entertainment, each of the sections being roughly the same in playing length as an ordinary 10 in. record. The size of the disc is about 11 in., and the long playing is obtained by running the grooves at a finer pitch (closer together), though this is done without noticeable loss of quality, except perhaps on the innermost grooves.

Very good numbers were chosen for the first couple to be released, including "Please," "Lying in the Hay," "Old Mother Hubbard," "I don't want to go to Bed," and "My Romance."

These were followed in the second issue by still further popular items, including, "Puss, Puss, Puss."

As the records play so long, I rather favour the use of "talkie" needles or some other long playing hard needle. The ordinary steel needle wears down rather badly before a side is finished, for it must be remembered that the grooves are narrower than is the case with ordinary records, and therefore the more rapid-flattening of the needle becomes noticeable.

HAVE YOU HEARD THESE?

"In Old Siberia" . . . . . *H.M.V. B4362*
GRACIE FIELDS.

"The Clock and the Dresden China Figure" . . . . . *H.M.V. B4351*
JACK SIMPSON (Xylophone)

"A Message to the Empire" *H.M.V. R.B.S.4359*
H.M. THE KING.

"Lying in the Hay" . . . . *H.M.V. B6306*
RAY NOBLE AND HIS ORCHESTRA.

"Love Songs" (Waltz) . . *H.M.V. C2339*
VIENNA PHILHARMONIC ORCHESTRA.

"Lucy Long" . . . . . *Col. DB1017*
MALCOLM MCEACHERN ("JETSAM").

"Song Carnival of 1932 Stars" *Col. DX432*
DEBROY SOMERS & CO.

"Classical Fragments" . . *Col. DX434*
CINEMA ORGAN.

"Black Laughter" . . *Regal-Zono MR796*
COLE BROTHERS.

"Try a Little Tenderness" *Regal-Zono MR801*
AMBROSE AND HIS BAND.

AN INTERESTING GADGET.

I have just had brought to my notice a small component for users of quiescent push-pull sets, that may interest my readers. It is a unit for tone controlling the pentode output of the set, and consists of a panel mounting moulding with a switch and two terminals.

In use it connects a resistance of 20,000 ohms in series with a ·005-mfd. condenser across the output of the push-pull valves. This has the result of reducing the high notes to a certain agreeable extent. On moving the switch to the second position the resistance is changed to 5,000 ohms, thus further reducing the high notes.

It is claimed that the latter setting is suitable for pick-up work when the high-note prominence is likely to be more than when radio is being received, and it can be used as a heterodyne reducer when interference is experienced. Normally for radio the 20,000-ohms position is used. Made by Ward and Goldstone, Ltd., the gadget costs five shillings.

BROADCASTING—THE NEXT TEN YEARS

By OUR SPECIAL COMMISSIONER.

This thoughtful and illuminative summary of B.B.C. tendencies deals with the important aspects of

GENERAL ENTERTAINMENT AND RADIO DRAMA

BROADCAST drama in the next ten years is a case of *quo vadis?* In the past ten years the B.B.C. has not made up its mind whether to strike out on an entirely new line, imitate the stage, or effect a compromise.

For this indecision I do not blame the B.B.C. Their attitude so far is perfectly understandable. They have had to feel their way in a welter of divided counsels. But the period of experiment and reflection should be over soon. Tentative effort, necessarily amateurish, must give way to a positive policy carried out with vigour and confidence.

The Issue of Distinctive Drama.

What then is the main issue? Simply this. Is there to be a distinctive radio drama or not?

If there is, and I for one hope that the B.B.C. makes up its mind that there should be and can be, then there must be radio repertory, and mystery. The exposition of the visual side of radio drama must stop; listeners must be given the glamour of a new form of radio representation, which is quite possible, once policy is determined in the right direction.

Let us predict therefore that, for its main part, radio drama in the next ten years will go forward on distinctive lines, employing not only a goodly number of competent artistes (on the same sort of contractual basis as is applied to the members of the orchestras), but also giving decent livelihoods to writers and composers specialising in this new form of dramatic art. So far so good.

A New Factor.

But there has to be reckoned with a new factor, namely television, which within ten years is practically certain to become at least a service necessary to broadcasting.

There has been much too much loose talk about television, and its possibilities. Assuming for the moment that television does reach the stage of general use, and that receivers of vision are generally procurable and tolerably efficient, this does not mean that broadcasting is to be revolutionised as was the screen when the voice joined it in the talkies. On the contrary, most that is distinctive and best in broadcasting will remain so only as long as it is not vitiated by the intervention of television, however efficient.

There is, of course, a legitimate place for television in the distribution of broadcast signals. I can imagine being glad to be able to see the faces and possibly the expressions of eminent speakers as they broadcast from talks studios; also, of course, I would like to see, even with a flicker, a recognisable image of the finish of the Derby or the Boat Race.

But I have no ambition to see the B.B.C. Orchestra, whether they are conducted by Dr. Boult or Stravinsky. Nor, indeed, do I want to be put off my listening mood by being disturbed by the maladroit appearances of playwrights trying to straighten out a muddle in radio dramas of their creation.

Vaudeville, too, has its problems. There is still an element of uncertainty as to the way it will go on the "mike."

Apparently, my friend Roger Eckersley, in his advocacy of the use of the concert studio for vaudeville performances with audiences, is inclining to the view that it is better for the B.B.C. to get into step with the ordinary vaudeville and music-hall practice rather than to venture on a new line of country. And in this I agree with him, if only for the reason that I do not believe the B.B.C. could ever afford to maintain repertory vaudeville, even if it were agreed that such a course were sound.

General Conclusions.

Moreover, there is the point that vaudeville by its nature requires more change than any other form of the art of entertainment. So we shall see broadcast vaudeville developing as a definite partner of the music-hall during the next ten years.

So far as general entertainment services are concerned, I would say that the next ten years should see an increasing allocation to artistes' fees, as well as a more generous recognition of the work of producers. In other words, the B.B.C. on the entertainment side will be graduating into a more professional atmosphere in which no risks of amateurism can be taken with impunity.

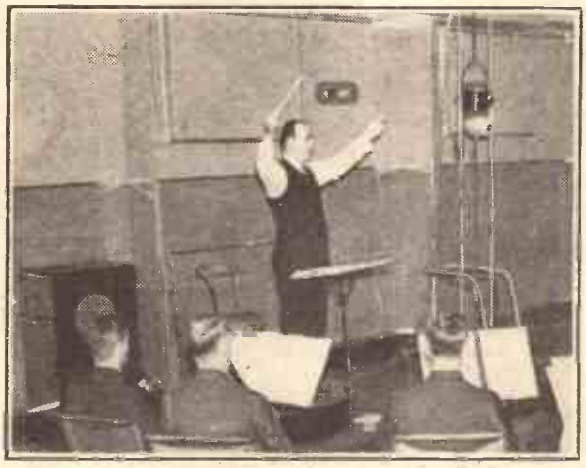
And now to turn to one's general conclusions on the whole subject: The basic problem, of course, is, will the monopoly survive? I, for one, sincerely hope it will, but I am not entirely convinced that my hope will be realised. If, however, the B.B.C. is guided in a statesmanlike fashion, so far as I can see there is no reason why the monopoly should not be perpetuated far beyond the next ten years.

What then are the elements of this statesmanlike policy? I am sure that I shall not be subject to correction in 1942 when I outline them as follows.

Topicality.

First of all, resiliency, without abandonment of principle. This means, in practice, special accommodation to changes of public opinion within the gambit of established policy. It does not mean any falling off in qualities of decision or standard; it does mean the skilful handling of current situations.

(Continued on next page.)



THE WIRELESS MILITARY BAND

under the conductorship of B. Walton O'Donnell, shown above, is one of the programme mainstays.

* * *

The scene at one of the Dramatic Control panels, below, shows a producer and his assistants

BROADCASTING A PLAY

PRACTICAL HINTS

On Vibration—Rejecting—Dial-Marking, etc.

TROUBLE WITH VIBRATION.

WHEN a loudspeaker and set are housed in a radiogram or similar cabinet, trouble is sometimes experienced due to microphonic noises caused by sound waves from the speaker causing the set and valves to vibrate.

As a precaution the back of the cabinet should be covered only with a piece of silk, a solid wooden panel being avoided. It is also helpful to stand the receiver on a sheet of sponge or Sorbo rubber which assists in absorbing vibration.

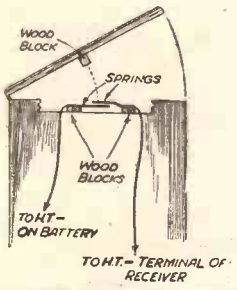
AN AUTOMATIC SAFETY DEVICE.

VERY often one is inclined to delve inside the wireless set, to change the grid-bias tapping, or a valve, for example, without troubling to disconnect the H.T. battery.

Apart from the possibility of a short by displacing a wire, there is the chance of a shock being obtained, or a valve being damaged.

All risk, however, can be easily obviated by using some form of switch, which automatically disconnects the battery from the set when the cabinet lid is lifted, or the back removed. Such an arrangement is shown in the sketch. This can be extended to practically any type of cabinet, of course.

When the lid is down the two springs are pressed together by the small block of wood screwed on the cabinet lid.



IT DISCONNECTS THE BATTERY

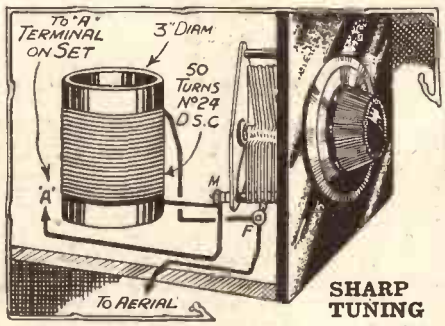
One spring is connected to the H.T. negative lead from the battery, and the other to the normal H.T. negative terminal of the set, thus the circuit is complete only when the lid is down.

REGIONAL REJECTOR.

ONE of the most difficult problems in the vicinity of powerful Regional stations is that of preventing interference when receiving a distant transmission.

In fact, in some instances the "twin" locals may actually tend to interfere with each other.

A rejector is often of assistance in eliminating or materially reducing the trouble, and one satisfactory type consists of a coil of 50 turns of No. 24 D.S.C. wire wound on a 3-in. diameter former. A ·0005-mfd. variable condenser is joined across the two ends of the coil, and the connections are as shown in the sketch.



SHARP TUNING

To operate the rejector the ·0005-mfd. condenser is slowly rotated until the interfering station disappears. The tuning point is fairly sharp and a slow-motion drive is an advantage.

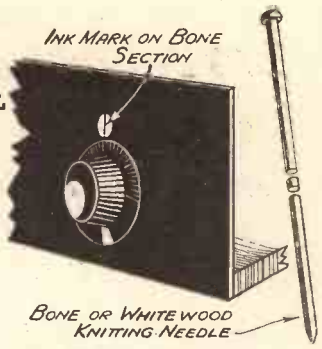
AN ATTRACTIVE DIAL INDICATOR.

A VERY useful and effective dial indicator can be made from an old bone or whitewood knitting-needle.

A hole is drilled in the panel above the tuning dial or in the most suitable position, and this should be slightly smaller in diameter than the needle.

A small section of the needle about the thickness of the panel is cut off and tapped into the panel hole.

If preferred an ink mark can be put on the indicator. White bone looks particularly attractive against a black or mahogany panel.



FINE CONTROL is obtainable with a dial indicator of this type.

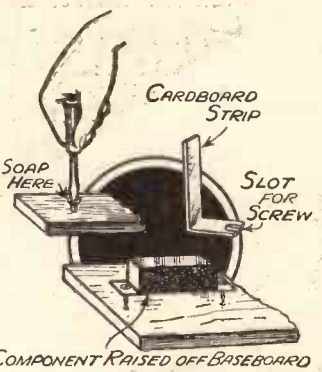
SCREWS THAT ANNOY.

THOSE screws that simply won't go into their holes on the baseboard are a source of constant irritation to the constructor. They will fall all over the place, stick under the wiring, lose themselves under components—in fact, do anything except "go home."

Several cures present themselves. Perhaps the easiest is a judicious use of soap on the end of the screwdriver. Screws and slotted terminal nuts can be dealt with easily in this way, so long as you remember to clean the soap off afterwards.

When you have a component with a thin, flat base, such as the condenser sketched below, it is a good plan to prick holes in the baseboard first, and then hold the component a quarter of an inch or so from the baseboard. This will steady the screws until they have a grip in the holes.

A third method is to use a piece of cardboard bent at one end with a slot in it to take the screw.



AIDS TO SCREW-DRIVER WORK

BROADCASTING—THE NEXT TEN YEARS

(Continued from previous page.)

Secondly, I would say that the B.B.C. must be more catholic in its field of choice of staff and must set its face against the tendency of "closed circuits" which has been far too much in evidence in recent years.

It is perhaps natural that little groups of enthusiasts for particular causes should, by virtue of their enthusiasm and their ability, tend to monopolise certain parts of broadcasting. This, however, is dangerous, and should be checked by the administrative authorities. My second condition therefore is "no closed circuit."

Accident of Personality.

The next point is, better security against what I can only describe as the accident of personality. In the past ten years, the strength of the B.B.C. has been measured chiefly in terms of the strong character of Sir John Reith. No great organisation of this kind can go on indefinitely based on one man, however strong his personality may be. What is needed is a lessening of the gap between the Director-General and his principal assistants, even if this means some drastic replacements.

Looking forward, there is no doubt in my mind that there should be more attention paid to the microphone and less to organisation, *qua* organisation, and "housing."

After all, the B.B.C. stands or falls by what gets into the homes and not on the elegance of offices or the excellence of "paper organisation."

Local considerations also will have their part to play. Not long ago, the B.B.C. wisely decided to retain a studio at Sheffield although the transmitter had been dismantled for a long time. But when, with equally good reason, it was suggested that Nottingham and Wrexham should have their equivalent studios no action was taken, presumably because in neither place did there exist the same degree of positive agitation.

In the next ten years the B.B.C. must be more sensitive to the legitimate movements of local opinion, and must not wait to be pushed into action of this kind.

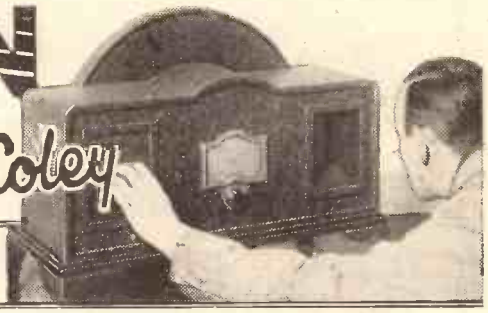
Dumping Ground for Failures

Then, of course, as I have already mentioned, much will depend on the type of Governor. If the B.B.C. gets young, broadminded and active governors, many of its problems will be less difficult of solution. If, on the other hand, the B.B.C. comes to be regarded as a convenient dumping ground for political and social failures, the maintenance of its monopoly would be more questionable.

And finally, I would say that the B.B.C. is only on the threshold of achievement and success, if it is guided with real statesmanship, comprehending clearly both possibilities and responsibilities—and I gamble that it will, to the greater glory and success of this England of ours!

MY TELEVISION EXPERIENCES

BY S. G. Coley



This is the first report to be received from a prize-winner in our recent Television Competition. All readers will be interested in the telling points that are raised concerning home television.

THE fan who has just completed the construction of the latest in wireless receivers is "full of it"; and the world must know about it.

I have nothing in common with him; that is, of course, with regard to Television.

In case you think I am not an enthusiast, let me hasten to add that my wireless set has been re-arranged almost as often as POPULAR WIRELESS has been published. And it's been good fun, too.

But my experience of Television has been disappointing.

Instead of "full of it," I rather think "fed up with it" more nearly expresses my feelings.

It is an anti-climax after the excitement of winning a Televisor, and I will try to explain the reasons for it.

The H.T. Supply.

Some delay was caused when I found that a source of high-tension supply giving 250 volts was required, for my eliminator only serves up to the usual 150 volts. From this it would appear to be virtually a necessity to work a Televisor from an all-mains set.

However, the necessary apparatus forthcoming, the viewer was ready for action.

With the speaker connected, the set was tuned in to London National, and when the characteristic chirruping of the broadcast vision was heard a change over to the Televisor was made.

The Televisor corresponds to the speaker of a wireless set, but seems to be more particular than the latter about the output from the receiver, judging by the results I obtained.

In the half hour of my first "peer," I expectantly moved the knob controlling the speed of the revolving disc, in the hope that the flickering background of red streaks would resolve itself into a picture.

But that night I saw nothing but the background.

One thing was clear to me, however, and it was the inadequacy of the half-hour broadcast. If Television is admitted to be a success it deserves more programme time. If the broadcasts are intended to help research the same applies.

Tests on Sound.

The next evening, prior to the vision transmission I carried out a few rough tests by utilising the fact that ordinary wireless sound waves affect the light of the neon lamp used in the viewer. These sound waves are visible on the screen as a constantly changing pattern made up of black rectangular spots. A pullover designer's nightmare, in fact.

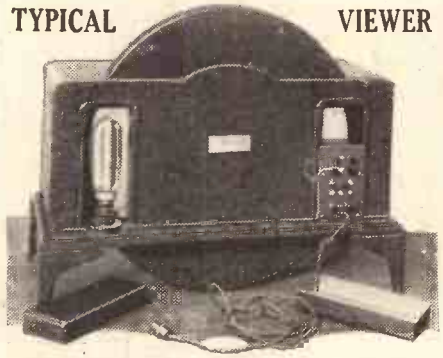
I found that by altering the output transformer ratio from 1 to 1 to 3·5 to 1 the pattern-weaving became much more clearly defined. An improvement was immediately apparent when I again attempted to receive the vision, and soon the chequered floor was discerned. A moment later, and I had the pleasure of seeing for the first time the image of a person transmitted by wireless.

As a picture, what I saw could hardly be termed a great success, but it was the first I had received, and I had hopes of getting better results later. It all seemed rather wonderful, but in these days a wonder is rarely that for its allotted seven days; and as I have not been able to improve substantially on the reception, boredom has replaced the sense of wonder.

There is no doubt that if the person televised be known to the one looking in, there would be recognition when a close-up is transmitted. But you can recognise a friend many yards away in the darkest of our streets.

The screen is roughly about four inches by one and a half inches, the longer sides being the vertical ones.

TYPICAL VIEWER



How a television viewer, similar to that used by Mr. Coley for his experiments, appears from behind with the "trap-doors" removed.

The chief characteristic of the images that I have obtained is undoubtedly the two lovely black eyes that have adorned their faces. An expanding and contracting black patch below them has generally represented the mouth of the artiste. It is evident that the problem of lighting the subject is a serious one, for all hollows such as the sockets of the eyes have lacked details. A glimpse of teeth could be seen on the few occasions that a singer has lifted the face to the gallery, but generally a living skeleton effect is seen. This latter is most noticeable when the subject has the type of chin that forms the point of an inverted isosceles triangle.

Dancers always figured on the Television programme. The reason for this is hard to see; like the dancers themselves.

To begin with, on such a small screen a full-length figure must necessarily be cut down to about two inches in height if movement of the arms is to be allowed for across the screen. The screen is flickering all the time, and the quick movements as of a dancer I found to be quite impossible to follow. The exhibitions have been just "something bobbing up and down." I believe the dancers had legs because of occasional flashes to be seen when they assumedly indulged in a little high kicking. The televised dancer has a poor chance of popularity under these conditions.

A One-Man Show.

A peculiarity prominent in the received images is a running of the light in a vertical direction; that is, similar to the speed effect given by an artist to a fast-moving car, but with the lines running at right angles to the horizon. This spreading of light causes distortion at the top and results in a general smudginess of the lighter parts of the picture, and makes elongated heads with hair on end. With the raising of an arm, for instance, from the vertical to the horizontal position a growth of light forms on the top side to disappear gradually on the lowering to the original position, and it is this which causes the movements of a dancer to be seen as flashes.

I am asked whether the pictures I have received are as good as those "pictures by wire" which are to be seen in the papers. Also how near one has to be to see them. With regard to the former question I must say that my apparatus does not produce a picture which can compare with the crudest of the published "pictures by wire" that I have seen. And as to distance, well, I find it rather disconcerting that my breath condenses on the lens. Television with a Baird Televisor of the type presented by "POPULAR WIRELESS" is a one-man show in my opinion. And a peep show at that.

Synchronisation Difficulties.

But I haven't mentioned the worst trouble I encountered. It is synchronisation of the viewing disc with a similar one at the transmitting end. The motor which drives the disc is provided with a variable resistance in circuit, and the incoming signal is also utilised to help keep the speed correct.

Despite this I found it impossible to synchronise for more than a few minutes at a time, and it was necessary to use the resistance control continuously. The effect of a variation in speeds is that you see a series of pictures moving past the screen at a speed proportional to the variation.

The picture will move off the screen slowly and be followed by a similar one travelling in the same direction. Another follows a bit faster, and soon they are flying round at high speed. Movement of the knob of the variable resistance will check this, but in practice I found that a constant

(*Continued on page* 1390.)

RADIOTORIAL

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

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

The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialties described may be the subjects of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

Technical Queries Editor: A. JOHNSON-RANDALL

QUESTIONS AND ANSWERS

POSITION OF "AIRSPRITE'S" ON-OFF SWITCH.

"DUBFAN" (Dublin).—"I am building your 'Airsprite Three,' and hope to have all the components bought by the end of the present month.

"May I in all sincerity throw a big brick at you? My dear sirs, look where you put the on-and-off switch! My set—the good old 'Magic Three,' is housed in a console cabinet, which is a few inches away from the wall.

"If I build the 'Airsprite' with the on-and-off switch as it is in blue print, look at the trouble I will have to go to, when I want to switch on or off. Oft-times I have the loudspeaker on top of cabinet, so I would have to: (1) Remove loudspeaker; (2) Open up cabinet lid; (3) Switch on; (4) Close lid; (5) Put loudspeaker back.

"Now, sir, can I, in safety, put the on-and-off switch (three point) on the front of the panel, and take the leads that go to the present on-and-off switch (in blue print) thereto?

"As there may be millions who want to do this, will you please insert your observation in the 'Radiotorial' of POPULAR WIRELESS as soon as practicable?

"I wonder if you have, or will get, similar letters to mine. This is the first time I have ever written to you, and I am sorry to have to throw you a brick. However, all the bouquets you have recently received should soften the damage!"

We decided on the present position for the switch chiefly in deference to the majority of requests from readers who seem to prefer it as shown in the blue print—evidently because their cabinets are not like yours. But, as a matter of fact, it is quite in order to put it on the front panel.

As you suggest the only alteration is in the *position* of the switch, its new leads going to exactly the same points as before.

Keep the wiring as short and direct as possible and you can safely do as you suggest.

DO YOU KNOW—

the Answers to the following Questions?

There is no "catch" in them; they are just interesting points that crop up in discussions on radio topics. If you like to try to answer them, you can compare your own solutions with those that appear on a following page of this number of "P.W."

(1) **How many B.B.C. stations are now working on the common wavelength of 288·5 metres, on which most of the relay stations used to work?**

(2) **Which foreign stations are the "neighbours" of North Regional, i.e. which occupy the adjacent wavelengths?**

(3) **If a milliammeter in the power valve's plate circuit kicks up to a higher reading owing to distortion on loud passages of music, etc., what should be done to correct matters?**

A. T. B. FOR THE "AIRSPRITE" TWO.

"I fitted your A.T.B. to my existing set with great beneficial results," writes G. M. (Aberdeen) in a letter, telling of his experiments with automatic tone balance. He points out that on page 1282, in the description of the "Airsprite Two," the words "F_2 terminal *must* join to the ·01 mfd. fixed condenser" are at variance with the diagrams. Both the wiring and the theoretical diagram show F_2 connected to L.T.—, earth, etc., which is correct, and the wording should, therefore, have read "The moving plates (M) must join to the ·01 mfd. fixed condenser.

KEEP TO VARIABLE-MU.

T. W. H. (Hook, Hants).—"Having heard the 'Airsprite' Radio Set in operation, I must say in my opinion it fully merits all the praiseworthy remarks bestowed on it. Anyway, it may interest you to know that I am scrapping the . . . . . and making the 'Airsprite.'

"I have all the parts (new) for the 'Airsprite,' the only thing which I am not sure of is the variable-mu S.G. valve, and should be glad if you would give advice on this matter. And, by the way, the reply to my query would interest many constructors, I expect, as this variable-mu S.G. valve seems not much heard of at present.

"My S.G. valve is a nearly new metallised. Also I have an old Cossor (not metallised) too old to be healthy, so I know this is no use in 'Airsprite' circuit.

"I may add that 'P.W.' has been my weekly companion since its first number, and have made up practically all your star sets, and numerous others, most of them giving satisfaction and all of them providing me with a very interesting hobby (although until recently a rather expensive one!). Wishing your journal its deserved success."

We are glad you raised the question of the S.G. valve, T. W. H., because it is one of considerable importance. The position is this.

As you probably know the variable-mu is the latest type of screened-grid valve, and it has now been long enough in general use for the facts about its utility and "worth-whileness" to be judged accurately.

There is no doubt about its success. It is definitely better than the older types, and it seems likely to supersede them completely.

That being the case, we do not think you ought to contemplate altering the "Airsprite" by the omission of volume control, etc., in order to use up one of the old type valves. Our advice is to go the whole hog and get the full "Airsprite" results with a variable-mu.

We are not forgetting the good money spent on the old S.G., but remember that uses for this class of valve are constantly increasing, and it is almost certain that if you put it aside now you will one day want to use an S.G. (as detector, perhaps), and then you will be glad to have a good one on hand, and will "get your money back."

But to use it instead of a variable-mu. in the "Airsprite" would be to limit the set right at the start, so we do not advise that course.

ASSEMBLING THE A.C. "AIRSPRITE."

T. L. (Rouen, France).—"I am one of your roving readers, my business taking me over France, Belgium and Holland, so I do not get my copies regularly, though I have them saved up at home.

"I have, however, had the Blueprint of the "Airsprite" forwarded out to me, and am keenly interested in this, as it appears to be just the design I was looking for. But I am not sure I understand the fixing of the baseboard, with choke and big condensers on, to the other baseboard with the coils and valves on. Is this placed at the back, on a right angle? Or what?"

Yes, the main smoothing apparatus, etc., is mounted on the separate board, and the necessary connections to the set are made with flex leads, the extra board being supported on panel brackets, facing the panel, and thus, of course, at right-angles to the baseboard.

The photographs published with the article, and the accompanying illustration, makes the arrangement perfectly clear.

(*Continued on page* 1388.)

IS YOUR SET BEHAVING ITSELF?

Perhaps your switching doesn't work properly? Or some mysterious noise has appeared and is spoiling your radio reception? Or one of the batteries seems to run down much faster than formerly?

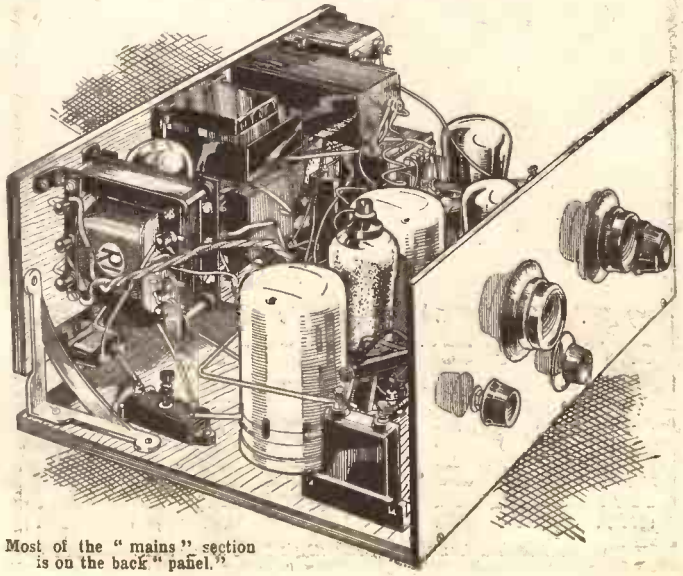
Whatever your radio problem may be, remember that the Technical Query Department is thoroughly equipped to assist our readers, and offers its unrivalled service.

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

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

LONDON READERS, PLEASE NOTE: Inquiries should NOT be made by 'phone or in person at Fleetway House or Tallis House.

SEPARATE SMOOTHING



Most of the "mains" section is on the back "panel."

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 1386.)

A GOOD TWO-VALVE CIRCUIT FOR PLUG-IN COILS.

T. B. B. (Oban).—I have the following parts left over (all in good working order) and I want them used as a two-valve set, with any others that may be necessary to make a good simple set.

8 plug-in coils (various sizes).
1 ·0005-mfd. tuning.
1 ·0003 „ „
2 valves (HL 2 and PM2 A).
2 ·0003-mfd. fixed.
2 ·0001 „ „
1 ·5 „ „
1 on-off switch.
1 Telsen Ace L.F.T.
1 3-coil holder.

Also grid leaks, valve holders, plugs, etc.

What I should like to do is to put up the "Plug-In" set which you described last autumn, as I heard one of these at the time, and it was marvellous for such a straightforward set, with few parts. But if the parts I have given above are unsuitable, then something on the same lines, suitable for an enclosed cabinet with upright front panel.

(Please give the wiring in words, as I can follow the description better than theory diagram).

Your components are quite suitable for a two-valver using the same circuit as the "Plug-In" Two. Those needed will be obvious from the point-to-point wiring which is given below.

Aerial terminal to one coil holder, other side of which goes to earth. Also earth goes to one side of adjoining coil holder, to moving vanes of the ·0003-mfd. and to moving vanes of the ·0005-mfd., to one filament socket on each valve holder, to a ·0001-mfd. fixed condenser, to G.B.+, to L.T.− and to H.T.−.

L.T.+ terminal goes to one side of the on-off switch. The other side of this switch goes to the remaining filament sockets of the two valve holders, and also one side of a 2-meg. grid-leak holder.

The remaining terminal on the second coil holder (one side of which is joined to earth) goes to the fixed vanes of the ·0005-mfd. tuning condenser, and also one side of a ·0003-mfd. grid condenser.

The grid terminal of the first valve holder (detector) goes to the free end of the grid-leak holder and to the other side of the ·0003-mfd. fixed condenser.

The fixed vanes of the ·0003-mfd. condenser go to one of the remaining (moving) coil-holders' terminals by a flex lead. Another flex lead joins the remaining side of this moving-coil holder to the anode terminal of the detector valve, and also to an H.F. choke.

If reaction effects are not obtained when the set is tried out it may be necessary to change over the two flex leads of the moving-coil holder, in order to get reaction the right way round.

The anode terminal of this detector valve holder is also joined to the remaining side of the ·0001-mfd. fixed condenser.

The vacant terminal on the H.F. choke goes to the "P" or "A" terminal on the L.F. transformer. Its H.T.+ terminal goes to the H.T.+1 lead.

The "G" terminal of the second valve holder is wired to the "G" terminal on this L.F. transformer. Its G.B. terminal goes via a flex lead and black (−) plug to the grid-bias battery.

The final connections are from the plate of this valve holder to the loudspeaker terminal (−); and then L.S.+ terminal to the H.T.+2 terminal.

There is nothing tricky or unusual about the circuit or operation, but if different makes of coils are used you may find it necessary to reverse the reaction connections again for some of them, owing to their being wound differently from the others.

STABILISING WITH A SPAGHETTI.

H. S. K. P. (Surrey).—I built the "Apex" a few days after it came out, with the parts as specified, and was then using batteries, and the set worked perfectly—perfect tone and volume and a real station-getter.

A few weeks ago I purchased an eliminator giving 25 m.a. to be on the safe side and after connecting up I found that on any wavelength below 400 metres the set went into oscillation with the reaction condenser right back and the tuning dials in step as with batteries, and the lower I got on the dials the bigger the squeal. The only way to get rid of the squeal was to de-tune the tuned anode condenser as much as 20 deg. on the dial; then, of course, I could not get any

(*Continued on page* 1390.)

THE ANSWERS

TO THE QUESTIONS GIVEN ON PAGE 1386 ARE GIVEN BELOW

(1) Only two, viz. Scottish National and Bournemouth.

* * *

(2) Prague (Czechoslovakia), on 488·6 metres is the one immediately above North Regional. The wavelength next below North Regional's is occupied by Langenberg, Germany (473 metres).

* * *

(3) The increased mean plate current denotes that too much grid bias is being used. So switch off L.T. and then move the valve's G.B.—plug to a lower tapping on the battery.

DID YOU KNOW THEM ALL?

"P.W." PANELS. No. 114.—HEILSBERG.

The great East Prussian station employs a power of 60 kilowatts. The wavelength is 276·5 metres (between Turin and Bratislava).

* * *

The programmes usually originate at the neighbouring city of Konigsberg, Heilsberg being quite a small place, but more favourably situated for the radio station.

* * *

The interval signal consists of the notes D flat, A flat, repeated three times in 4½ seconds, with a 4½ seconds interval. Distance from London, 882 miles.

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 1388.)

foreign stations or proper tuning. Above 400 metres everything was O.K. but I could not use the reaction condenser.

I tried another lead to H.T.1 and cutting down S.G. voltage—all to no avail. The only thing which got rid of the squeal was disconnecting the lead to S.G. anode from the ·0003 condenser and putting it in to No. 1 on the tuned anode coil, but then the set was rotten and could not pick up any foreigners and lost all its "punch."

Anyway, to cut a long story short I replaced the lead to the S.G. anode back on the ·0003 condenser, and inserted a 1,500-ohm spaghetti resistance in the lead from the ·0003 condenser to No. 6 on the tuned anode coil and the set then worked as it did originally, but naturally with more volume, etc., than with batteries.

I should like to know why the resistance cured the trouble, and to take this opportunity of thanking you for such an excellent "cheap to build" set.

The reason you got the instability is interesting. "To be on the safe side" you say you got an eliminator giving 25 milliamps.

Usually an "Apex" arrangement of S.G., detector and power valve will consume only half or less of what your "eliminator" is capable of supplying. And when only half the load is imposed on mains rectifying apparatus, the voltage goes up to a point greatly in excess of that marked on the instrument.

Your very high voltages thus gave rise to an unwanted liveliness, which you have cured by dropping the S.G. anode a voltage with the resistance.

This is certainly one way of dealing with the trouble, but it means that you are still getting excessive anode voltage from the unit because of the small load imposed on it.

You could reduce the voltages by applying an extra load across the mains unit (eliminator) in the form of a wire-wound resistance to bring the total current consumption from the unit up to about the 25 milliamps for which it is rated.

MY TELEVISION EXPERIENCES

(*Continued from page* 1384.)

synchronisation to be unobtainable with the particular resistance fitted to the Televisor.

Half an hour of telepeeping has a more tiring effect on my eyes than hours of driving on a foggy night. The lateness of the broadcasting hours may partly account for this. Another disadvantage of the time is that the motor of the Televisor is very noisy and knocks badly and is bound to cause interference with neighbours sooner or later. The biscuit-tin construction of the viewer is not helpful in this respect.

The poor results I have obtained may be in some measure due to the wireless set used to drive the Televisor. Well, my set is by a well-known maker, is an S.G.3 with a pentode valve, and is being used at a distance of about eleven miles from the London station. It gives me every satisfaction and I cannot give it any higher praise than that it is nearly as good as it was advertised to be. It is powered by a battery eliminator of first-class make.

I leave it to you to judge whether the set is the trouble or not. Personally, I cannot see that a different receiver can make a really noticeable difference to the results obtainable. The grain of the picture would seem to make other than close-ups impossible of good reception, without consideration for other defects.

However, an offer has been received from a Television fan to demonstrate the pictures obtainable with a set specially designed for the job. And maybe I shall be enlightened.

B.B.C. SUNDAY PROGRAMMES

(*Continued from page* 1365.)

than twice the number of licence-holders in the country.

The B.B.C. need not fear that its Sunday programme policy is not, on the whole, satisfying to the great bulk of the people of this country. I had myself abundant evidence that it is so.

At the same time, if the hours of public worship are respected in this way, the same rule does not so strictly apply to the Broadcast Service. Only three-quarters of an hour is in question, and it seems needless to strain the matter; but there could be no violent and relentless objection to the provision of an alternative secular programme of the finest sort during this time.

The Broadcast Service is a religious "extra," most valued by many people but not by all. It is provided mainly for those who, for various reasons, cannot attend the ordinary church service. There must always be one service at least available for such people; but for the rest—Shakespeare for all, and not only for Londoners, might well be the starting point for the discussion of a slightly altered policy.

NEW "RADIOMAG"

Telsen's Latest Attractive Compilation.

THERE are very few things that you could buy for 6d. to excel in value for money the latest edition of the Telsen "Radiomag."

Bound in a most artistic four-colour cover, No. 4 of the "Radiomag" easily surpasses both in size and contents anything that has previously emanated from this enterprising organisation, and three full-size blue print wiring diagrams are given free with every copy.

Almost every aspect of home radio is covered in the generous contents of this new issue, and in addition to informative articles on such topics as the aerial and earth, H.T. batteries, ganging, etc., full constructional details are given for the Telsen "All-Mains S.G.3," the Telsen "Super 6," and the Telsen "Super Selective Four."

Mr. Rupert Collins, who is responsible editorially for the compilation of the "Radiomag," has succeeded in combining interest and instruction in a way which makes the reading thoroughly "digestible" from cover to cover, and we congratulate him.

Coincident with the publication of this new issue of the "Radiomag," The Telsen Electric Company announce price reductions affecting almost every component in their extensive range. Details of the new prices are all given on a special inset leaflet which is included in every copy.

THE "AIRSPRITE"

A Reader's Results.

The Editor, POPULAR WIRELESS.

Dear Sir,—I have now completed the "Airsprite," battery version, and am delighted with it on a first test, its power, selectivity and tone are very good and I have "bagged" practically all the stations claimed in your test report.

Yours faithfully,
A. E. KILLICK.

16, Icknield Road,
Luton, Beds.

THE LINK BETWEEN

(*Continued from page* 1364.)

scheme that has as its objective the elimination of inconvenience and delay in cases where faults do develop, and that is why I feel disposed this week to give a special pat on the back to the enterprising Ekco organisation.

As a result of an elaborately organised system of mobile service depots, owners of Ekco instruments in any part of the country can command service at a moment's notice.

The Ekco vans are virtually mobile test laboratories, and they are fully equipped for dealing on the spot with any possible contingency. Each van is accompanied by a qualified engineer, whose advice is available not only in connection with set faults, but with regard to local conditions, installation problems, and the elimination of local interference.

It would appear very definitely to be a case of this is service, *that was!*

A Record in Records.

In little more than five years that ever-popular artiste, Miss Gracie Fields, has created a record in record sales for any single artiste that is excelled only by Caruso's.

No less than four million discs have been made and sold by the Gramophone Company since Gracie started to record, and recently, to use her own words, a "do" was given by H.M.V. to celebrate the passing of the four million mark.

The four-millionth record was pressed by Miss Fields herself, in the presence of Press representatives from all parts of the country, and afterwards the company was entertained to a luncheon that was characterised by the inclusion of Lancashire hot-pot.

If one could assume that only one of her records had gone to each home, then Miss Fields' gramophone audience would represent roughly four-fifths of the total number of radio listeners in this country! But that is hardly likely, because anyone who has once bought a Gracie Fields record would never be content to let it rest at that.

All the same, it is a magnificent indication of the high esteem in which Gracie Fields is held, and the sale of four million records in so short a space of time is an achievement of which both the artiste and the Gramophone Company can justly be proud.

"P.W.'s" postcard literature scheme saves you time and money! Week by week in these columns reviews are given of all the latest catalogues and leaflets appertaining to every aspect of radio, and if you want any or all of the literature to which reference is made you need only send a postcard giving the numbers of those in which you are interested, and the required literature will be sent off to you free of charge except where otherwise stated. The reference numbers in each case are given at the end of the appropriate paragraph, and applications may refer to any issue of "P.W." published in the last four weeks. Postcards, on which your name and address should be printed in block capitals, should be sent to G. T. Kelsey, at Tallis House, Tallis Street, London, E.C.4.

Modernising the "Mullard Master Three."

A new supplement to "Radio for the Million" has just been issued by Mullards in which full instructions are given for the modernisation of the "Mullard Master Three" and the "Master Three Star," by the addition of an efficient screened-grid H.F. stage.

This new "Radio for the Million" supplement takes the form of a broadsheet which contains—in addition to a full-size wiring blueprint—complete and clear assembly instructions, calibration chart, point-to-point connections, theoretical diagrams, photographs and a drilling template.

The conversion is not expensive, and it can be carried out for 29s. 6d., excluding the cost of the new screened-grid valve that will be required.

"P.W." readers desirous of obtaining a copy of this new supplement can do so through the postcard literature scheme. Please let me have your postcards early. **(No. 25.)**

Cheaper H.T. Batteries.

I am always pleased to be able to pass on news concerning price reductions, especially when, as in the present case, it affects the pockets of those who are dependent upon H.T. batteries for their radio results.

Battery enthusiasts everywhere will welcome the news that the complete range of Ediswan H.T. batteries is to be reduced in price. All the standard capacity types with the exception of the 60-volt unit will be subject to a reduction of 2/-, and the 60-volt one is to be brought down from 6/9 to 5/6.

There is now no excuse for anybody using anything but reputable batteries.

LOUDSPEAKER RESULTS ON THE SHORT-WAVE ADAPTOR

Some further helpful notes concerning the operation of the instrument which was described in detail in the last issue of "P.W."

THE operation of a superhet type of short-wave adaptor is, in general, much more simple than is the case with a straightforward detector arrangement, mainly because the tuning is not so critical and because the need for working right on the threshold of reaction is obviated.

For this reason I do not imagine that any reader who has built, or who is building the new superhet short-wave adaptor which I described in detail last week, will encounter any real tuning difficulties. All the same, there is a right and a wrong way of going about everything, and some further notes upon the correct procedure to be adopted in this case will not, I feel, be amiss.

But before I settle down to the question of operation, I want just to give a few details as to how the adaptor should be connected up for use in conjunction with a mains set.

For Mains Sets.

It is imperative, of course, that the set with which it is to be used should be provided with one or more H.F. stages, but otherwise, it matters not whether it is A.C. or D.C., it can be used with completely satisfactory results.

To use the adaptor with a mains set, the adaptor should first be connected up to separate batteries in accordance with the instructions given in the main article last week. The essential difference lies in the earthing arrangements, and in this case, instead of transferring the earth lead from the set earth terminal to the adaptor earth terminal, *you leave it connected to the set, and join the adaptor earth terminal to the set earth terminal by means of a separate piece of wire.*

The aerial arrangements remain the same as in the case of the battery application which was described last week.

Now a few more words concerning operation.

When you get your adaptor working correctly, you will find that you can almost ignore the left-hand adaptor tuning dial when searching for distant programmes. Tune with the right-hand dial alone, but move it very, very slowly, especially when using the smaller pair of coils. The left-hand dial can then be adjusted for best results when a station is located.

Always Oscillating.

It greatly simplifies the finding of distant stations if you advance the *set* reaction control until it just commences to oscillate, for stations are then heralded by the familiar carrier-wave howl. I hope it is clear that the adaptor reaction condenser must be set so that the second valve in the adaptor (which is the combined detector and oscillator) is always oscillating. Otherwise the chances are that you will hear nothing.

If you do use the set reaction condenser to find carrier-waves in the manner described above, then it must, of course, be decreased when you do locate a "howl" in order to get intelligibility. Slight readjustment of the other controls may then be found to be necessary in order to get the best results.

By the way, with certain valves, it may be found that reaction tends to become uncontrollable when using the smaller set of coils, in which case I advise you to try taking one turn off the reaction winding, which is the one that is done with silk-covered wire.

It is quite an easy job, but it should only be done if you are unable to get rid of the squeal. Again, it is only necessary to remove a turn from the coil to the right of the screen looking at the adaptor from the front.

Measured Wave Range.

As a result of my coil wavelength measurements, I have determined that there is a quite appreciable overlap (which is an advantage), but the larger of the two sets of coils—the "S.W.3's"—do not tune up so high as I had anticipated. The upper limit is not very greatly over 50 metres, but there is nothing of any real importance above this wavelength, so that the range is quite adequate.

In the case of the "S.W.2's," the lower limit is below the minimum setting of my standard wavemeter, so that it must be somewhere about 14 metres. Again, that is all to the good; but tuning down there is indeed critical, and you will never hear anything unless you manipulate the dials very, very slowly.

In passing, may I just mention that if there are any readers who want to listen to wavelengths appreciably above 50 metres, suitable coils can be obtained from Messrs. A. F. Bulgin. They are designated "S.W.4's."

THE LISTENER'S NOTEBOOK

(*Continued from page* 1370.)

this particular debate fell a bit short of its predecessors.

* * *

There is little doubt that most of the women engaged in broadcasting have voices eminently suited to the job. Perhaps there is some quality in the female voice—an absence of huskiness, is it?—that places it above man's over the air.

Our language mistresses are superb broadcasters. And we mustn't forget, of course, the female announcers on the Continent, especially those of Rome and Napoli.

In praising women thus, I have in mind only women talkers. Women vocalists are an entirely different proposition. We will leave it at that.

* * *

It is good news to hear that James Agate is going to be busy again. There is something about his broadcasting that makes him indispensable. He is often provocative—but what live broadcaster isn't?

I am rather sorry Mr. Agate's job isn't to be anything more than a compère. No one, I fancy, will notice the limitations of this rôle more than himself. Despite its limitations, compère-ing is an art of which much can be made. Witness Christopher Stone, for instance. He makes the most of his chances. Still, this doesn't prove that he wouldn't make a good deal more of a thirty-minute talk.

Bobbie Comber is another man who knows how to compère a show, in his own particular way.

But if the show is a long one, he tends to become the show, and that's unfortunate.

* * *

I think it's an admirable plan to begin a fresh series of talks every now and again, rather than to divide the year into three or four terms, and began each term with a fresh series, to be continued until the next term.

Just when I was beginning to tire of some of the present series in progress, there comes along a new one, for Friday evenings, called "Workers of Europe." I don't know whether it was the freshness of the subject that appealed to me particularly strongly, but the fact remains the discussion between the German and the English agricultural worker struck me as being uncommonly good!

ANOTHER "AIRSPRITE" REPORT FROM THE RADIO INDUSTRY

From THE LONDON ELECTRIC WIRE CO. AND SMITHS LTD.

THE radio listener who has a small or medium-powered radio set is always faced with the desire to receive distant stations which are almost beyond the capabilities of his set. He does this by pushing regenerative amplification or reaction to its ultimate limit, so that local energy drawn from the high-tension supply in his detector plate circuit supplements the energy induced by the transmitting station in the high-frequency portion of his circuit.

So far, so good ; but unfortunately the feed-back of local energy has the effect of reducing the high-frequency resistance of the tuned circuit into which it reacts, with the result that its resistance is very much reduced. Consequently, the response or resonance curve is narrow and steep, and the sidebands of the higher frequencies of sound are cut off. Naturally, the higher the frequency of sound the greater is the cut-off, so that when reaction is fully advanced only the lower frequencies come through and reproduction is muffled or "woolly."

It was therefore with considerable interest that I listened to a demonstration recently given by Mr. Rogers, of POPULAR WIRELESS, with a radio set in which **this disadvantage had been definitely overcome. Furthermore, the system employed appears to be full of good points, for it is simple to install and simple to operate. In fact, it is more than simple to operate ; it is automatic.**

The components which are essential to the system are a differential reaction condenser, a low-frequency transformer having a rising characteristic, and a fixed condenser. If anyone were to build any standard radio set all these components would be required, so that there is really nothing extra to buy.

The system will be amply described by others, but I will tell you exactly as I see it.

A low-frequency transformer is used having a rising characteristic, i.e. a progressively greater response to the higher frequencies of sound. A fixed condenser is also included in the circuit, which is automatically connected virtually across the primary of the low-frequency transformer when the reaction condenser is at minimum. The value of this fixed condenser is so selected that when connected in this manner with reaction at a minimum, as it would be for local-station reception, it compensates the rising characteristic of the transformer by tending to by-pass the higher frequencies.

In the other extreme position of the reaction condenser, when the receiver is on the verge of oscillation for distant reception the fixed condenser is virtually out of the circuit, so that the advantage of the rising characteristic of the transformer is retained and compensates an inherent quality of any circuit on the verge of oscillation, whose resistance must therefore be very small.

I prophesy a great future for this system of automatic tone control which, there is no doubt, will improve the quality of reproduction of the great majority of radio sets which have been made in the past and will be made in the future. W. F. BOYD,
Chief Radio Engineer.

TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio technique.

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

High Notes with Pentode.

WHEN using a pentode valve with an ordinary type of loudspeaker—by which I mean *not* a moving-coil type—you will often enough find that the high notes are over-emphasised. Special precautions may have been adopted in the earlier parts of the circuit to take care of the high notes, with the result that when it comes to the last stage—and this applies also to a power valve output stage—the predominance of the high notes upsets the quality.

Tone Control.

The proper way to deal with this is to use some form of tone control, of which the simplest is the arrangement of fixed condenser and resistance in series and connected across the output of the set or the input of the speaker. This arrangement is now very extensively used and is quite effective.

The values of the condenser and resistance depend upon circumstances, particularly upon the speaker, but for the resistance you will generally find something between 10,000 and 50,000 ohms suitable, whilst the condenser may have a value of ·01 mfd.

The reactance of the condenser diminishes with increasing frequency, so that the higher the notes the greater the "shunting" effect of the condenser, whilst the resistance, which is indifferent to frequency (and which should be adjustable, by the way), gives you a means of regulating the effect of the condenser.

Electrolytic Condensers.

I frequently get letters from readers about the use and applications of electrolytic condensers, which I have mentioned once or twice in the past. Many people seem a bit dubious as to the claims made for them and as to whether they would prove useful in particular cases.

Perhaps I should state briefly the general purposes to which electrolytic condensers are suited. These are high-tension and grid-bias smoothing, smoothing of the exciter current for dynamic speakers, by-passing generally and filament-current smoothing. In short, wherever you have direct or rectified current which requires smoothing, the electrolytic condenser may come in useful.

Polarisation.

Bear in mind that electrolytic condensers are always polarised, that is, they work only one way round, and must not therefore be used with raw A.C. If A.C. is applied to the condenser the latter will simply act as a rectifier of sorts, but chemical action will take place within it which will soon render it useless.

This type of condenser, therefore, has positive and negative terminals, just like a battery cell, and the D.C. or rectified current would be led to the condenser exactly as though it were a cell to be re-charged, that is, positive to positive and negative to negative.

Leakage Current.

An electrolytic condenser always allows a certain amount of D.C. current to pass through it—the "leakage current" as it is called, but with a good condenser this leakage current will be relatively very small. As an example, with a "dry" condenser the maximum leakage current after one minute working, at rated working voltage, should not exceed 5 milliamps, whilst with the wet or aqueous type the leakage current should not be more than 1 milliamp.

The latter type are generally made with a capacity up to about 8 mfd., and for D.C. voltages up to about 500 volts, whilst the "dry" types are made for various capacities up to as much as 2,000 mfd. and for similar voltages. I should perhaps add that whilst the dry type may be mounted in any position, the aqueous type must be mounted upright.

A Useful Gadget.

You know when you have to do any soldering by the aid of one of the gas rings on the gas cooker, you generally find that the tip of the iron stands in only one or two of the little jets of the ring, whilst all the rest are wasted. Apart from the waste of gas, which is perhaps not very important, it takes so much longer to get the iron hot, especially if it happens to be a decent-sized one.

I saw a little gadget the other day which struck me as being just the thing for this purpose. It consists of a sort of "cowl," or inverted bowl, of sheet iron, about 3 in. in diameter, with a slot cut in the top, big enough to accommodate the end of the soldering iron easily.

There is an extension "handle" of iron strip, about 5 in. long which has a turned-up notched end in which the shaft of the soldering iron rests. You simply place the thing with the cowl over the gas ring, and lay the iron with its shaft in the notch and its copper bit in the slot in the cowl.

The flames are collected together by this cowl or basin and all pass out through the slot, where they play upon the copper bit, so that practically the whole of the heat of the gas ring is concentrated on the object to be heated. I am not sure whether it is actually on the market yet, but it will probably be available in the near future in commercial form, and I believe will be sold for about a shilling.

Chemical Earthing Devices.

I don't know how many of you have tried the so-called "chemical" earths, but quite a number of readers have told me of greatly improved reception they have obtained thereby.

I have tried two or three myself, and I must say I was very favourably impressed. The theory is that the deliquescent or hydroscopic (water-collecting) substance penetrates into the surrounding soil and forms a sort of permanent attraction for

(*Continued on next page.*)

TECHNICAL NOTES

(*Continued from previous page.*)

any moisture there may be about, thus giving a kind of "tentacle" connection between the earth lead and the ground.

Television Developments.

Television experimenters in various parts of the world may be divided broadly into two classes, those who favour the mechanical methods of scanning, and those who believe that the only hope for television lies in a purely electrical scanning system. The latter practically resolves itself into the use of some form or other of the cathode ray tube, as used originally in the cathode ray oscillograph.

Remarkable improvements have been made during the past two or three years in these cathode tubes, until now it is really astonishing the brightness and "quickness" of the images on the fluorescent screen.

I remember only a very few years back, when we used to use screens of this kind at Cambridge in positive-ray experiments: the great problem was to get a really good and lasting screen, and if you could get that it was half the battle.

Fluorescent Screens.

Recently a great deal of research work has been done on these fluorescent screens, by Sir Herbert Jackson and others, and wonderful strides have been made. Not only can very bright images be obtained—easily visible in subdued daylight—but also the "lag" is so small that there is scarcely any noticeable "persistence" of the image.

This latter feature is obviously most important if overlapping and blurring of images is to be avoided.

In the latest type of cathode-ray tube the cathode consists of an electrically-heated oxide-coated filament, and the tube contains an inert gas at a very low pressure, about one ten-thousandth of a millimetre of mercury, which is very roughly one ten-millionth of atmospheric pressure. The electron beam passes between two pairs of metal plates, one pair being arranged at right-angles to the other pair, and a suitable electrical potential is maintained across these plates.

In this way the electron beam may be deflected either east and west on the screen, so to speak, or north and south. This type of oscillograph can be used with success up to at least 1,000 kilocycles.

Seeing Your Own Voice.

A very interesting experiment with a tube of this kind is to connect it with a microphone and a suitable amplifier when the actual waveform of the voice and other sounds can be watched with the greatest clearness and ease, whilst the sounds are actually heard by the ear.

Short-Wave Points.

Those of you who are new to short-wave reception will find that there are many features quite different from reception on long waves or even on broadcast wavelengths. Perhaps the most noticeable point is the variation in conditions according to the time of day, amount of sunlight, and so on.

A general rule you will find is that the more daylight the lower the wavelength that can be used. For instance, you would

(*Continued on next page.*)

TECHNICAL NOTES

(*Continued from previous page.*)

hardly expect to hear U.S.A. on 48 metres before 10 at night, nor on 16 metres after tea-time in the winter.

Long-distance transmissions below 20 metres can generally be looked for in broad daylight, up to about 30 metres at dusk, and up to, say, 60 metres after dark. There is nothing hard-and-fast about this, and sometimes these general rules will be found to be completely upset. But they serve the purpose of a general guide.

Loudspeaker as Choke.

If you want to run an additional loudspeaker from a radiogram, it is usually a comparatively simple matter, if the speaker is of the ordinary permanent-magnet type. But if the speaker happens to be a mains-excited moving-coil instrument, you want to watch what you are about or you will upset things.

It is fairly obvious in this case that if another speaker is connected it had better be a moving-coil type, even if a permanent-magnet. Again, if the speaker is a mains-excited one, it is fairly simple to connect the pot in parallel with the first one, when it should receive its correct exciting current. But often enough in a radiogram the pot of the moving-coil speaker is used as a smoothing choke, and if you connect another one in parallel with it you will upset the smoothing conditions altogether.

All these points should be watched. It is never safe just to assume that you can run wires in parallel with the corresponding connections on the first loudspeaker and join up with the second.

Watch Your Connections.

I had a case a few days ago where a mains-excited speaker was used in a radiogram, the speaker being used also as a smoothing choke, and we wanted to connect another speaker at a distance away. We found it quickest to use another speaker of exactly the same type (one being fortunately available), and to disconnect the leads from the first speaker and connect to the second.

Alternatively, in such a case, I have seen the speaker removed from the cabinet and the leads extended to the distant point.

THE P.W. "AIRSPRITE" FOUR

(*Continued from page* 1363.)

them through the tops of the cans as these are fixed in place.

The "earthing" of the foil is done automatically by the metal shielded components which rest on it. Incidentally, this also earths these shields! The only connection you have to make to the baseboard foil is to join the screened pick-up lead to it. Don't omit the shielding of this lead.

Take one of the soldering tags off one of the components (we don't solder in "P.W." sets unless it is absolutely unavoidable!) and screw this to the baseboard through a hole pierced in the foil, so that it lies over the screened lead. The contact will be quite good enough for the purpose so long as the tag presses fairly tightly on the metal covering of the lead.

You will meet no snags in building the "Airsprite" Four. An easy and interesting evening's work, and your set will be ready for its first test. But I am afraid I shall have to leave the operating details until next week.

THE TELSEN SUPER SIX

(*Continued from page* 1366.)

inasmuch as it would tend to obviate the high-note cut-off to which many superhets are prone.

In our tests of the Telsen Super Six, the results were gratifying in the extreme. The initial adjustments called for a certain amount of care, but every operation is lucidly explained in the issue of the Telsen Radiomag in which the set is described, and in consequence the task is far from being a formidable one.

Once the set is adjusted, the single-dial control literally bristles with distant programmes. It was far too lengthy a task to endeavour to count all the stations we heard, but some idea of the amazing sensitivity and selectivity of the set will be gathered from the fact that at no part of the tuning condenser could we find a space of more than two degrees without striking a station. In most cases programmes were separated by only one degree, and yet there were no traces of interference except where stations were heterodyned initially.

The set is not entirely immune from "repeat" points, but that is not a failing that is common only to the Telsen arrangement. It happens with so many superhet schemes, but in any case it is not sufficiently serious to constitute a cause for concern.

The kit as it is sent out is complete down to the last detail. Every nut and bolt, every piece of wire—in fact, *everything* necessary for the construction of the set, including a nest of spanners and a screwdriver, is included in the attractive carton in which the set is packed.

The chassis is of metal, and every hole is accurately drilled to take the parts that are mounted on it. A smart and neat appearance is imparted to the metal panel by the black crystalline finish that is employed, and again, the drilling of the holes to which the panel components are secured is commendably accurate.

The order in which the various components have to be mounted in the construction of the set is very clearly defined in the printed instructions, and the way in which every aspect of the construction is dealt with leaves absolutely nothing to be desired. It is our considered opinion that it would be impossible to go wrong.

The Telsen claim that with this kit it is possible to combine the stability of a factory-built receiver with the extreme sensitivity of the individually-adjusted constructor's set is, in our opinion, fully justified, and we are confident that this great new kit-set will fill a widespread demand for a super-sensitive, super-selective receiver at a "reachable" price.

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