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BUILD THE "FIRESIDE" TWO (See Page 20)

Popular Wireless

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No. 354. Vol. XV. INCORPORATING "WIRELESS" March 16th, 1929.

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Those Marconi Royalties. A New Beam Development
Modernising the Original "Melody Maker"
Programme Parasites. "P.W." White Print No. 15. Radio Talkies

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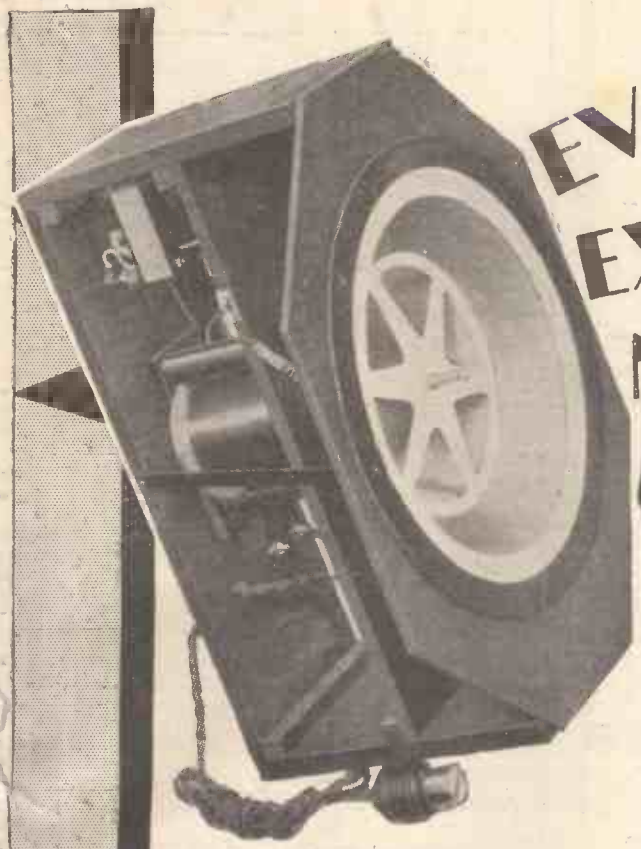

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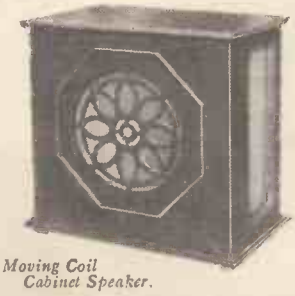

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Arks. S. 14

IMPORTANT Announcement!

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for the 1927

Cossor

Melody Maker

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Contents of the COSSOR Conversion Kit:—

One Cossor Screened Grid Valve Type S.G. 220.
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N.B.—Your Wireless Dealer can also supply, if required, two Cossor slow Motion Dials at 3/6 each and one Cossor L.F. Transformer at 21/-

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Popular Wireless

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RADIO NOTES AND NEWS.

Well-Deserved Honour—A Competition for Artists—Short-Wave Experiments—A Great Reception Feat—Rough on Robbers—An Australian "Star"—Long-Distance Screwdriving.

Well-Deserved Honour.

OUR hearty congratulations to Dr. J. A. Fleming, F.R.S., on the well-deserved honour of knighthood which he has received. He has had a long and fruitful professional life, and as the Grand Old Man of Valves will never be forgotten in scientific circles the world over. (Why he has never had a Nobel prize is a mystery to me.)

A Reminder.

DURING this month the League of Nations is conducting short-wave broadcasting tests to the U.S.A., South America, Japan and Australia. On March 19th and 26th speeches will be transmitted to America in English, French and Spanish for one hour; on March 20th and 27th in Japanese for half an hour; and on March 14th, 21st and 28th, in English for half hour periods. The station used will be PCLL on 18·4 metres.

Competition for Artists.

THE Radio Manufacturers' Association offers a prize of £50 for the best design for a poster to advertise the 1929 National Radio Exhibition at Olympia. The designs, which must be submitted before May 31st, must be finished rough in colour, full size upright, double crown, 30 in. by 20 in., and must be suitable for lithographic reproduction in not more than nine colours and for reduction for use as poster stamps, 2⅛ in. by 1½ in. They must incorporate the wording: "The National Radio Exhibition, Olympia (New Hall), September 23rd to October 3rd, 11 a.m. to 10 p.m. Admission 1s. 6d. daily (Tuesday, September 24th, up to 5 p.m. 2s. 6d.)." Address sketches to Secy., R.M.A., Astor House, Aldwych, London, W.C.2.

Future Dance Music.

THE future supply of dance music from the B.B.C. will be as follows: On Mondays, Tuesdays, Wednesdays and Fridays, by one or more of: Ciro's Club Band, Piccadilly Players, Kit-Cat Restaurant, New Princes Orchestra, Herman Darewski and Band, Jay Whidden's Band from the Carlton Hotel, Jack Hylton's Band from Ambassador's Club, and Marius B. Winter's Band from Hotel Cecil. On Thursdays, between 10.30 and midnight the B.B.C. Dance Orchestra will be "on the air," and on Saturdays Ambrose's Band from the May Fair Hotel.

News from Afar.

THE Chairman of the Columbia Graphophone Company, Mr. L. Sterling, has returned from a world-wide tour full of notes and news. Greatly impressed with the world's strivings after television and talking films he forsees that in the not remote future a common household article will be a machine operated by three buttons, one for music, one for the vision of a film and another for the reception of broadcast.

East and West.

MR. STERLING states that in the matter of gramophone music the Japanese are coming along nicely; they demand European music, including that of Beethoven, Mozart, Brahms and even Wagner. On the other hand, the Chinese, true to type, stick to Chinese music. He says, also, that he has hopes of a fifteen minutes' record being produced as a result of work now being done—a prospect which will doubtless delight many of you.

Gramophones Generally.

AS I like radio I have not much time, and certainly not much money, to spare for gramophones, and therefore I do not know—I freely admit the dreadful fact—much about the latest models of talking-machines. I hear a £40 thing occasionally and, I repeat, it has an accent like a Yankee and a "background" like a nail being sharpened on coarse sandpaper. On the other hand, I have a good radio set coupled to a pleated parchment loud speaker and, short of moving-coil types, I have heard no L.S. to beat it for fidelity of reproduction.

One Reader in Particular.

I THINK that my complaint is mild, my inquiry for information laudable. Nevertheless, a reader who gives neither name nor address, has flown at me tooth and nail. He thinks that I jam my nose on to the record in order to hear the "scratch"—Heaven forbid!—and says that the "nasality" slogan was exploded long ago. Well, it wasn't exploded on February 24th, because on that date I heard a new record on a new machine and the twang was there. However, far be it from me to despise the talking-machine. Perhaps the B.B.C. had better scrap its artistes and transmit "records." What says the public?

Short-Wave Experiments.

IT was reported about February 22nd that Austria's new short-wave experimental station would shortly be testing on 49 metres, using

(*Continued on next page.*)

A ONE-VALVE WONDER.

This photograph, taken at the White City during the British Industries Fair, shows a huge £150 valve, made by Mullards.

NOTES AND NEWS.

(Continued from previous page.)

30–40 watts. A little bit too near for comfortable S.W. reception, perhaps, but worth tuning for occasionally when nothing much else down on that band offers. Unless Austria wants to put out some propaganda I really do not see that she needs a short-wave transmitter.

A Great Reception Feat.

I THINK that is a fair description of what Mr. C. G. Allen did whilst flying with Mr. Bert Hinkler 3,000 feet above Croydon. He received 3 L O (Melbourne) on a six-valver, the distance being some 11,200 miles, and the wave-length 31·55 metres. Reception on an aeroplane in flight calls for considerable skill even under the most favourable circumstances, and to get an Australian station well enough to identify it is surely a bit of work deserving the highest praise.

Rough on Robbers.

THE police authorities of the West Riding are severely discouraging malefactors. They have equipped their headquarters at Wakefield with a complete radio station, besides supplying their squads with portable transmitters and receivers. Doncaster, Selby, Settle and Rotherham police stations have radio equipment which enables them to transmit over distances varying from 50 to 75 miles. The way of the transgressor is hard indeed—harder every year. Burglars, etc., owe nothing whatever to Marconi.

Long-Distance Telephony.

IT is only a matter of a year or two and world-wide radio-telephony will be a commonplace. Since the Buenos Aires—Berlin wireless telephone service was opened on December 10th last, no less than eleven European countries have been connected to it, in addition to which Buenos Aires opened a direct service with Paris on January 31st. Tests from this country through the Continent are already taking place, and before long we shall undoubtedly be able to call up the Argentine.

Club Note.

ALTHOUGH I did not receive the news in time to announce the Alma Wireless Society's meeting of March 5th, I am pleased to be able to call attention to this body of radio enthusiasts. They meet at the Bermondsey Men's Evening Institute, Southwark Park Road, S.E. Fuller details can be got from Mr. S. F. Harris, 13a, Winstead Street, Battersea, S.W. 11. I am told that 1a and 1c buses pass the club door, and No. 78 buses within two minutes' walk of it.

Wireless Wisdom.

THE "News of the World" tells me that "The function of a lightning arrester is to permit charges of atmospheric electricity to leak off the aerial to the ground so that they do not accumulate to such an extent that lightning is attracted." And again, "The arrester is a protection, but it cannot sidetrack a lightning bolt should it strike the aerial." In a word, the lightning arrester does not arrest lightning bolts or even side-track 'em. What it does with its bolts is not known. Oh, these Sabbath scientists! What happens to the "atmospheric electricity" if you do not fit an arrester? Does it discharge through the receiver? Archibald certainly not! Oh, no!

Music Everywhere.

I HAVE already reported the Singing Shovel of Sweden, the Philharmonic Beanpot of America, and the Tuneful Telegraph Pole of Aberdeen, and now a first-class U.S.A. radio magazine has brought to light the strange case of the bakery boiler of Ohio, which amazed the flue-cleaner with a band piece and an announcement by K D K A. It is certified that the bakery had no radio set in or near it. Added to this is the allegation of an Iowa man that his radiator burst into melody—this also certified by independent auditors. There must be a radio phenomenon, the secret of which has yet to be disclosed, connected with large metallic masses. Now, Barts! What about it?

SHORT WAVES.

"If television does broadcast a man's secrets," says my tame cynic, "it won't be worse than the older method—tell-a-woman."—"Daily Sketch."

* * *

WHETHER NEEDED OR NOT.

Musically-inclined Customer: "And how often will I have to have this set tuned?"

Salesman (furniture "expert"): "Er, ah—well, it would be a good thing to have it tuned whenever the tuner comes round."

* * *

The subject of a recent B.B.C. talk was: "Can the Lower Animals Hear?" Listeners-in resent being so described.—"Punch."

* * *

AN APPALLING PROSPECT.

Announcer (during morning exercise on the radio): "And our marathon pianist, Bill Mahoney, will now play 'Forever'!"—"Radio News."

* * *

When Sir John Reith is kidnapped and held to Ransom, when Savoy Hill blows itself sky-high through excess of electricity, and pigs fly to France by way of the Channel Tunnel, then some people may get what they are asking for—dance music on Sunday.—"Daily Herald."

* * *

GRAND RECEPTION.

Radio Constructor: "Have any luck with your television set yet? What did it bring in?"

Radio Experimenter: A whole house of tele-visitors the first night."—"Radio News."

* * *

ARISTOTLE.

He lectured on philosophy,
But now he's dead, I know.
For otherwise it's certain he
Would "Talk" from 2 L O!
—"Daily Chronicle."

An Australian "Star."

P. W. (W. Australia) kindly draws my attention to the exploits of Mr. K. L. Williams, of South Australia, who publicly states that he has identified 40 broadcasting stations in Europe. List published, but no details of set used. Mr. Williams says that the German stations are the strongest, but that ours are weak. P. W. recommends K. L. W. for a "Royal Dukeship."

Deductions of a DX Expert.

FROM his experiences Mr. Williams has drawn some conclusions which may interest you. Acknowledgements to "The Listener In." (1) The best time of year for DX is round about the March and September equinoxes, and the best times of day just before and just after sunrise and sunset. (2) Signals are strongest when full moon, but an increase of "static" then. (3) "Static" usually bad when there is wind. These conditions apply, of course, to Australia. Perhaps some "P.W." reader will give us his observations for Great Britain.

Fultograph Picture Transmission.

YOU all know about the wireless pictures that are now being transmitted on the Fultograph system by the B.B.C. through 5 X X from 2.0 to 2.25 p.m. from Tuesday to Saturday inclusive. I hear that in view of improved processes in transmission, the B.B.C. has arranged to adjust the times and stations allotted for picture transmissions outside programme hours, as follows:

Afternoon Transmissions.

5 X X—2.0 to 2.25 p.m. on Tuesday and Thursday.

Night Transmissions.

(a) 5 X X and 2 L O—12.0 midnight to 12.15 a.m. on Monday and Friday.

(b) 5 G B—11.15 to 11.45 p.m. on Wednesday and Saturday.

Long-Distance Screwdriving.

I ACKNOWLEDGE the good old tip from S. J. B. (Leyton, E.) for getting a screw into position for driving when it is to go into a hole which the hand cannot reach. The method is to put the screw through a small hole in the end of a strip of stiffish paper, and to lower him till his business end sits in the hole. A few turns with the screwdriver and the paper can be torn away. Beautiful simplicity! Now tell us how to get out a screw which will not "rise," but only turns round and round flush with the wood, when you can't get your hand at it, please.

Our Aristocracy.

A SPINSTER gentlewoman of these parts was one of the first hereabouts to invest in a radio set. Recently she told me that she had been forced—*absolutely forced*—to dismantle it and give it to her chauffeur. I said: "My dear lady, why?"

"Just think," she replied, "*everybody* has one now, and I have no recourse but to revert to the —er—grand piano."

"Grand?" I said.

"Yes," she replied. "Dear dear Handel is *so* neglected nowadays."

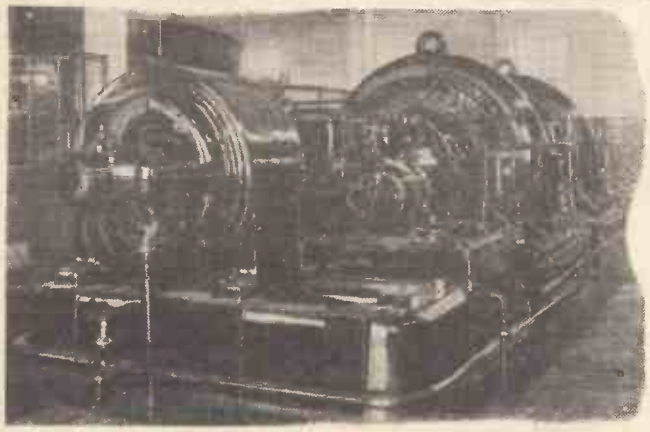
"Is he not?" I moaned.

But you must bear in mind that she lets me rent her garage dirt cheap.

Thoughts on Radio.

I HAVE been reading a pungent article on radio education, by Mr. P. A. Barnett, late H.M. Inspector of Schools. He says that a voice from a machine has an inhuman personality deeply injurious to the common life of the teacher and child. "The loudspeaker is 'an offence in itself.'" "The B.B.C. is not qualified to propound syllabuses which shall be final for all schools and sundry." All very hot stuff, but when I read, "wireless may come to be all that the child will listen to," and "It comes to us with a sort of pistol to our heads," I begin to fear that Mr. Barrett thinks no clearer than he sometimes writes. What *sort* of a pistol?

ARIEL.



PROGRAMME PARASITES

In which the author discusses atmospherics, Morse messages, and other such things which tend to interfere with our broadcast reception.

By S. R. WRIGHT, M.I.R.E.

"5 G B last night would have been perfect except for a fearful crackling," is a remark one frequently hears when a few wireless friends get together in the morning business train.

Among the average listeners there are many who do not take a great deal of interest in the why and wherefore of their sets. They require them to keep in working order and provide them with amusement. As to how they do so, they are not in the least interested.

Others know sufficient about wireless to carry out what one might conveniently call "running repairs," while the remaining few are genuinely enthusiastic on the subject.

It is to the non-technical sections I would address these few remarks in order that the "crackling" so often referred to may be better understood.

Interference, due to crackling, may be divided into two main divisions. Firstly, that which is present in the atmosphere or earth and picked up by the aerial-earth system of the receiver; secondly, there is the interference caused in the set itself by faulty connections, loose or corroded terminals, broken flexible wires, run-down high-tension batteries, faulty grid leaks, and a hundred and one other troubles common to a wireless set.

The First Test.

Such faults I propose to leave out of the scope of this article, as their remedy lies with the more experienced listener or a repairer, and to deal solely with the causes of crackling over which the listener has little or no control.

The quickest way to find out whether the trouble is in the set or being picked up from outside is the time-honoured test of disconnecting the aerial lead from its terminal and noting whether the crackling ceases immediately this is done.

If the noise continues, then the fault may be confidently looked for in the receiver itself, unless it is being caused by electrical machinery running in the immediate vicinity of the receiver. Such things are lifts, electric motors, refrigerating plants, vacuum cleaners, violet-ray outfits, and the like.

These cause sufficiently strong interference to be picked up by the set itself, even though the aerial is detached, if they are situated nearby.

The main source of crackling which is picked up in the aerial is, of course, beyond remedy at present. I refer to atmospherics, X's, or whatever pet name one has for them.

Here again there are two, if not three, divisions to be made. Atmospherics, which are actually very miniature flashes of lightning, or discharges of electricity produced in the air, manifest themselves in two main forms when heard in the loud speaker.

Types of Atmospherics.

They occur either as sharp "cracks" of varying intensity or as long, grinding noises lasting two or three seconds. The latter sound as though one's next-door neighbour was having a couple of tons of coal shot into his cellar. The third type, if it may be called one, is heard either by itself or when the other types are also present. It consists of a rustling sound and is really caused by a multitude of very small atmospherics, not powerful enough to cause a decent noise individually.

When these troubles descend on one's aerial there is no known method of reducing them which can be easily employed by the amateur.

This is the wonderful switch gear at the new "Met." power house at Neasden. Radio enthusiasts in the neighbourhood will view the innovation with mixed feelings, as such premises are good makers of "static"!

Naturally, an indoor aerial provides much more freedom from atmospherics than an outdoor, even though the indoor aerial is hopelessly inefficient. Moreover, a very high aerial is very partial to picking up more atmospherics than a low one.

Other forms of interference received by the aerial are caused by tramway systems, electric railways, and other powerful electrical machinery.

Quite apart from these forms of interference, I have noticed others not often mentioned by writers. The switches on the house-lighting system cause very sharp cracks in the speaker whenever they are operated, and if there is a faulty switch a continuous cracking can often be traced to it, or even a loose-fitting electric-light bulb.

On the sensitive set, the interference caused by houses in the immediate vicinity can be heard quite clearly, while electric bells set up a terribly loud noise when operated nearby.

Another Source of Trouble.

A telephone exchange in constant use causes trouble, and this is very noticeable in large towns and cities. Every time a plug is pushed home on the telephone switchboard a corresponding crack is heard in the speaker, even if the exchange is some distance away.

When all these separate causes of interference are contemplated it is remarkable how reception is achieved at all, and, coupled with the terrible din of spark transmitters on ships and shore stations, it would appear that the time is fast approaching when some of these noises will have to be taken under control.

Legal Control.

In a newspaper a day or two ago, it was announced that the Austrian Government had prohibited the use of violet ray apparatus during evening broadcasting hours. I wish other governments would make an attempt to deal with the terrible interference which arises from the operation of spark transmitters on ships and shore stations.

The other afternoon, a French coastal station ruined the reception of Langenberg and 5 G B for fully half an hour. It may

(Continued on next page.)

PROGRAMME PARASITES.

(Continued from previous page.)

have been longer, but I switched off after that, thoroughly disgusted.

The same procedure was followed for the whole period. The call-sign of a French ship was sent, followed by the call-sign of the station, then by a series of very lazy V's in Morse code. After about five minutes of this he would repeat the dose.

Now, I have nothing to say to the argument put forward in official quarters that messages concerning shipping are far more important than broadcasting, although, judging by messages I have heard passing many a time, one would think they were hardly as important as personal.

Badly Tuned Stations.

Wireless at sea is imperative, and it is equally imperative that the wave-length of 600 metres allotted for the use of shipping should not be interfered with by broadcasting stations. But does this mean that the ship and shore stations should blot out broadcasting stations working on 460 metres with a snarling, raucous grinding noise, more reminiscent of the lower regions than wireless signals?

If broadcasting stations are confined to their particular wave-lengths, then the shipping stations should keep to theirs too.

Again, is it necessary for a station situated on the north-west coast of France to use such power that the signals blot out stations like Langenberg or 5 G B away up in the north of England?

There is something very seriously wrong, and now, after five or six years of complaining, I contend that the 12,000,000 odd listeners in Great Britain are entitled to make their voices heard in the matter.

If you have an X-ray outfit near you, you will hear it at work in your radio set, and may confuse it with ordinary atmospherics of a particularly "bad" type.

Everyone who has a small knowledge of the system of spark transmission is aware of the trouble. A spark transmitter of the type usually used in ship and shore stations makes a ghastly noise on a very wide wave-band even when accurately tuned to its correct wave-length, and properly operated.

If the aerial coupling is made too light, and the operator is not particular to 20 metres either way then the interference becomes more than a joke.

Again, I maintain that the precautions taken by broadcasting stations to maintain their correct wave-lengths are equally applicable to ship and coastal stations.

We were told years ago that all the spark transmitters were gradually being replaced by valve sets which would not cause trouble. Personally in the last ten years, I have noticed very little diminution of the trouble.

Regulations about keeping wave-length and amount of aerial coupling on spark transmitters should be more rigidly enforced, and where coastal stations are found interfering outside their normal area of operation, the power should be cut down.

It has been said that a million pounds would be required to convert all the spark transmitters in the British Isles to more modern apparatus. It has been further asked from where this money was coming.

May I be allowed to make a humble suggestion?

Curing the Jamming.

Last year, the Government netted £192,166 from the payments made by listeners for their annual wireless licences.

Last year, the G.P.O. netted £141,875 ostensibly for the trouble taken in printing and distributing licences, collecting the money due and reminding listeners that their licence required renewal.

I make no comment beyond the fact that I would like the chance of doing a year's such work for the same pay, considering the organisation is already in being and probably paid for by other services.

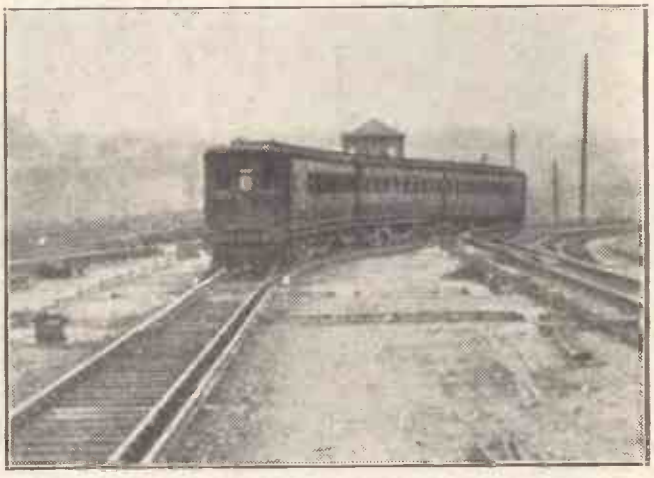
Why is not this money, paid by listeners, devoted to replacing these spark sets and the general reduction of interference so that the persons who have paid the money have a chance of hearing even an hour's programme without that snarling *dah-dah-di-di-dah-dah* bursting forth every few minutes.

THE NEXT WEEK:

"DWARF" THREE

TERSE TECHNICAL TIPS.

An anode-bend detector requires a fairly large input, and is therefore better for local-station than for long-distance reception.



As electric trains swiftly glide along, the sparking on the rails causes interrupting ether disturbances.

Although most soldering-tags are supposed to be ready "tinned," it is better to re-tin them than to trust to the original coating which is generally too thin or old to be of much use.

* * *

If the soldering-iron is not hot enough the solder will tend to be "sticky" in use.

* * *

If solder has taken properly it "runs" over the soldered surface, and does not form in a lump or blob.

* * *

Avoid emptying accumulators, etc., if your hands are cut, as poison (from the lead or acid) easily enters the body if the skin is broken.

* * *

Scrupulous care should be taken to clean the hands after overhauling an accumulator, especially if the job is undertaken just before a meal.

* * *

A VALUABLE PRECAUTION.

When mixing battery acid, wear a pair of goggles to protect the eyes against an accidental splash.

* * *

If a splash of battery acid accidentally gets into the eye, bathe it immediately in clean warm water.

* * *

Every effort should be made to wash out all traces of battery acid that may accidentally enter the eye, during battery-acid-mixing, and an ordinary eye-bath will prove helpful for this.

* * *

Do not use twisted wire for long loud-speaker leads round the house, as undesirable capacity is induced by this method. A good wire for loud-speaker extensions which is practically invisible is the No. 16 D.C.C. wire.

* * *

In sets in which the reaction condenser is connected between the reaction coil and the plate of the valve it is a good plan to insert a spare fixed condenser of any capacity from ·001 upwards in the lead to act as a prevention of battery shorts.

* * *

One of the commonest causes of scratching and scraping noises is a burnt-out primary winding of a low-frequency transformer or a low-frequency choke.

MODERNISING THE ORIGINAL "MELODY MAKER"

The great host of "P.W." readers who own "Melody Makers" will be interested to know that a conversion-kit and chart can now be obtained showing how this famous receiver can be modernised. In its new form a screened-grid valve is used for H.F. amplification, and this article tells of the easy conversion, and of the excellent results obtained on test.

By P. R. BIRD.

UNDOUBTEDLY the modernising of the famous Cossor "Melody Maker" is something of an event in the radio world. I suppose everybody has heard of this set, which, when introduced, scored an instantaneous success all over the country. In many thousands of homes there has been the excitement of the parts arriving, the fascinating game of mounting everything in place, the wiring, checking, connecting, and, finally, and best of all, the results.

Employing Screened-Grid Valve.

Bearing its reputation in mind, the first thing that will strike the critical radio man will be the question—"Well, why modernise this set at all? If the original 'Melody Maker' was such a success, why is it necessary to alter it now?"

Really, this is rather an important question, so it will be worth dealing with it briefly before going into the actual details of modernising the "Melody Maker." It is easily explained in a few words, the words being "the screened-grid valve."

About the time that the original Cossor "Melody Maker" appeared before the public, screened-grid valves were making their debut.

In the past year the 2-volt screened-grid valve has become available and its advantages have found such favour with the public that there was a demand to know if such a valve could be embodied in the Cossor "Melody Maker" without too much trouble on the part of the owner of the set.

The answer to these queries came into my hands in the form of a chart and a complete set of parts for modernising the original Cossor "Melody Maker." The cabinet, panel and baseboard sizes were unaltered, and the chart showed that the main condensers were arranged as before, but between these two and placed lower down were a couple of extra dials which proved to be volume control and reaction condenser respectively. Certainly the front-of-panel alterations were simple enough; but what about the back-of-panel and the baseboard?

Here is the new "Melody Maker," with its two small coils instead of the familiar "Cossor Coil," and with the new screened-grid valve in the first socket, in place of the detector. Note how closely the new layout conforms to the old.

Another look at the chart showed that there had been considerable reshuffling. Gone was the big double coil on the long cardboard tube. Instead, there were two coils wound upon the ordinary standard formers, but with rather different plug-in connections, one coil being mounted horizontally and the other vertically. Between these coils was a metal screen, and examination showed that a surprising transformation had been made in the circuit.

The old "Melody Maker" employed three valves, and the circuit was a detector and two low-frequency amplifiers. Now, without moving the valve holders, the new circuit is transformed into a high-frequency, detector, and one low-frequency circuit, so that the distance-getting properties of the receiver should be far, far greater than ever before.

Reference to this point will, of course, be made at a later stage of the article when dealing with the tests carried out with the new receiver, but at the moment all we need say about the circuit alterations is that they have been effected with astonishingly little alteration to the layout of the receiver. The last valve, indeed, and its associated apparatus, remain exactly as before. The middle valve, which was formerly the first L.F. valve, is now promoted to be detector, so beside it stands a grid leak and a grid condenser. These two valves and their associated components are screened off from the high-frequency end of the set.

The first valve holder, which was formerly carrying the detector valve, now takes the new screened-grid valve. It fits into the same holder as before (after the necessary alterations to the wiring of the valve holder have been completed), but on the top of the new valve there is an extra terminal. From this terminal the H.F. valve passes the signals along to the detector on the other side of the screen by means of a wire which is covered with insulation and passed through a hole in the screen.

Simple Coil-Mounting.

What was originally the reaction condenser is now the high-frequency tuning condenser, the new reaction condenser being one of the "tiny tots" which have been evolved during the last year, and which, incidentally, are capable of giving extremely good results, as has been proved in this case. Two ordinary valve holders are used to mount the two coils which

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MODERNISING THE ORIGINAL "MELODY MAKER."

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now replace the big double coil on the long tube, and these valve holders (which are really coil holders) are so artfully placed that wiring is kept short and spacing is really good.

Although I was burning with curiosity to try the set and to see what it would do, I had to pause at this stage to admire the chart showing the ingenious wangle which has been carried out with the connections so as to simplify the work of altering the old set into the new. Much remains unaltered. The loud-speaker terminals are

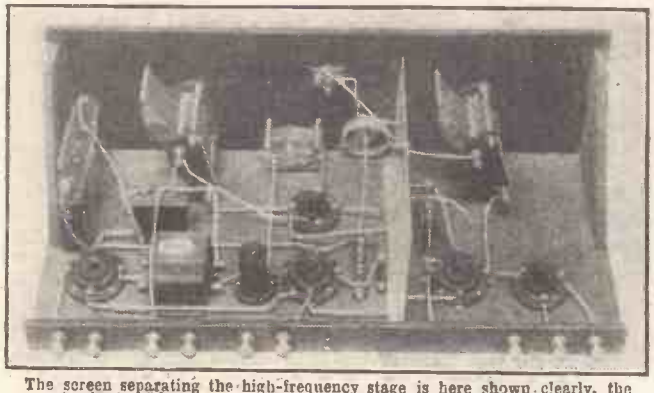
From the Report on the Original Cossor "Melody Maker."

"My first rough run round the dial gave me eight stations, all worth listening to, on the loud speaker."

the same, H.T. positive and negative are the same, and next to them are the two L.T. terminals as usual. But the on-and-off switch, which previously came next, has now gone, and I fancy will not be regretted.

Simple Switching.

The work of switching the set on and off is now done by the topmost of the three controls in the centre of the panel, and personally I consider this a very great advantage, although possibly there were cases where an on-off switch at the back of the panel was an advantage. Still, looking at the set from the back



The screen separating the high-frequency stage is here shown clearly, the grid leak and condenser being placed close beside it. Note the direct wiring and the simplicity of the H.F. end of the set.

you can see that the three right-hand terminals which previously were "earth" and the two "aerial" terminals, are now completely altered. Not their positions, which remain just the same as before, but the earth terminal is now marked "H.T. 60 volts," and to this is taken an extra lead from the H.T. battery by means of which the correct potential is applied to the screen of the new valve (via the "plate" terminal of the valve holder).

Next to this "H.T. positive 60" terminal —that is to say, the middle of the three right-hand terminals—we have the new aerial terminal, and incidentally there is now only one and not two aerial terminals as previously. But so selective is the new arrangement that station separation is far, far easier than formerly (more about that will be said later when we come to the results, etc.).

The New Wiring.

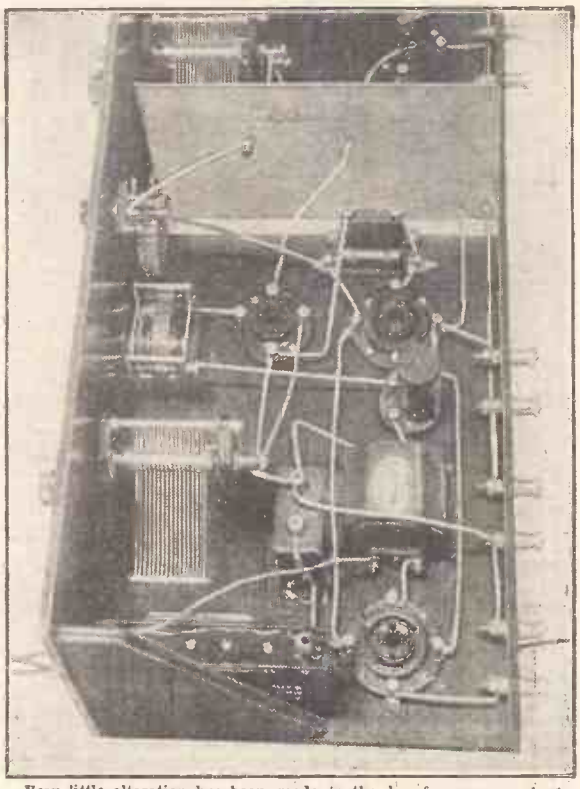
The last terminal of all, which was formerly the first aerial terminal is now the earth terminal. It carries only a couple of wires, one of which goes to the valve-holder-which-is-really-a-coil-holder, and the other to the metal screen, which, being connected to other places, such as the variable condenser, on-and-off switch, batteries, etc., forms a sort of useful distributing board, in addition to its main function of keeping the high-frequency amplification from straying.

Having got so far, we may as well glance at the rest of the alterations before turning our attention to the most interesting one of all—the alteration in reception. As the photographs and chart will show, the grid of the screened-grid valve is connected straight to its coil and to its condenser by a lead which is only 3 in. or so long, and which is well away from all the rest of the set, thus ensuring a really good and undiminished input to the amplifying valve. Standing beside the metal screen near the H.F. valve is a fixed condenser by-passing the H.T. supply to the screening electrode. And that is "all there is to it" on the H.F. side of the screen.

Mounted on the panel close up against the other side of the screen is the variable resistance which supplies the filament current to the H.F. valve, and by means of which any desired degree of softness can be given to a very loud local station.

Next to this variable filament resistance is placed the new variable condenser by which reaction is controlled, this being connected on one side to the coil holder, and on the other side to an H.F. choke which is placed between the middle (detector) valve and the L.F. transformer. Really this is all the alteration worth mentioning, for the transformer itself, 2-mfd. condenser beside it, and the grid-bias battery, as well as all the connections to the last valve, remain exactly as before.

I should like to be able to dwell upon this stage of the work and to have given you a few hints in the hope of being of service to "P.W." "Melody Maker"



Very little alteration has been made to the low-frequency end of the "Melody Maker," as this illustration shows. The "middle" valve, formerly the 1st L.F., is now the detector.

owners, but honestly, there is no more to be said about it, for Cossor's, Ltd., have covered every point, and the wiring really is as simple as the chart makes it appear.

Having completed the connections and given them the "once over" as our friends across the Atlantic say, I replaced the completed set back in the cabinet and connected up the batteries, loud speaker, aerial and earth.

The First "Run Round."

Knowing what the original "Melody Maker" would do in the way of distant-station-getting, it was with considerable interest that I turned the reaction condenser all out, adjusted both the tuning dials to 0 and turned the variable resistance on the face of the panel full on, so as to give the filament of the high-frequency screened-grid valve its full power.

From the Report on the Modernised Cossor "Melody Maker."

"Straight away a fine collection of programmes commenced to tumble in one after the other. I counted twenty-two at the first attempt!"

As you have in all probability noticed, it is when its tuning condensers are "all out" that any set is in its most unstable condition, and I cannot say that I should have been surprised had the set started oscillating. But nothing of the kind! There was no sign of a squawk or a squeal until I started to advance the reaction condenser, when almost immediately there came that soft and familiar "plop" from

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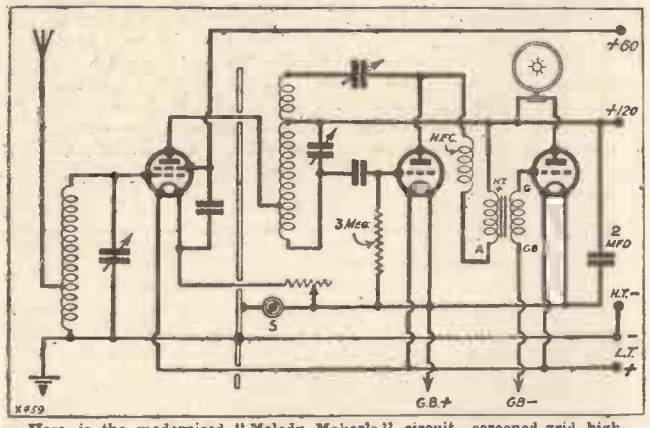
MODERNISING THE ORIGINAL "MELODY MAKER."

(Continued from previous page.)

the loud speaker which showed that the set was oscillating properly.

Reaction, then, was all right at the bottom of the scale, and by means of careful adjustment of the variable reaction condenser the set could be made either to oscillate, to hover on the verge of oscillation (which as you know is its most sensitive condition), and finally to draw right away from the oscillation position altogether.

Setting the reaction condenser just a little way from the minimum, and at that point where the gentle breathing in the loud speaker told me we were approaching the oscillation point, I placed one hand on each of the other (tuning) dials and started to work up the tuning scale, away from the 0, keeping both the condensers in step all the time. And straight away a fine collection of programmes commenced to tumble in one after the other—I counted twenty-two at the first attempt!



Here is the modernised "Melody Maker's" circuit—screened-grid high-frequency amplifier, detector, and transformer-coupled L.F. stage.

Selective and "In Step"

First came an organ solo, very weak to begin with but rising to quite good and pleasant strength when first the left-hand and then the right-hand dials were accurately adjusted. Next came a German talk, deliberate and guttural, with immense emphasis, and true Teutonic impressiveness. Two degrees further and the German lecturer had gone completely and a sweet soprano voice had "taken" the loud speaker! Another touch of the dials and another programme altogether had appeared and taken possession of the radio stage, and already I was well convinced that the modification of the Cossor "Melody Maker" was a complete success. Evidently the set was going to be a winner, so I settled down to enjoy an hour of it.

The dials were fairly brimming with stations, and although 2 L O had now started (and he was only between 8 and 9 miles away), the selectivity was so good that without a wave-trap one could get within a few degrees of his adjustment and still get the foreign programmes.

Down below 2 L O there was an extraordinary collection of foreigners at good strength, and what is more, the stations were easy to pick up because the dials were "in step." No matter how well the coils are matched in such a receiver, there are bound to be tiny discrepancies in two differently tuned circuits, which tend to throw the tuning readings out slightly, but in this set the close correspondence of one dial with the other was really remarkable.

When the aerial condenser was placed, say, at 21, the anode condenser came exactly in time with it at 21. Further on, when the aerial was set to 49 the anode condenser had to be set for 48·5—practically the same! Towards the top of the dial the circuits came exactly into resonance when the aerial was at 69 and the anode at 70—again practically the same!

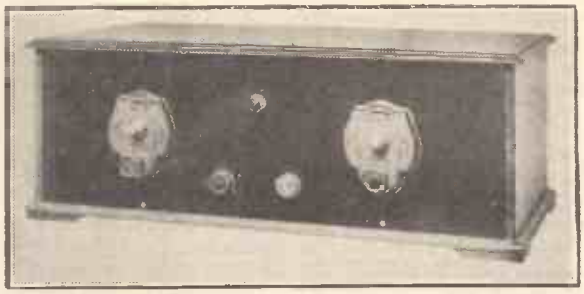
While still nearer to the top of the dial, when we might reasonably have expected them to be a degree or so out, the aerial read 88 when the H.F. condenser came exactly into tune at 88·5. The advantage of such a very close correspondence in the reading is obvious, for "searching" for distant stations simply means tuning the condensers until the readings correspond, and just giving that final touch which is always necessary in long-distance reception to bring the signal up to its full strength.

Being completely satisfied and, indeed, delighted with the long-distance getting properties of the receiver there yet remained the local programme test.

2 L O and 5 G B

On my old Cossor "Melody Maker" 5 G B's was good, but not absolutely too good. It was always possible to tell the difference between 5 G B's and 2 L O's programmes, for instance, because London wanted a lot of holding down, whilst 5 G B wanted just a little pushing in order to fill the rather large room in which the speaker is situated. The introduction of the screened-grid valve, however proved to have levelled things up remarkably!

By means of the volume control now incorporated, London could be reduced easily and quickly to the exact strength required whilst the extra high-frequency amplification brought 5 G B up to a distinctly better strength than it had been previously, and thus the quality of the two programmes was far more even. So great was the initial signal strength put into the detector by the high-frequency valve that Daventry, and during the course of the evening, several foreign stations, were so loud that the volume control was necessary for them, as well as for the local station!

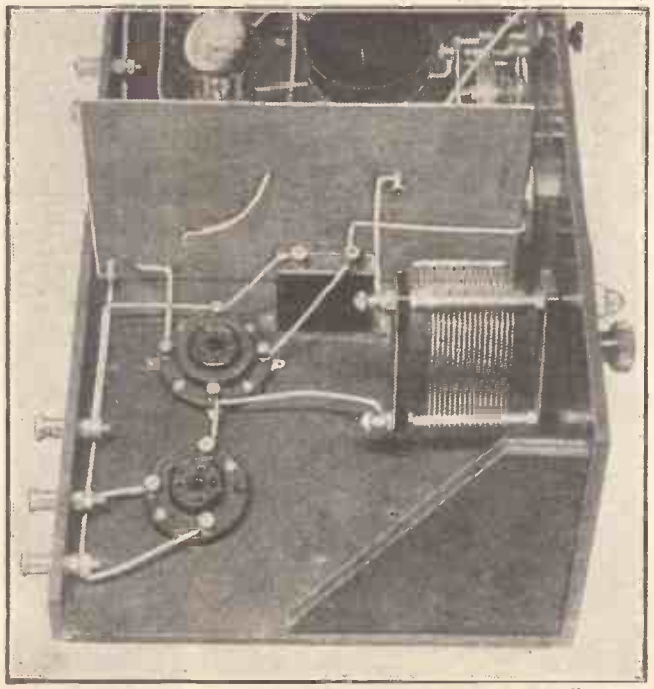


The two extra panel controls placed between the main condensers are volume control (left) and the new reaction condenser. Above them is the on-off switch.

A Wonder for Distance.

Not being provided with long-wave coils I could not explore the upper wave-lengths as well, but perhaps this was fortunate, for time was getting on and I had now secured above thirty different programmes!

I had proved that the conversion from the old set to the new was quite a simple affair, and that even if no long-wave coils were used plenty of alternative programmes were available. Moreover, that if the old Cossor "Melody Maker" was a wonder for distance, this new version was definitely superior.



"Simplicity itself" sums up the wiring of the H.F. stage. Note the lead (coming through the screen) which will be affixed to the top terminal on the screened-grid valve. This lead carries the H.F. output to the detector, the usual "plate" socket of the valve being connected to its screening grid.

THOSE MARCONI ROYALTIES.

The Present Position of the Marconi v. Brownie Royalty Case.

By A SPECIAL CORRESPONDENT.

IN August of last year one of the most interesting cases in the records of patent litigation was decided by the Comptroller General of the Patent Office. The issue arose out of an application made by the Brownie Company for the grant of a compulsory licence to use certain wireless patents owned by the Marconi Company.

The actual patents were two in number, one covering the use of high-frequency reaction, and the other the use of grid-leak rectification. The Patent Office tribunal decided that the Brownie Company had established their claim to be granted a licence, not on the terms offered by the Marconi Company, i.e. on payment of a flat rate of 12s. 6d. per valve stage, but on a more favourable basis.

The rate of royalty laid down by the Comptroller-General was 10 per cent of the wholesale selling price of the manufactured set, subject, however, to a minimum of 5s. on the first valve and 2s. 6d. for each subsequent valve employed.

Recognised Royalty Rate.

Up to this time the recognised rate of royalty paid by manufacturers to the Marconi Company in respect of the circuit patents used in broadcast receivers was a fixed sum of 12s. 6d. per valve stage.

The decision in favour of the Brownie Company at once raised the question as to why one particular company should enjoy more favourable terms than those given to the bulk of manufacturers who were bound by their formal trade agreement to pay at the rate of 12s. 6d.

It must, however, be stated that the 12s. 6d. rate covered the use of some thirteen different patents (covering the resistance-capacity coupling and other forms of circuit suitable for wireless reception), whereas the lower rate awarded to the Brownie Company applied only to two specific patents, viz. those relating to reaction and grid-leak rectification.

Shortly after the Patent Office decision had been published, the Marconi Company entered an appeal against it in the High Court.

This appeal was brought before Mr. Justice Luxmore in the Chancery Division on February 27th, and led to an unexpected and somewhat dramatic result.

Important Patents.

Mr. Whitehead, K.C., for the Marconi Company, said that the Brownie Company's original application to the Patent Office was based on the ground that there had been an abuse by the Marconi Company of their patent rights.

The two patents in respect of which they asked for a compulsory licence (reaction and grid-leak rectification) were of outstanding importance. In fact, they had placed wireless reception by means of valves on to the footing of a practical and flourishing industry.

The Marconi Company, except through a subsidiary company, had taken no part in the manufacture or sale of broadcast receiving sets. As owners of the two patents in question (amongst others) they depended for their remuneration upon the payment of royalties by licences.

With the exception of certain companies, known as "the big six," royalty at the rate of 12s. 6d. per valve stage was paid by all Marconi licensees, the number of which exceeded two thousand.

"An Amazing Decision."

The "big six," who paid at the rate of 10s. per valve holder, received this concession for valid reasons. For one thing they had been in the broadcasting industry since the beginning, and therefore had shared the initial risks, and for another they paid large amounts by way of royalty each year. If the Brownie Company's average royalty payments amounted to £5,000 or £10,000 per annum, they would have been given the same favourable terms.

The striking feature of the Comptroller-General of Patents' decision, Counsel continued, was this: Apparently if an individual

Broadcasting the news bulletin from the Moscow broadcasting station.

said "There are some other people who by licence have been permitted to enjoy the fruits of this invention, and I want to enter into competition with them on an equal footing," and if the patentee said "No, I do not choose to let you have a licence," then, according to the Comptroller-General's decision, this constituted an abuse of the patent monopoly.

Counsel considered that this was an amazing decision, and went on to argue that the Brownie Company had never established even a *prima facie* case of abuse of the patent monopoly on the part of the Marconi Company.

At this point Counsel mentioned that the Comptroller-General had not yet issued a formal "Order" stating the precise terms under which a compulsory licence would be issued.

Mr. Justice Luxmore said that the law only provided for an appeal against a definite "Order" made by the Comptroller-General, and since there was no formal Order in existence, he did not see how the Court could proceed to deal further with the matter at the present time.

After some discussion it was agreed to ask the Attorney-General, who was appearing in another Court, to attend later and give his views on the matter.

"Outstanding Too Long."

After a short adjournment the Attorney-General appeared before the Court and stated that he understood that the Comptroller-General felt that there would be great difficulty in drawing up the necessary Order without the assistance of the parties concerned.

The Judge thereupon ordered the appeal to stand over pending the drawing up of a formal Order giving effect to the previous findings of the Patent Office tribunal.

Once this had been done, the appeal could then proceed in accordance with the provisions of the Patents Acts. Mr. Justice Luxmore promised to do all he could to expedite a fresh hearing of the appeal, adding that the matter was an urgent one which had already been left outstanding too long.

TECHNICAL TIPS.

When soldering do not leave the lid of the flux off but make a small hole in it just sufficient to pass a stick or wire through and thus keep the flux from getting dirty.

* * *

If you use an earthing switch it should be placed immediately underneath the lead-in so that the leads from this can go straight down to earth.

* * *

Very often the degree of contact at the lead-in point can be improved by soldering a large spade terminal to this instead of merely twisting the wire.

* * *

If the aerial or lead-in wire is allowed to touch a metal obstruction such as a gutter, this may in turn cause interruption during the programme.

* * *

The connections to the L.T. battery and its connecting strips should always be connected tightly or bad contact here may cause intermittent interruption during reception.

* * *

Good contact in the earth lead is at least equally important as good contact in the aerial lead.

* * *

If your set howls and if the howl alters in pitch when the set is adjusted you are causing the howl. If you are not quite certain whether your set is oscillating or not, write to the B.B.C. for their very helpful free booklet on this subject.

* * *

When wires are soldered to terminals mounted in ebonite the heat softens the latter, so that the fixing screw of the terminal should be tightened up after the work is completed.

"RADIO TALKIES."

Some further news concerning our Technical Editor's latest and most spectacular invention.

By G. V. DOWDING, Grad.I.E.E.

I EXPECT you have been wondering why, during the past week or two, "P.W." has had nothing to say about my latest invention. Indeed, I have had not a few letters from readers asking me whether or not the scheme has fizzled out. But this I can assure my correspondents is far from being the case. Very shortly now I shall be able to tell you the whole story. A vast amount of planning has had to be done in order to ensure that there shall be no hitch in the practical operation of the system. You see it involves so many interests besides those of the B.B.C., and we have had to proceed with caution at every step so that everyone concerned is satisfied that there are no grounds for anything but friendly co-operation.

And let me place on record that so far we have met with nothing but kindly assistance. It has been my experience in the past that new ideas are not always welcomed, but this time I have not encountered the tiniest scrap of destructive criticism and good wishes continue to pour in from every quarter.

Much More Versatile.

I must tell you, however, that my whole scheme of things has been considerably revised, and its scope very considerably widened. By the invention of one or two further simple devices, and the considerable improvement of the original apparatus, the system has become much more versatile. Those of you who may have seen limitations and even difficulties in the use of my invention will no doubt be glad to learn that the last vestige of these has been swept away. I hate to be so secret about things, but it is impossible to say much more at the moment. I want you to regard this short article as a sort of interim report of progress; a message that all is still very well and that things are prospering mightily as it were.

The apparatus has now stood up to some very gruelling tests, and even I am astonished at how sweetly it operates. Rough handling fails to put it out of order and there is nothing tricky or critical in its operation. This is all the more extraordinary inasmuch as a vital section of it is being worked at fifty per cent above its normal speed. The reason for this is not merely to see whether or not it has any weaknesses, but owing to definite "exigencies of service." At the same time it has shown that there is more than an ample margin of safety.

You will remember that we started to produce a film especially for test purposes. This film was to have been called "A Dash For Liberty." We have encountered numerous difficulties in "shooting" this, because most of the scenes are laid out-of-doors. The weather has been very badly against us and on top of that influenza has laid its snivelly hand on our artistes. Some day this film may be completed, but I fear that this day must be postponed until we are able to command the resources of professional film studios—a day, by the way, which I think is not so far away.

However, it soon became obvious that months would pass before the "Dash for Liberty" would successfully conclude, so other arrangements had to be made. Through the kindness of one of the leading Talkie Picture Corporations with whom we have been in intimate contact, we were able to borrow three ordinary Talkie films for use in our tests and at demonstrations.

Films Sent to France.

Small replicas of the film had to be made for the home-cinema projectors and in not all cases, for certain reasons, could such be done in this country at the moment, although later on there will be full facilities for this sort of work in England. Certain of the films were sent by air mail to France, but delays occurred in the French Customs. Finally, however, back by air came the films with their small replicas accompanying them, and we were able to proceed.

But the projectors used at the ordinary cinemas run at 24 pictures per second, whereas home cinemas operate at only 16 or so pictures per second. Quite clear pictures are obtainable on the small home screens at this speed, but it was obvious we could not run films recorded at the 24 per second rate at this much reduced figure. The apparatus had to be remodelled in order that the small replicas could travel at the speed of their big brothers. At first I did not think the little home projectors would stand up to it, but the experiment was attempted and proved entirely successful. I think that you will agree with me that this says a great deal for the reliability of the home projector.

A Spontaneous Tribute.

I have now successfully operated some half dozen models, together with their various attachments, and there does not appear to be a single snag anywhere.

Very few people, comparatively speaking, have seen the gear in action, but I have never been more gratified in my life at one spontaneous tribute paid it. We had completed and had running two complete sets before we started on the 24 pictures per second model. Dr. Roberts happened to pay us a visit while we were giving this one its very first run. As often happens with hand-made mechanism of an entirely new nature, a very considerable fault developed somewhere (this happened to be a spindle so out of alignment that it caused periodic "binding").

The instrument was behaving extremely badly for this reason and, moreover, there was a lot of "messing about" on the part of the mechanics in attendance. Nevertheless, Dr. Roberts, who, if I may say so in all friendliness, is a most critical scientist, appeared to be completely fascinated. He kept his eyes glued on the model, and words such as "marvellous!" "wonderful!" (which one does not very often wring from the lips of a Cavendish Laboratory savant) were distinctly heard by all present. At the conclusion of the test run he candidly admitted that he considered the whole thing something in the nature of an achievement.

LATEST BROADCASTING NEWS.

B.B.C. EASTER ARRANGEMENTS.

THE GOOD FRIDAY PROGRAMMES—A SUNDAY MORNING BROADCAST—BANK HOLIDAY AT 5GB.

B.B.C. Easter Arrangements.

FOR the past year or two the B.B.C. has included in its series of special Symphony Concerts, given at an outside hall, a programme appropriate for broadcasting on Good Friday. Altogether, this has proved an excellent arrangement, for not only are listeners treated to a programme of first-class music, excellently performed and conducted, but opportunity has also been provided for those in London who prefer it to attend the concert on the one evening of the year when entertainment facilities in the Metropolis are curtailed to a minimum.

Many people will, therefore, welcome the decision to continue the practice this year, with a performance of Verdi's "Requiem" at the Queen's Hall. It had been, and is still, hoped that the work would be given under the conductorship of Gino Marinuzzi, one of the most eminent of living Italian conductors and composers.

The Good Friday Programmes.

Marinuzzi has conducted in Madrid, Paris, and Milan, being the Musical Director of the Scala Opera House in the latter city for three years. In 1920 he took over the artistic direction of the Chicago Opera Association, afterwards paying an extended visit to South America.

The concert will occupy the whole of the evening programme on Good Friday between 8 p.m., and the close down at approximately 10 p.m., with a fifteen minutes' interval at 9 o'clock for the news bulletin.

In other respects, too, the Good Friday programmes conform to the type that listeners have grown accustomed to expect on this day. They begin at 10.15 a.m. with a short service from the studio, such as is given every other week-day morning, followed by the time signal at 10.30 and the weather forecast, the latter conceivably being very valuable intelligence to those who intend spending the first national holiday of the year out of doors.

A Sunday Morning Broadcast.

There is then a long break until 3.30 p.m. when the Wireless Military Band is giving a concert until 5.15 p.m. Fifteen minutes of poetry reading will then be followed by an hour's light chamber music performed by the Aeolian Players.

At 6.45 a sports bulletin, another important broadcast to those anxious to learn how their favourite league teams fared that afternoon, will be read, and then comes a special religious service (to be radiated from all stations) from St. Ann's Church, Manchester.

The service, entitled "The Shadow of the Cross," has been prepared by the Rector, the Rev. F. Paton-Williams, who will also deliver four short addresses, the interludes between will be filled with hymns and anthems by the Choir.

"Good Saturday" offers nothing much out of the ordinary, except to those who profess to live for hearing opera. For these there is a goodly slab of "Samson and Delilah," played by the B.N.O.C., under the conductorship of Eugene Goossens, sen., at the Prince of Wales Theatre, Birmingham.

One of those all-too-rare Sunday morning transmissions has been arranged for Easter Day, the relay of a service from York Minster, at which the Archbishop of York will preach. This will be the Archbishop's first broadcast since his appointment to the office some few months ago. During the evening a service will also be broadcast from St. George's Chapel, Windsor, after which Mr. Percy Pitt will conduct a Grieg programme in the studio.

The importance or otherwise of the programmes on Easter Monday depend entirely on the weather. Should the day be wet people with any shoes to mend will do well to get on with the job, at any rate, until 7.45 in the evening, when things begin to liven up with an hour and a quarter of variety.

Bank Holiday at 5 G B.

At 9.35 there will be a concert of music from the Russian Ballet, then a Bridge broadcast (quite a good theme on which to start arguments in a hundred thousand homes where the game will probably be played that night), and then some dance music until midnight. The staff of the Birmingham Studios who are supplying the 5.G.B. programmes that evening have arranged an Old Folks' programme, and a Bank Holiday Concert, with an hour of dance music before this type of entertainment starts from 2 L O.

THE FIRST OF THE "TWINS."

A recently-taken view of work in progress at the new 2 L O—first of the twin-wave regionals—now under construction at Brookman's Park, near Potter's Bar.

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

REPAIRING CONES

SHORT-WAVE HINTS—MAINS NOT SUITABLE—ETC., ETC

Repairing Cones.

A READER sends me an account of how to repair a loud-speaker cone which had become damaged by being crushed. I pass this on in case it may be of use to other readers whose cone speakers have suffered in a similar way.

The paper cone was removed from its framework and was thoroughly moistened by being exposed to the steam of a kettle. Under this process the joint was loosened so that the cone could be laid out flat. It was then rubbed over with an ordinary flat iron so as to smooth out the crushed places, and was allowed to dry in this flat position.

When it was quite dry it was taken up and fixed into the cone formation once more and then coated over with a thin layer of celluloid varnish. After leaving for twenty-four hours it was found to be in perfect condition again and was replaced in the frame and gave, according to my correspondent, better results than before!

Short-Wave Hints.

Those readers who go in for short-wave experimental work will be well aware of the importance of a proper value of grid leak in the short-wave receiver. If the grid leak is not of the proper value you will find the receiver go in and out of oscillation with a loud "cluck," whilst when the correct value has been discovered the receiver goes into oscillation quite smoothly. In some cases it is not, however easy to get the desired results merely by adjusting the grid-leak value, and it may be necessary to alter the anode voltage on the detector.

In connecting up the receiver, the movable plates of the tuning and reaction condensers should always be connected to the filament return of the stage.

Mains not Suitable.

A point upon which I have previously remarked is that batteries are practically essential for successful short-wave operation

(*Continued on page* 34.)

A NEW "BEAM" DEVELOPMENT.

An account of an interesting experiment.

From A CORRESPONDENT.

SUCCESSFUL tests have now been carried out of a new and important development in long-distance wireless telephony and telegraphy. Briefly, by its aid, beam wireless stations already in existence can be used for telegraphy and telephony simultaneously and with almost complete secrecy. The invention is a combination of efficiency and economy, which may be applied to all existing beam stations, thus avoiding the necessity for building new stations for telephonic communication or making additions to existing plant.

An experiment took place recently when Mr. F. G. Kellaway, the Managing Director of the Marconi Company, and some friends spoke into an ordinary telephone at the Bridgwater Beam Station to the Vice-Chairman of the Canadian Marconi Company in Montreal.

A Valuable Development.

The new development is due to Mr. Mathieu, and while Mr. Kellaway was speaking over a distance of more than 3,000 miles, the same wave-length was being used for the transmission of two wireless telegraphic messages and, at the same time, also, as Mr. Kellaway was speaking, the tape was running off written telegraphic messages in the operating room at the rate of a hundred words a minute, and these were being relayed to London without interruption at all.

It appears that it is only during the last few weeks that the finishing touches have been given to this new development. The secret of the system is reported to lie in a new method of reception. Until recently it has not been possible to use a station for wireless telephony and telegraphy at the same time, but it appears now that when Morse messages are transmitted from Montreal or any other station fitted with the necessary apparatus, simultaneously on the same wave-length with, say, telephony, they are sorted out on reception, and while the Morse code message continues without further assistance to be recorded upon the tape, the spoken message transmitted on the same wave-length is also sorted out and regulated by an invention which is called "a gain controller and echo suppressor." The object of the echo suppressor is to check fading and to maintain uniformity of tone.

In the reception room there is a switchboard to connect up with various telephone receivers. These receivers are automatically controlled, and as soon as the speaker at one end pauses in conversation, an automatic regulator allows the answer to come through. Two people, however, cannot speak to each other at once. In other words, if both are speaking at the same time the message becomes a mere jumble.

But the Marconi-Mathieu Multiplex system, as is the title of this new development, has many great advantages. To begin with, there is more efficiency, it is much cheaper and does not mean that wireless stations have got to be reconstructed, or that completely new stations have to be designed.

Another great advantage is that the short waves can be used and that it is economical in power and possesses the advantage of almost complete secrecy. It is considered that with the Mathieu system four telegraphic and one telephone communication could be carried on the same wave-length at the same time.

Installed at Rugby.

These new developments, it is reported, have now been brought to a commercial stage after eighteen months experimental work, and by their adaptation they will make the Empire more independent in its means of communication. The system has now been installed at Rugby, and the next stage will probably be that the Post Office will supervise experiments with the system between Montreal and Radio House, London.

THE "TITAN" COIL.

A WARNING.

We have now traced several cases of trouble with the various "Titan" designs to incorrectly made commercial versions of our new combined-wave coil unit. In view of the high pressure at which some of the manufacturers have found it necessary to work in their endeavours to keep up with the demand, we think it possible that there may be other cases as yet unknown to us.

We are anxious to eliminate this source of difficulty in getting the results of which we know these sets are capable, and to see that a proper standard is maintained.

In this we wish to ask our readers to assist us, and any constructor of one of these designs who finds that he is not getting proper results is urged to check up the following details on his coil: (1) Continuity of windings (test with 'phones and dry cell on the appropriate terminals); (2) Direction of low-wave primary and secondary windings; (3) Correctness of connections to terminals, particularly as regards the loading coil. These details can all be obtained from the March 2nd issue of "P.W.," which contained a full specification of this coil, with all constructional details.

In the event of a definite fault being found the reader is requested to communicate with the makers, and to notify the Editor, giving the nature of the fault, and the NAME OF THE MAKER.

THOSE DANCE TUNES.

From A SPECIAL CORRESPONDENT.

IN connection with the broadcasting of dance bands the B.B.C. has forbidden the announcing of the titles of tunes. As a result of this step, the Performing Rights Society has now threatened to ban the broadcasting of dance music. And so, once more, the B.B.C. is in trouble!

Nevertheless, this time it is undoubtedly acting in the right way. The B.B.C. stopped the announcing of titles of dance music because certain bands were advertising certain tunes by continual repetition, on payment of the publishers; and, furthermore, were what is technically known as "plugging" certain tunes via the announcer's microphone in the various places where the dance bands play.

B.B.C. "Disgracefully Exploited."

However, the Performing Rights Society is a powerful concern, for it numbers among its members the leading publishers of dance music. As it is, the B.B.C. pays that society many thousands of pounds a year in fees, and recently an agreement was formulated for a five years' licence to broadcast dance tunes. The Society at the moment of writing is holding this up. Nevertheless, it is anticipated that they will see sense in the matter, because the most reputable publishers in the dance music industry are agreed that it is desirable to stamp out the "plugging" of certain tunes.

The well-known music publisher, Mr. Feldman, is of the opinion that there cannot be a satisfactory arrangement until the B.B.C. controls its own dance bands, or engages a Director to select its own dance tunes. It is Mr. Feldman's opinion that the B.B.C. has been disgracefully exploited, but the remedy he suggests taken by the B.B.C. is rather extreme, and affects far more people than the few responsible for the present action.

FROM THE TECHNICAL EDITOR'S NOTE BOOK

STANDARD SAC-LECLANCHÉ BATTERIES.

THERE has been extraordinary progress in the design and construction of wet H.T. batteries. For instance, the Standard Wet Battery Company has now added to their range a cell which has a larger capacity than any of triple-capacity dry types. We were recently sent two trays of these cells (No. 4) and found them, as claimed by the makers, capable of providing up to 60 milliamps. And you could take this current for a considerable period before noticeable voltage drop occurred. Sixty milliamps is, of course, much more current than the biggest of ordinary sets take. At 20 milliamps these No. 4 cells have a life of approximately a thousand hours. This would give you nearly a year's use at a regular three hours per day.

A tray of the No. 4 cells described.

Thus it will be seen that the wet H.T. battery is an economical proposition when it is considered that it can be completely renewed merely by fitting new sacs and zincs. The price of a 48-volt tray of No. 4 cells is £1 17s. 2d., and new zincs are available at 1s. 6d. per dozen and new sacs at 4s. 6d. per dozen. A year or two ago a wet H.T. battery was a pretty poor proposition, and of interest only to country listeners having the smallest of valve sets. Now, however, it would seem that the wet H.T. battery is becoming a serious rival to other forms of supply for normal purposes.

THE "D.X." THREE.

D.X. Coils, Ltd., have produced a set design which they style the "D.X." Three. They claim that this is a real distance-getter and volume-producer. A clear wiring diagram of this receiver is available.

RIPAULTS' H.T. BATTERY LABELS.

In future, Messrs. Ripaults, Ltd., inform us, all their H.T. batteries are to be sent out with guarantee labels. Then, in the event of any battery having failed, in the purchaser's opinion, to give good results, it would only be necessary for the label to be removed from the battery, the details called for filled in, and the label sent to Ripaults, Ltd., who would give the matter their immediate attention.

"RADCROIX" MAINS UNITS.

At one time the constructor of radio sets was looked at askance by the radio trade, but these days he is regarded very kindly, which is only as it should be, in view of his numerical strength! Thus we find everywhere sets of parts of receivers, loud speakers, mains units and so on.

I say mains units, but actually kits of parts of them are only just beginning to blossom forth in real numbers. Among the first in the field here were the Wholesale Wireless Co., of Farringdon Road, London, E.C.1, who have four designs to offer. There is a Full Wave H.T. Unit for 100-110 volt mains, having 6 tappings, and another having 12, the set of parts for them being £2 17s. 3d. and £3 5s. 0d. respectively.

For 200/240 volt mains there are two similar designs, the components for which are £2 17s. 9d. and £3 5s. 6d. The outputs range up to 185 volts at 33 milliamps.

We have had one of the units assembled and have tested same. We find it quite satisfactory. It should be noted that the kits of components include Radcroix Power Transformers and Chokes, Tapohm Variable Wire Wound Resistances and Hydra condensers. The individual merits of all these components will be well-known to "P.W." readers.

NOTABLE PRICE REDUCTION.

By speeding up production in their Tottenham factory and closely gauging costs the Loewe Radio Company, Ltd., have been able to reduce the price of their local receiver to 63s., including the famous multiple valve type 3NF and royalty, but excluding coils.

And it is interesting to note that ample provision has also been made for the repair of valves whose filaments have been burnt out, provided the glass bulb is intact and the internal structure not mechanically damaged. The cost of repair has been fixed at 16s. 6d., and this, it will be noted, is less than the price of one ordinary power valve.

"TITAN" THREE CABINETS.

The "Titan" Three is, considering its performance, a remarkably cheap receiver. Nevertheless, constructors can make it an even more economical outfit if they assemble the cabinet themselves.

Hobbies, Ltd., of Dereham, Norfolk, are supplying complete sets of parts of "Titan" Three cabinets at 7s. 6d. each (postage 9d.). The wood is of high-grade mahogany, and is supplied accurately cut and planed. A baseboard is included. It is an easy matter for the amateur to glue and screw the cabinet together.

At 4s. Messrs. Hobbies retail a complete polishing outfit, and with this the cabinet can be given a really "professional" finish.

We have closely examined both the Hobbies "Titan" Three cabinet and the polishing outfit, and find them of excellent quality in every way.

COLUMBIA H.T. BATTERIES.

Most H.T. batteries of the so-called "dry" type are assemblies of cells of circular form. But the Columbia breaks away from this method of construction and has, instead, cells of flat form, "Layerbilt," as it is termed. By this means considerable compactness of assembly is achieved, as there are not all the odd corners to be filled up.

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

Thus we have a 60-volter of respectable capacity in the Columbia range which is well under 6 in. by 5 in. by 3 in. in size. Just the sort of battery, in fact, for a portable set. This particular Columbia, by the way, has tappings at 16½, 22½, 30, and 45 volts. Spring-clips are provided at these points, clips which will hold the ends of leads as in a vice—another point worth noting by the portable-set enthusiast.

Columbia do not, of course, use soft wax filling; a hard, brown substance is employed which a summer sun cannot effect—yet another portable set pointer.

We have recently received one of the above 60-volters for test, and find it as full of vigour as every other Columbia we have had cause to have "on the bench." Columbias are certainly fine batteries, and readers can buy them with every confidence that they will render them good service.

The 60-volt Columbia H.T. Battery.

THE "TOM-TIT" TWO.

The Editor, POPULAR WIRELESS.

Dear Sir,—I wish to thank the author of the "Tom-Tit" Two published in "P.W." a few weeks ago.

I have constructed the set and it has proved itself an efficient little set, working a loud speaker at the power and clarity of any three-valver I have yet heard, and this on a small aerial fifteen feet high.

I have also bagged four or five different stations (foreign) on the speaker after dark.

Wishing the author and your paper every success.

Yours, etc.,

H. G. NORTON.

Suffolk.

THE "SHORT-WAVE" TWO.

The Editor, POPULAR WIRELESS.

Dear Sir,—Just a line in reply to a letter in your columns by J. A. Walsh (Gorton) re the "Short-Wave" Two. Well, I take my hat off to W. L. S. The set is all he claims; it's a topper. It may be of interest to Mr. Walsh to know this is the first time I have written to you, but I have been a reader of your paper from the first issue. I have not built the set to specifications. The panel is three-ply and the coils are Igranic; the rest are first-class stuff. And 2 X A F can be brought in as easy as tuning a broadcast set.

Wishing you and your valuable paper every success.

C. B. FAIRCLOUGH.

Liverpool.

PIANO AS LOUD SPEAKER.

The Editor, POPULAR WIRELESS.

Dear Sir,—The following may be of interest to your readers, judging by the amount of interest it has caused in my immediate circle. It concerns the use of one's piano as a loud speaker. The whole point is that the piano is not damaged in any way, and—in the case of pianos constructed as mine is—the unit may be instantly removed.

A sketch herewith (not to scale) shows what was done. The unit is mounted on a hardwood strip and the strip is merely wedged in position between a pair of vertical members of the main piano frame, the stylus merely being pressed firmly to the back of the sound board. Other methods of fixing would have to be evolved for pianos constructed differently from the case under review.

The results are surprisingly good. The tone is all that can be desired and the response is quite good all through the piano scale, and the bass notes, while clear and defined, are not "boomy."

Yours faithfully,

HERBERT A. BOWER.

Kent.

THE "TITAN" THREE.

The Editor, POPULAR WIRELESS.

Dear Sir,—As no reports on the "Titan" Three have been published I think you will like to hear of my results with this set, the best three-valve set you have ever published and I have tried. I am enclosing you a list of stations received and identified by means of a graph chart and "World Radio's" help. The loud speaker was used throughout on a 30-ft. aerial, 25 ft. high. I made this set the Wednesday after issue and got most of these stations the first few days, and have proved most of them since.

Yours sincerely,

E. A. SANDELL.

P.S.—"Loose 'Un" (Sheffield) wants to study things up a bit first.—E. A. S.

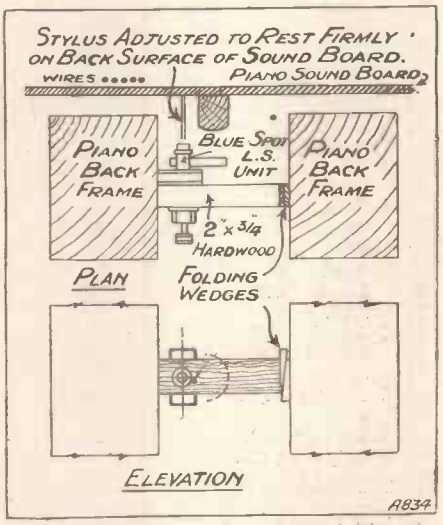
Seaham Harbour.

CORRESPONDENCE.

THE "TITAN" THREE

THE "SHORT-WAVE" TWO—PIANO AS LOUD SPEAKER—THE "TOM-TIT" TWO.

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



SHORT WAVES.

Station	Dial Reading	Remarks
Nuremberg	0	Good
Newcastle	7	Interference with N/cle
Toulouse P.T.T.	24	Weak
Horby	31	Good
Cologne	35	Strong
Turin	52	Loud at times, fading
Konigsberg	55½	Good
Magdeberg (?)	59	Moderate
Viborg	61	Moderate
Bournemouth	64	Noisy or relays (?)
Bordeaux	73	Good at times
Aberdeen	83	Good (consistent)
Breslau	89	Loud
Cardiff	91	Weak
Glewitz	93	Loud
Naples (?)	97	Weak, can't identify
Huizen	99	Good
Copenhagen	101	Weak
Prague	103	Good
Goteborg	105	Loud (very consistent)
Barcelona (?)	107	Weak
London	111	Fades (loud at times)
Leipzig	114	Good
Stuttgart	118	Good
Manchester	120	Weak
Fredriksstad (?)	122½	Weak relay(can't iden.)
Hamburg	125	Good
Glasgow	129	Weak
Frankfurt	136	Good
Dublin (?)	132	Can't identify
Katowice	134	Weak
Brünn	138½	Weak
Stockholm	139½	Weak
Rome (?)	140½	Can't identify
Langenberg	147	Good
Berlin	151	Weak
5 G B	152	Good (fades away)
Oslo	155	Good at times
Toulouse	156	Very weak
Milan (?)	157	Weak
Brussels	158	Moderate
Vienna	160	Good (consistent)
Riga (?)	162	Can't identify
Munich	163	Good (weak at times)
Budapest	166	Consistently good
Jubliana (?)	170	?

Good.—These are received every night, and some during the day.

(?)—Identified by means of Graph Chart and Kilohertz (kilocycles) (nearest).

LONG WAVES.

5 X X.
Radio-Paris.
Königswusterhausen.
Hilversum.
Paris (Eiffel Tower).
Motala (?)

Using series condenser in circuit and 12 tapping and 60 on long waves gives almost constant reaction.

This is not leg-pulling.—E. A. S.

Valves.—Mullard, S.G.; Osram, R.C.C; Osram P.2.15. I found the R.C.C. was about twice as good as a Mullard H.F. as detector.—E. A. S.

SHORT-WAVE NOTES.

By W. L. S.

AT last I have a letter from a reader who claims to belong to the H.A.C. Club, having Heard All Continents, as far as short-wave broadcasting is concerned. He has stolen a march on me, for I still lack South America to complete my list, although I have often logged South American amateurs on telephony.

Mr. D. S. Coe, of Plymouth, has recently been hearing the Monte Grande, Chile, station just below 15 metres with some regularity, although it was not until recently that he became aware for certain of the identity of the station.

The Best Stations.

He says that all the other continents are easily received, and finds the best stations are: Australia, 2 F C and 3 L O; Asia, P L E and P L F (Dutch East Indies); Europe, P C J, etc.; and Africa, 7 L O (Kenya Colony).

Mr. Coe puts up a list of other stations received that shows he knows how to handle a short-waver, and promises to help me to keep up to date with notes and news. Many thanks!

I made a short-waver recently with an "anti-mobo" device in the H.T. lead to the detector, with a view to using the set occasionally with an H.T. eliminator, working from A.C. This I did, and the set performed very well indeed, the hum received on 'phones being such that several people would not have noticed it at all.

While hanging on like grim death to a very weak signal a few nights ago, and staring, as is my wont, at the bowels of the receiver, I saw that I had connected the by-pass condenser for the anti-mobo resistance on the *wrong* side of the latter. It was simply across the H.T., and there was no by-pass at the set end of the resistance! Yet so well does the set perform that I have not yet altered its position!

Conditions for amateur work have bucked up very considerably ever since the beginning of February, and the last week of that month showed a batch of stations coming through from the Antipodes that was quite beyond anything I have heard before.

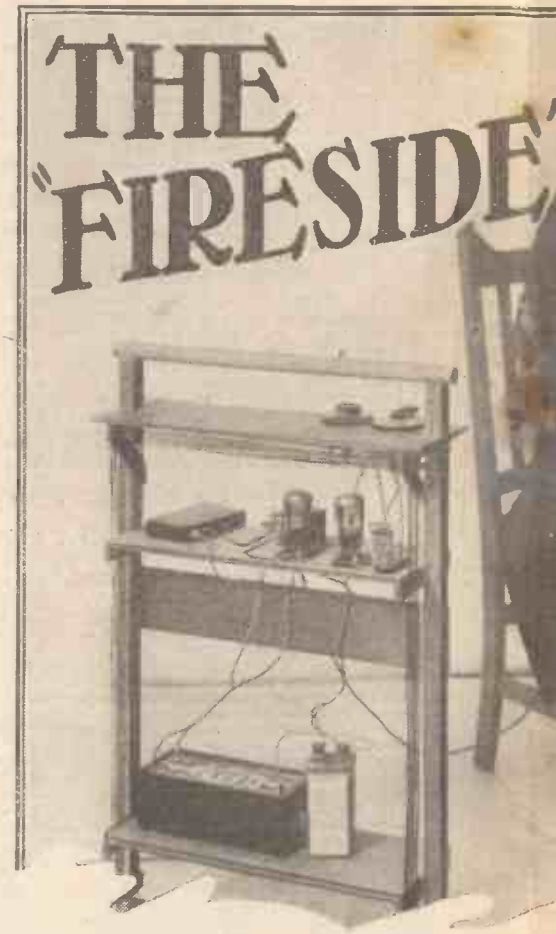
The best time is about 2.30 p.m. on the 20-metre band, when many Australians and New Zealanders come roaring in like high-power commercials. If only 3 L O or 2 F C were on at that time, the B.B.C. would be able to give a relay far in advance of anything they have yet carried out.

A Curious Dead-Spot.

A great number of South African stations has also been coming through in the early evenings on the same wave-length. Z S 4 M. in particular, although a newcomer to amateur transmission, from what he told me when I was working him some time back, is putting a signal into this country that can only be compared with a local amateur transmission. Up to this year I do not remember hearing a South African signal that could honestly be called anything above R 5, but Z S 4 M is consistently R 8 or so.

Incidentally, a very curious example of a dead spot is afforded by the fact that up to the present there has only been *one* two-way communication between South Africa and New Zealand. Australia seems to have no difficulty, but up to the end of 1928, at all events, this one solitary piece of two-way work was the sole representative as far as New Zealand was concerned.

THE "FIRESIDE"



Here is a novel frame-aerial receiver which, although of an extremely inexpensive nature, is a most efficient collector of programmes.

IMAGINE alongside your armchair a novel kind of set. You reach out one hand to its dials, and in a moment you have tuned in Berlin, and sink back in your armchair enjoying in complete comfort the programme coming through clearly in the 'phones. All this, too, on a set that costs but a fraction of that required for a receiver which would produce the same programme on the loud speaker.

On many evenings I have tuned in as many as twenty-five distant stations at satisfactory 'phone strength, all clear enough for the programme to be followed comfortably for long periods. This log included such far-distant stations as Budapest, Vienna, Stockholm, Madrid, etc., so that the DX capabilities of this simple little set are quite out of the ordinary.

Completely Self-contained.

Moreover, the set is complete in itself, accommodating all the batteries and requiring no external aerial or earth, so that it can be used in any room in the house. Being completely transportable, you can place it in an odd corner when not in use, and it can even be left there when you want only the local station.

In essentials it comprises a wooden framework forming a support for the frame aerial, which you will see wound on one side. In the framework are three shelves, on the top one are two controls, tuning and reaction; on the next the receiver proper, and lastly on the bottom one the batteries. Across the top is a wooden bar which serves as a stout handle for carrying the set about.

The size of the wooden framework naturally decides the size of the frame aerial,

You can carry this unique home-made set about with you whilst it is actually bringing in foreign stations at good strength.

COMPONENTS.

- 1 Variable condenser, ·00035 mfd., with slow-motion drive or vernier dial (Ormond Small Logarithmic in set. Any good make: Lissen, Lotus, J.B., Cyldon, Igranic, Dubilier, G.E.C., Colvern, Pye, Burton, Utility, etc.).
- 1 Variable condenser, ·0001 or ·00015 mfd. (Ormond balancing in set. Any good make: Lissen, Bowyer-Lowe, Dubilier, J.B., Burton, Cyldon, Peto-Scott, Igranic, etc.).
- 1 Fixed condenser, ·0002 mfd., with grid-leak clips (Dubilier, Mullard, T.C.C., Lissen, Goltone, Clarke, Marconiphone, Igranic, Burne-Jones, etc.).
- 1 5-meg. Grid leak (Lissen, Mullard, Igranic, Dubilier, Pye, Ediswan, etc.).
- 1 L.F. transformer, high ratio (Igranic Type J in set. Any good make: Lissen, Mullard, R.I.-Varley, Philips, Marconiphone, Ferranti, Brown, etc.).
- 2 Valve holders, anti-microphonic (Benjamin, Lotus, Igranic, W.B., Burton, Burne-Jones, B.T.H., Bowyer-Lowe, Wearite, Marconiphone, Redfern, Burndept, Ashley, etc.).
- 1 On-off switch (Benjamin, Burton, Lotus, Lissen, Igranic, Burne-Jones, etc.).
- 2 Terminals (telephone type or plain. Igranic, Eelex, Burton, Belling-Lee, etc.).
- 5 Plugs (Clix, Eelex, Burton, Igranic, etc.).
- Wood (see text).
- Sundry wire, etc. (see text).

and as I wanted to make this as large as possible, in order to get a good pick-up factor, it was necessary to make the framework fairly large.

The width of the set is only 6 inches, just sufficient to accommodate the average size batteries, so that it does not take up much room when placed against the wall when out of use.

Straightforward Circuit.

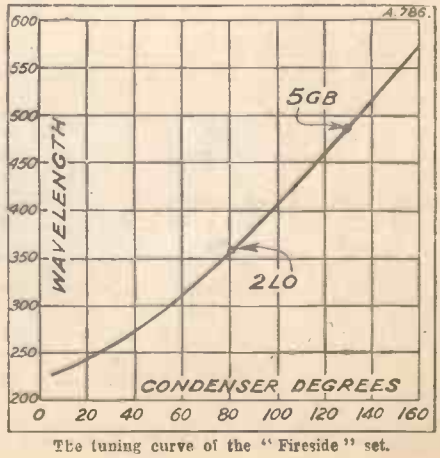
The circuit of the receiver, unlike its make up is quite conventional, consisting of a grid detector with throttle-controlled reaction, followed by a transformer-coupled L.F. amplifying valve.

It will be seen from the circuit diagram of Fig. 1 that the rest of the circuit is quite straightforward. As it is necessary to obtain as much amplification as possible, consistent with good quality, we require a high ratio transformer, so that I decided to use one with a step-up of 6 to 1.

The H.F. choke is a little home-made affair which is very simply constructed from a cotton reel and a small quantity of fine wire. With this particular choke, the construction of which will be described later, a reaction condenser of ·0001 mfd. capacity gives complete control of reaction over the full range of the tuning condenser.

It is rather essential to use a 5-megohm grid leak as shown in Fig. 1, as this value produces the best results. You should choose a sound component, as a faulty leak will give the set a noisy background and spoil reaction control. The leak I used happened to be a very good one, and the background when no signal was coming in was amazingly quiet. This absence of receiver noise is a very valuable feature in a set of this description when you are trying to tune in a weak signal.

Construction can be carried out in easy stages, commencing with the wooden frame-



The tuning curve of the "Fireside" set.

work. This, as you will see from the photographs and diagrams, is composed of two uprights, A, held together by the handle-bar on top and the stay piece in the middle, and supported on two reinforced cross-pieces for feet.

The three wooden shelves rest on pieces of wood screwed to the inner sides of the

This extraordinary transportable set was designed and is described by

J. ENGLISH.

uprights, to which are also screwed the four frame winding supports.

Having procured two lengths of inch-square wood, both 33 in. long, you proceed

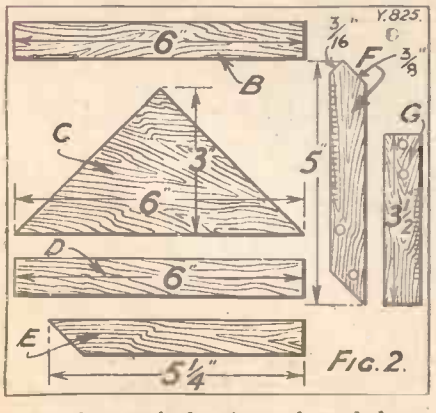


FIG. 2.

to attach to each the pieces of wood shown in Fig. 2, which gives the necessary dimensions of each piece. These pieces, of which you will require two of B, C, E, F, and G, and four of D, are cut from lengths of wood ¾ in. wide and ¼ in. or ⅜ in. thick, with the exception of the triangular pieces, C, which are cut from ½-in. sheet wood.

There is no need to use ebonite for the frame supports F and G, and I can recommend dry oak as the best, as it does not bend under the strain of the frame windings, and has a good insulation resistance. The twenty slots for the frame wires are cut with a fine saw or a hack-saw blade, spacing the slots ⅛ in., starting ¼ in. from the outer end of F and ½ in. from the outer end of G.

Finishing the Framework.

When the parts shown in Fig. 2 have been cut out and the necessary screw holes drilled in them, they are attached to the uprights A, as shown in Figs. 3 and 4, which clearly indicate the position of each part. A spot of glue or seccotine under each part before screwing down makes a stronger joint.

Note that the base B is screwed to the bottom of A, and the triangular reinforcing piece C then screwed to both. This makes a solid foot for the uprights. It is a good idea to sandpaper down each piece of wood before screwing it in place, as this is easier than rubbing down all the woodwork when finally fitted together.

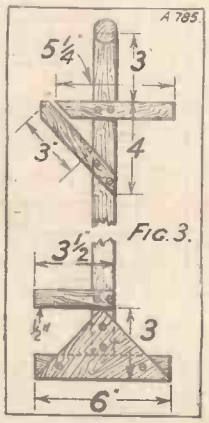


FIG. 3.

You will now see the reason for the peculiar shapes of some of the parts shown in Fig. 2. The panel support E, for example, is cut obliquely so that a space is left between it and the frame support F for the wire to be passed through for winding the frame.

The next step is to join together the two side members by means of the middle strut, cut from ½-in. thick wood, as shown in Fig. 4, care being taken that the side members are properly upright and parallel before finally screwing on the strut. Then cut and fit the baseboard and battery shelf, the best material for these being five- or six-ply, but do not screw them down.

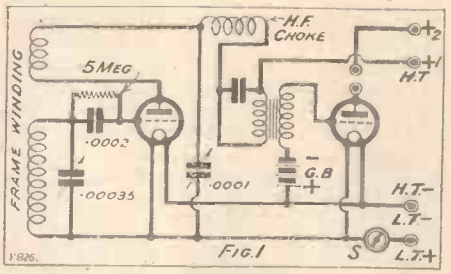


FIG. 1

The panel is cut from ¼-in. mahogany or other thin wood, the inch-square slots to clear the uprights being cut out with a saw and a chisel. The handlebar can be cut from 1-in.-diameter dowelling, or even a broomstick, small pieces being cut out on one side to form the slots into which the top of the uprights fit. This bar should not be screwed to the uprights until the panel has been finally mounted.

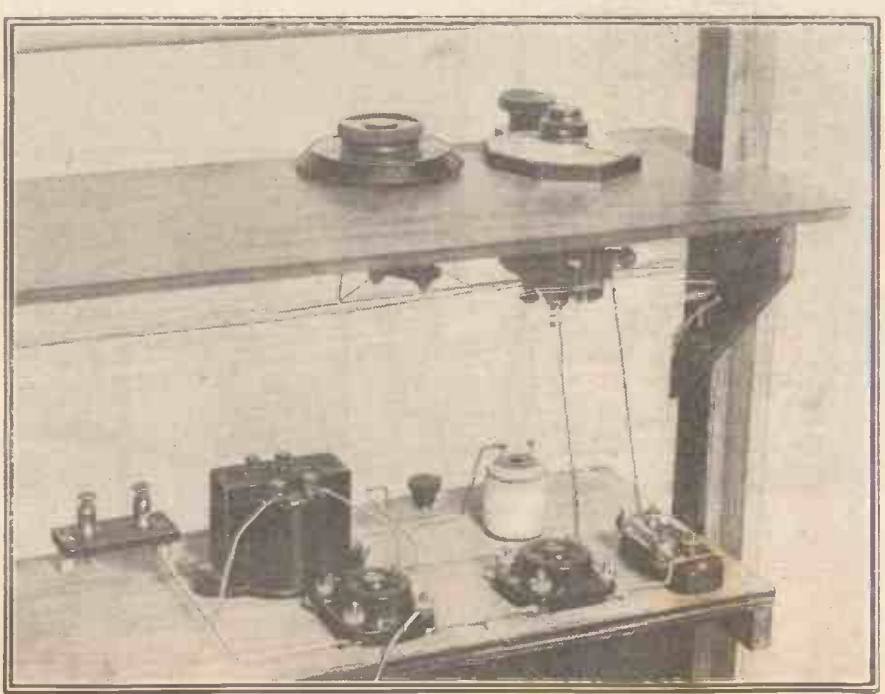
Staining the Wood.

The construction of the wooden framework is now almost finished, and you only need to give the wood a surface finish.

You will doubtless have your own ideas about this, but a very easy method of imparting quite a pleasing appearance to the woodwork is to brush it over with Brunswick black thinned down with two or three parts of turpentine.

This stain is quick drying, and leaves a dull brown surface which can be french polished if desired.

(Continued on next page.)



The close-up of a vital portion of the set shows its entirely unconventional design. It could, of course, be enclosed by an ornamental covering if desired.

THE "FIRESIDE" TWO.

(Continued from previous page.)

You will notice that the framework is constructed so that it can easily be enclosed with thin wood or cardboard on the four sides. In my opinion this is not necessary, but some constructors may prefer a totally enclosed outfit, in which case one or more doors should be fitted on the front in order to give access to the baseboard and the battery shelf. Enclosing the receiver in this way will not lower its efficiency if this additional construction is carried out without too much metal work.

Winding the Aerial.

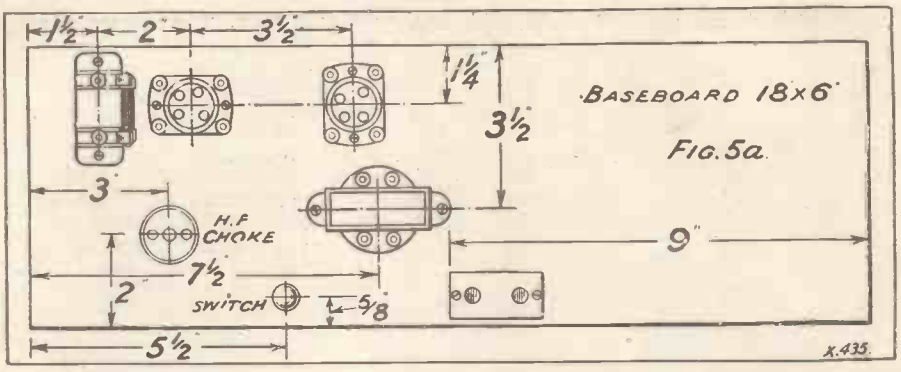
The next step in construction is to screw down the battery shelf, remove the baseboard and panel, and commence winding the frame aerial. Practically any type of wire can be used for this, but I favour a thin silk-covered wire, as this can be wound on more tautly than a thicker wire, and in the original set I used No. 30-gauge wire, green silk covered, which looks quite well against the dull brown woodwork.

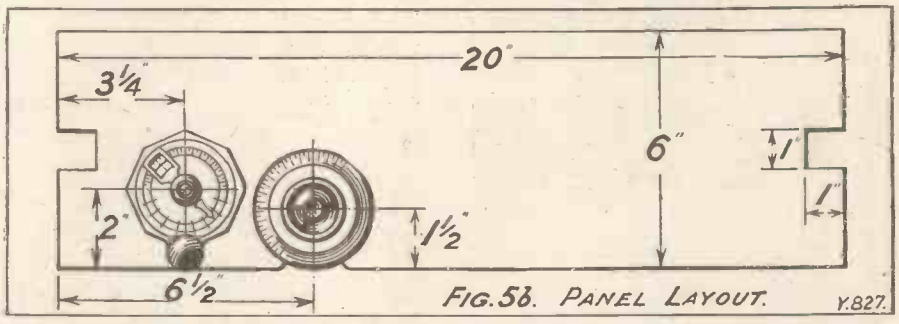
The reaction winding of 5 turns is put on first, commencing at the end of the frame supports nearest the uprights. The ends of the windings are secured in place by passing through small holes drilled in the inclined frame support nearest the tuning condenser and wedging the wire in the holes with pieces of match-stick.

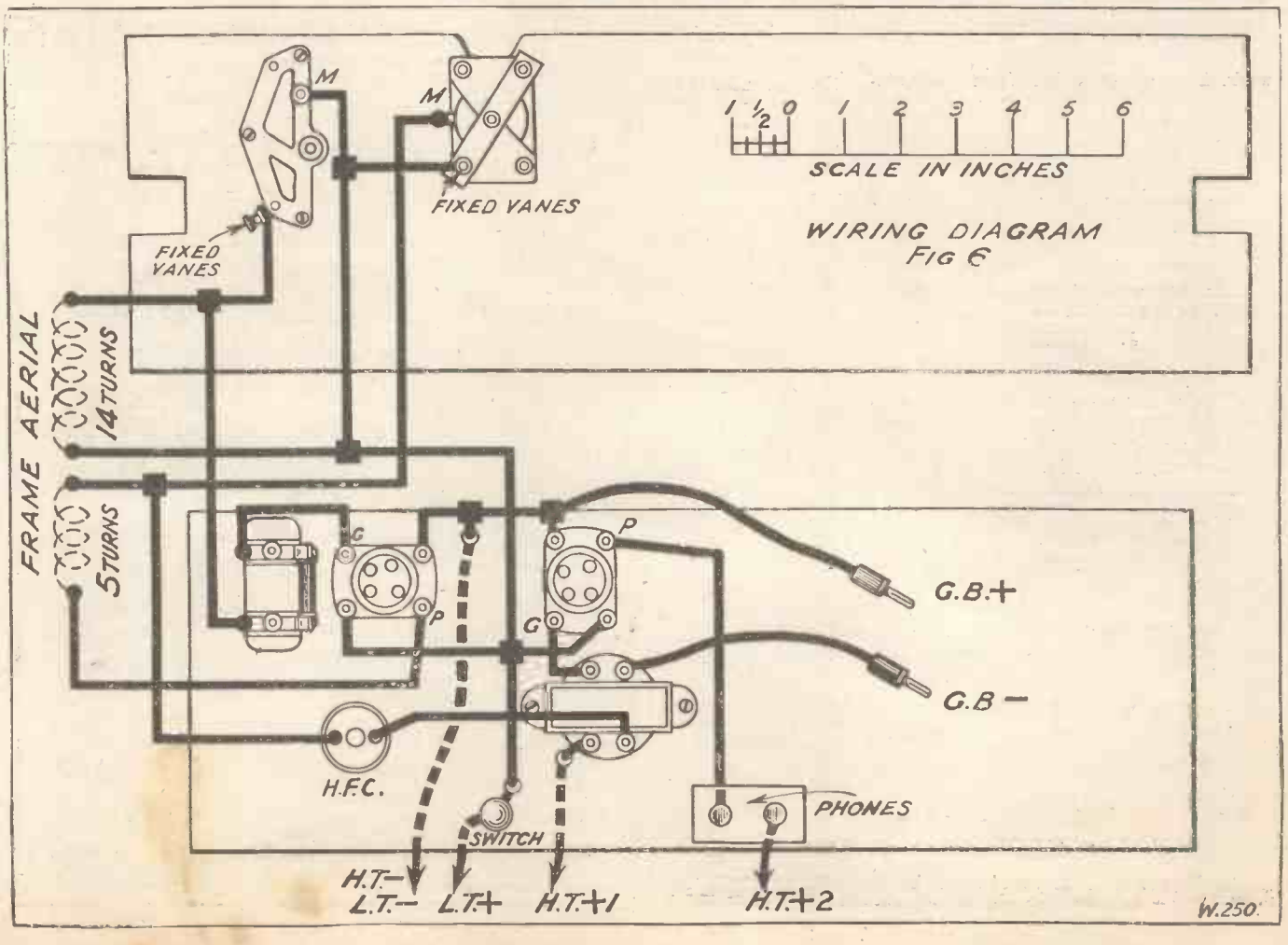
The frame aerial proper consists of 14 turns wound in the same direction as the reaction winding. It does not matter which way the frame windings are wound; in the original set the direction of winding is anti-clockwise, as seen from the back of the set.

The mounting of the baseboard components is shown in Fig. 5a, and this piece of work is quite straightforward. The only component which you need make up is the

(Continued on page 24.)







THE "FIRESIDE" TWO.

(*Continued from page 22.*)

H.F. choke. I have intentionally incorporated a home-made choke, as it can be made up for a fraction of the cost of the commercial article and is quite easy to construct. Of course, you can use a commercial H.F. choke, choosing for preference one of small size.

Take an empty cotton reel of the usual type about 1 in. high, and drill two small holes, one at each end, into the centre hole through which the ends of the windings can be passed. Then wind on enough No. 36 D.C.C. wire to fill up the reel level with the rims, passing the ends through the holes into the centre hole, and up through this to two brass screws mounted on one end of the reel, soldering the wires to these screws. Do not use any other kind of wire, as No. 36 D.C.C. was found by experiment to be the best.

The Final Connections.

The H.F. choke can then be bound up with a layer or so of silk ribbon or cotton tape as shown in the photographs, and secured to the baseboard by a screw from underneath or by a spot of Seccotine or glue.

You should finish the wiring of the baseboard before screwing it in place in the framework, as this simplifies wiring considerably. I would strongly advise you to solder all joints and connections, because I have noticed in the past that unsoldered joints soon spoil the efficiency of a frame-aerial set. There are very few soldered joints to make, and the little extra trouble is really worth while.

After drilling the panel as shown in Fig. 5b, the two condensers are mounted and the dials placed in position. You will notice that a small piece of the edge of the panel is cut away beneath the reaction condenser dial, in order to give thumb control of this condenser, which is quite a useful feature.

When mounting the slow-motion dial, secure it to the panel with a small, thin brass screw, as there is not room for the nut and bolt supplied for the purpose with the condenser in the position shown, while no connection to the metal dial is necessary. Fit each terminal of the condensers with a soldering tag, to which leads can be soldered, as this is a sounder method than just securing the wire under the terminal nut.

The panel having been placed in position in the framework, it only remains to join up the leads from the frame and reaction windings, and run a few leads from panel to baseboard as in Fig. 6, to complete the receiver, which can now be prepared for a trial run. and, I expect, at this stage of construction, you will be quite impatient to try out the set.

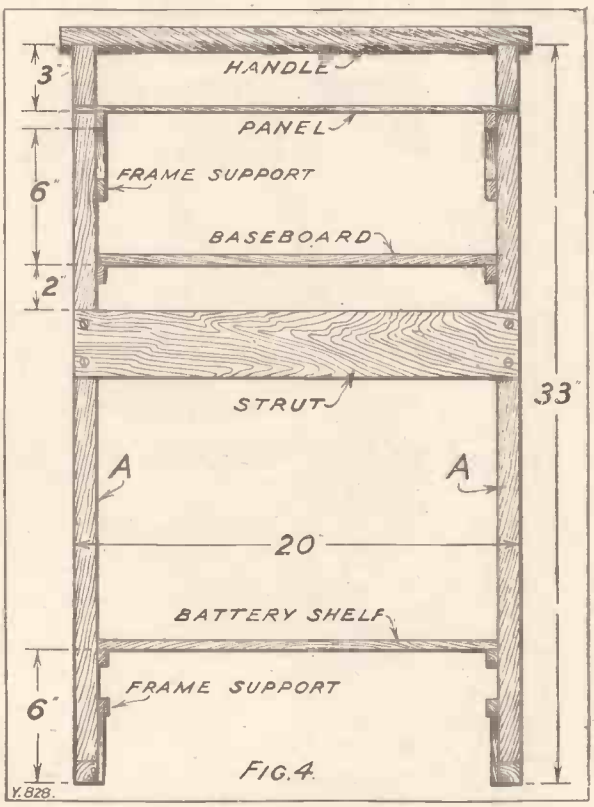


FIG. 4.

RADIOTORIAL

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

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

QUESTIONS AND ANSWERS.

THE 7s. 6d. THREE-VALVER.

R. K. L. (near Farringdon, Berks).—"What is the best way of making contact with the home-made condensers which were described by Mr. Harris in his 7s. 6d. three-valver?"

There are two methods of making electrical contact with the ends of the condensers. One is to make a hole through the foil at each end and pass a metal screw through with washers and soldering lugs. This requires delicate and careful work, otherwise you will tear the foil, and the method is not recommended for the beginner.

An easier way is to take a piece of the electric-light flex, bare it completely, when you will get a number of fine strands of wire. Scrape or rub these clean and wrap them round the tinfoil, twisting the loops so made to get very good contact.

Do this lightly and you will not squash the foil too much. It does not matter if it is pressed together a little, but do not tear it. The strands of wire should be twisted together and made of sufficient length to reach the grid soldering lug on the valve holder, or other point to which they are to be connected. (Full details were given on page 982, "P.W." 345.)

THE "TITAN" THREE.

J. H. (Southsea, Hants).—"It was with great delight I heard your 'Titan' Three, for I am a beginner. I notice the transformer looks like a Super 19s. one, but the set dealers specify the 8s. 6d. one. Which is best, and which is the one in your set?

"Also, what voltage is required for high tension. Another puzzle for me are the terminals on the set. There are three H.T. positives, H.T. + 1, H.T. + 2, and H.T. + 3. Do I connect up the H.T. positive on the batteries to only one of these, and if so, which one? Also the grid bias, is that only a kind of resistance, and how are connections made to it?"

Dealing with the questions in the order in which they are asked, the first one is the question of the transformer. We used the 19s. one, and should certainly advise you to employ one of the more expensive ones in preference to the 8s. 6d. one, if you can afford it. As you can easily imagine, the makers cannot possibly put the quality into an 8s. 6d. transformer that they can into a more expensive one, and as the set is worthy of the best you can give it in the way of components we should certainly not use the cheaper transformer if the better one is procurable.

The voltage required for H.T. depends upon the valves you employ. If you look on the box in which the valve is packed you will find that the makers recommend it to be used with a certain voltage for H.T. You want a battery which is capable of giving this voltage or a little more, and which also is capable of supplying sufficient current for the valve. Thus using the most powerful type of valve recommended by us in "P.W.," No. 349, in order to get really good reproduction a treble-capacity battery is necessary. Double-capacity batteries will, of course, work the set satisfactorily, if maximum volume is not required. They can, even, give great volume for a time, but unfortunately if used for long periods they tend to need replacement very often, as the set under such conditions requires rather more H.T. current than they are capable of supplying. For a little-used set, never "all out" for powerful speaker work, the standard batteries can be used.

Only one H.T. battery is required, but there are several connections made to it, and this explains why you have H.T. positive 1, 2 and 3. The idea is that the H.T. negative is connected to the H.T. negative terminal and then the H.T. positive 3 terminal takes the maximum voltage whilst H.T. positive 2 and H.T. positive 1 are plugged in at intermediate points on the battery as these terminals do not require such high voltages as H.T.3.

The grid bias is just a small 9-volt battery (more than 9 if the super-power valve requires this) for grid bias, to which is taken two flexible leads, one from the terminal on the L.F. transformer marked G.B., and the other from the filament of V3, which is marked G.B.+. This latter lead is a flexible one with a red plug at the end and the other grid-bias lead from

(*Continued on page 28.*)

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page 26.*)

the G.B. terminal on the transformer is a flexible lead with a black plug at the end.

Mount the grid-bias battery (which is marked + and —) and then the red plug should be plugged in at the + end. The black plug will not necessarily go right at the negative end of the battery, but probably at some intermediate point according to the H.T. voltage which you are using and the results obtained with your particular valve. All you have to do before connecting up the rest of the set is to place the grid-bias battery in position with the red plug at the positive end and the black plug at 3 or 4½ volts, as marked on the battery, altering this latter position if necessary later on. Be sure to read all the articles about the "Titan" carefully, understanding each point as you go along if you wish to get the really best results possible from this really remarkable set.

ANOTHER "TITAN" QUERY.

R. O. N. (Midhurst, Sussex).—"In the list of components for building the 'Titan' Three it says, 'One "P.W" standard screen 10 in. by 7 in. (Burne-Jones, Ready-Radio, Paroussi, etc.).' I purchased one of these, but I noticed that instead of measuring 10 in. by 7 in. it is a good deal short of the latter measurement. Will this be O.K. ?"

Yet the actual dimensions of the screen used in the original "Titan" were not quite 10 in. by 7 in., but what is meant by these figures is a screen suitable for a 10-in. baseboard and a 7-in. panel. In order to allow for the thickness of the baseboard and for the various styles of cabinets, some of which have a cross-piece for holding the panel in the front, the screen is not actually 7 in. high, but it is nevertheless described as a 7-in. screen because it is for use behind the 7-in. panel. You will find this perfectly satisfactory in use.

IS SOLDERING NECESSARY?

L. D. M. (Leighton Buzzard, Beds).—"Is it really necessary to solder the wires in a home-built short-wave set ?"

The answer to your question is that *good contact* is essential, and as soldering is the best means of getting this in most cases soldering has come to be regarded as being essential for successful short-wave work. If, however, for any reason soldering is absolutely impossible for the set builder, he need not despair, for even upon the short waves it is possible to get good contact with screw-down terminals. The only disadvantage is that such connections are liable to fail after a time because the joint cannot resist oxidisation, etc., whereas a good soldered joint when it is properly made is likely to be practically everlasting. Upon the short waves the last extra ounce of efficiency is just the one that makes all the difference between success and failure, and so it is that soldering is recommended in such circumstances.

"P.W." TECHNICAL QUERY DEPARTMENT

Is Your Set "Going Good"?

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

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

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

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

OUTPUT FROM THE PENTODE.

A. G. L. (Oxford).—"Can you tell me if the undistorted output of a pentode valve is equal to a small power valve of the 12s. 6d. type or to a super-power valve, 15s. type ?"

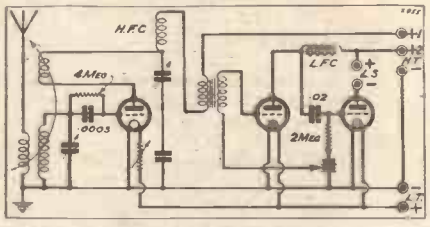
In our opinion, when used under proper conditions and in a suitable circuit, the pentode is equal to the super-power valve.

A GOOD SHORT-WAVER.

"COSMOPOLITE" (London, E.C.).—"Although I have not done much of it, I have always been very fascinated by short-wave reception. After two false starts I got going down to 20 metres on a one-valve set, and was looking for something more powerful—say two or three valves—when I saw the letter in 'P.W.' of February 23rd, from Mr. Baker.

"But I don't quite understand what he means by 'the 2·35 in M.W.'—was that a set you have described previously, which I missed ? I suppose you couldn't let me have the circuit ?"

The reference to the coils like those in "the 2·35 in M.W." means that Mr. Baker was using coils similar to those described for a popular short-wave set which was described in "Modern Wireless" ("M.W.") last December. The set was called



"The 2·35 for Australia," this title being derived from the fact that two valves were used, the total cost was 35s., and it would tune in the Antipodes !

Fortunately Mr. Baker kindly sent with his letter a copy of the circuit he uses, and although it could

(*Continued on page 30.*)

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page 28.*)

not be used at the time the letter appeared. we have pleasure in reproducing it herewith in further explanation of his letter in "P.W." No. 351.

SEVERAL CONNECTIONS FROM ONE H.T. BATTERY.

D. S. (Spitalfields, E.1.).—"I am a regular reader of 'P.W.,' and I would be very much obliged if you will let me have this information. I am making the 'Titan' Three, and there are the connections to the H.T. battery which I do not understand, though I have read your final page."

At one time all sets had only two H.T. connections. But in sets like the "Titan" Three it is usual nowadays to show not merely two H.T. connections—namely one H.T. negative (−) and one H.T. positive (+)—but three or more H.T. connections. In all such cases the H.T. *negative* terminal goes to the black plug inserted into the H.T. negative socket on the battery, as usual. But the H.T. *positive* terminals each carry a flexible lead and a red plug, and these plugs are placed in different sockets in the H.T. battery, as required by the set in question.

For instance, in the "Titan" Three using the valves recommended, you will find that the H.T. negative plug goes to the H.T.− socket on the H.T. battery, the H.T.+ (1) plug goes into the battery at about the 80-volt socket, whilst the H.T.+ (2) plug goes into the same H.T. battery at the 60-volt socket. Finally, H.T.+ 3 goes to the maximum (last + socket) of the battery. So there are three positive leads, one H.T. negative lead, and only one H.T. battery.

A SWITCHING PROBLEM.

R. F. H. (Newmarket).—"I wonder if you could help me with this problem of switching. As you will see from the diagram (enclosed) the set is a straightforward sort of one using a detector with a resistance in its plate circuit which couples through to the first L.F. valve, this in turn having the primary of the transformer in its plate circuit, so coupling the second L.F. valve. The last valve is a power valve with 18-volts grid bias, and as I have got a good aerial the volume I get is enormous.

"This, in fact, is partly the trouble, and for quiet reception (I like the wireless on as kind of quiet musical background) I should like to be able to switch out the middle of these valves. I have puzzled over it a good deal, and although the job ought to be simple enough I cannot make out how to do it.

"You will see that the valve in question (the one following the detector) has a separate rheostat in its filament circuit, with which I could switch it out quite easily, so it seems to me that I ought to be able to push over from the detector straight on to power valve. But up to the present I have failed to make it work, or else it necessitates altering the grid bias and messing about with other leads to such an extent that it is not worth it. You will see that there is not very much room for a switch, but I have a feeling that it ought to be possible to insert one so that the output is changed over without too much trouble. Can you tell me how to do this?"

Switching of this kind is always apt to give rise to possibly unexpected results, especially if, as in this case, the exact values of high-tension used, valves, etc., are not known.

We think, however, that by means of a simple single-pole double-throw switch of any type you should be able to arrange matters quite easily by

(*Continued on page 32.*)

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 30.)

means of the following connections. First of all disconnect the coupling condenser, which is placed between the detector valve plate and the grid of the first amplifying valve, from the grid of that valve and its grid leak.

Leave the latter two points connected together, but join the now vacant side of the coupling condenser to the centre terminal of switch arm of the single-pole double-throw switch. Take one of the contacts on the switch to the grid and grid leak of the first amplifying valve, so that when the switch is thrown over in this position the circuit is restored to its original condition.

The remaining contact of the switch should now be connected to the grid socket of the valve holder of the power valve. This is already connected to the secondary of the low-frequency transformer, so do not interfere with that, but simply add the new lead to it. If now the switch is placed on this side, the grid and grid leak of the second valve are automatically disconnected and the output from the detector will be taken straight on to the grid of V3, the secondary of the transformer acting as a kind of leak with the correct negative grid bias applied.

EFFECT OF GRID BIAS ON PLATE CURRENT.

H. H. A. (Bursley, Staffs).—"I have recently managed to acquire a good milliammeter and when I proudly connected this up in the plate circuit of my last valve I found to my astonishment that the current was a great deal less than I had expected on looking at the valve curve, which I must admit I do not understand a lot. I had been messing about with the instrument for a few minutes when I happened to take out the grid-bias plug and found it made an enormous difference in the anode current—in fact it doubled it!

"I checked over the connections carefully, and found it was certainly the grid bias which was doing this and nothing else, and I wonder whether it is O.K. for the grid-bias voltage to affect the anode current in this way, or whether there is something wrong in the set?"

There is nothing wrong with the set or with this particularly system, for one of the effects of correct grid bias is to reduce the plate current, and in your case this certainly seems to be happening in quite the usual way. Now that your have a milliammeter we suggest that you look at some of the back numbers of "P.W." and study the short and interesting articles which have appeared from time to time upon the subject of valve curves, plate current, grid volts, as you will find these extremely interesting and of really practical use to you now that you have a measuring instrument by means of which you can take advantage of the information in these articles.

Just one word of warning, however, is necessary. You should remember that a milliammeter is necessarily rather a delicate instrument and that it is very easily burnt out or ruined by passing excessive current through it by careless connections to batteries, etc.

Always make sure that it is connected up the correct way round as marked on the instrument, and that the circuit into which it is connected is one in which only *milliamps* are flowing and not enormously greater current, which might burn out the instrument or swing the pointer so violently as to make or break it. (If the makers of the instruments are approached, it is probable they will send you a small booklet or something of the kind on the correct use, as it is usual when such instruments are being issued to the public to provide some means of ensuring that they are used to the best advantage.)

A CORRECTION.

The Sifam Electrical Instrument Co., Ltd., inform us that their Pocket Model Voltmeter—advertised in "P.W." last week, page 1352—is a high- and low-reading instrument, and the voltages shown should have been 0-6-120 (not as given, 0-6-20).

TECHNICAL NOTES.

(Continued from page 14.)

and so far most mains-supply units, whether of the low-tension or high-tension type, do not seem to have proved satisfactory for short-wave.

With an ordinary broadcast receiver, using a loud speaker, a slight amount of A.C. ripple is unnoticed owing to the volume of the reproduction. But when listening to very weak signals with headphones the case is entirely different, and A.C. ripple which would pass unnoticed in a broadcast receiver may be very conspicuous.

Method of Operation.

Furthermore, a broadcast receiver is operated below oscillation point, which in itself is a factor in keeping the A.C. ripple down to a minimum, whilst in a short-wave receiver, as the reaction control is advanced, the ripple may be considerably amplified with the signal.

In using a short-wave receiver it is also important to use an efficient vernier dial in connection with the tuning condenser. This is not so important with the reaction condenser, but tuning on the high-frequencies is so critical that signals may easily be passed over by the operator without their presence being noticed and the desirability of vernier tuning control is evident.

Reading Curves.

A good deal is heard about charts and performance curves with reference to transformers, valves and so on, but I am afraid that in a great many cases the average user has very little idea what is meant or supposed to be meant by these curves, whilst in other cases, I am sorry to say, the charts themselves convey very little anyway.

Perhaps one of the simplest cases, which may be taken as an example to illustrate

(Continued on next page.)

TECHNICAL NOTES.

(Continued from previous page.)

how a performance curve is intended to be used, is that of the low-frequency inter-valve transformer. In this case the chart is comparatively easy to determine, and its interpretation should be readily appreciated.

You know that the audible sound reproduced from the loud speaker covers a considerable range of frequencies (or numbers of vibrations per second); a low note consists of a comparatively small number of vibrations per second, whilst in a high note the number of vibrations per second is comparatively large.

What the Curve Shows.

Now when these sounds are converted into electrical variations, these have to be handled by various pieces of apparatus, amongst them the intervalve transformer. The way in which the transformer will handle the electrical impulses depends, amongst other things, upon the frequency of the impulses; the low-frequency impulses may be handled in quite a different way from the high-frequency ones.

Frequency Response.

Inasmuch as the speech and sound currents cover, as I have already mentioned, quite a considerable range of frequencies, it is very important, if faithful reproduction is to be secured, that the transformer (as, indeed, the other components in the circuit) shall not differentiate to any great extent between the low-frequencies and the high-frequencies. In other words, the transformer should have a fairly even or uniform response to all frequencies within the required range.

At first sight you might imagine that it was impossible to get an electro-magnetic or inductive device uniformly responsive to a wide range of frequencies and, indeed, it is only by concentrated study and research that the excellent L.F. transformers now upon the market have been produced.

Wide Range.

A fair range for the acoustic frequencies in question would be from about 50 vibrations or cycles per second to, say, 8,000 or 10,000.

If the amplification ratio is taken as the amount by which the incoming signal is amplified by the transformer and one valve, then an amplification ratio of 20 to 30 may be considered good and an amplification ratio of 50 very good.

Magnification Ratio.

If the amplification ratio is plotted against the frequency in cycles, we have a curve which will show if any particular frequencies are unduly magnified. Such special magnification is known as "resonance," and is indicated on the chart by a

(Continued on next page.)

TECHNICAL NOTES.

(Continued from previous page.)

hump or peak, where the amplification goes up for a particular frequency and then down again, being lower for frequencies above or below the resonance or peak frequency. As a rule an inferior transformer shows only one such peak, or the peak may take the form of a very broad crest. Again, the curve may simply slope away downwards as the frequency increases.

Flat "Curve."

What is required obviously is a "curve" which, in fact, is as nearly as possible a *straight-line* parallel to the frequency axis. It will be clear to you that if the curve were, in fact, such a straight-line parallel to the frequency axis, it would indicate that the magnification factor was constant for all frequencies within the range.

It is impossible in practice ever to achieve these ideal conditions, but in certain transformers now made available by the best makers, it has been shown by authenticated tests that the actual working curve approximates remarkably closely to the theoretically perfect curve.

A Good Performance.

With certain of the best-class present-day L.F. transformers it is possible to obtain a performance curve which is very much

(Continued on next page.)

RADIO PICTURE PROGRAMMES.

Daily Time-Table of Fultograph Picture Transmissions.

MONDAY.
Daventry 5 X X & London 2 L O — 12 midnight to 12.15 a.m.
Berlin 1,649 m. .. — 12.45 p.m. to 1.15 p.m.
Vienna, 518 m. — 2.15 p.m. to 2.45 p.m.
& 2 pictures after evening programme

TUESDAY.
Daventry 5 X X — 2.0 p.m. to 2.25 p.m.
Berlin .. .. — 9.45 p.m. to 10.15 p.m.
Vienna .. .. — 2.15 p.m. to 2.45 p.m.
& 2 pictures after evening programme

WEDNESDAY.
Daventry 5 G B — 11.15 p.m. to 11.45 p.m.
Berlin .. .. — 12.45 p.m. to 1.15 p.m.
Vienna .. .. — 2.15 p.m. to 2.45 p.m.
& 2 pictures after evening programme

THURSDAY.
Daventry 5 X X — 2.0 p.m. to 2.25 p.m.
Berlin .. .. — 12.45 p.m. to 1.15 p.m.
Vienna .. .. — 2.15 p.m. to 2.45 p.m.
& 2 pictures after evening programme

FRIDAY.
Daventry 5 X X & London 2 L O .. — 12 midnight to 12.15 a.m.
Berlin .. .. — 9.45 p.m. to 10.15 a.m.
Vienna .. .. — 2.15 p.m. to 2.45 p.m.
& 2 pictures after evening programme

SATURDAY.
Daventry 5 G B — 11.15 p.m. to 11.45 p.m.
Berlin .. .. — 12.45 p.m. to 1.15 p.m.
Vienna .. .. — 2.15 p.m. to 2.45 p.m.
& 2 pictures after evening programme

SUNDAY.
Berlin .. .. — 12.45 p.m. to 4.30 p.m.
Vienna .. .. — 2.15 p.m. to 2.45 p.m.
& 2 pictures after evening programme

Transmissions from Radio-Paris will commence shortly, but times are not yet available. Other Continental stations will be starting soon.

TECHNICAL NOTES.

(*Continued from previous page.*)

superior to the average resistance-capacity curve, and in view of this and of the admitted superiority of transformer-coupling; from the point of view of amplification per stage, there seems no reason why transformer coupling should not come back completely into favour.

Exponential Horns.

Following my remarks in this journal of December 15th with regard to exponential loud-speaker horns, I have had sent to me some interesting literature from Messrs. Payne & Hornsby, Limited, of 7, St. Andrew's Buildings, Gallowgate, Newcastle-on-Tyne, who state that they are importing American exponential horns and are able to offer the same at very reasonable prices.

There appear to be four different sizes of these horns available. In one the length of the air column is 120 in. This, of course, is coiled up in a special way for compactness and the dimensions of the unit so arranged are as follows: Height 19½ in., width 17½ in., depth 13½ in. Another model has an air-column length of 84 in., and its other dimensions are: height 22 in., width 13 in., depth 14 in. A third and very compact model gives an air-column length of 91 in. with height 21½ in., width 18 in., and depth 15 in. The fourth model is a smaller type enclosed in a special cabinet and gives 28 in. air-column length, height 11 in., width 12 in., depth 8 in.

A Television Correction.

We wish to point out to our readers that in the issue of POPULAR WIRELESS for the week ending February 2nd there appeared, on page 1098, a reproduction of a photograph of one of the technical assistants of the Baird International Television, Ltd., which had the caption beneath it: "A television test in progress in New York."

We have been informed by the Baird International Television, Ltd., that the photograph in question was taken on the roof of their premises at 133, Long Acre, London, W.C.2.

We regret that, owing to an error, the wrong caption should have been given to this photograph, and we avail ourselves of this opportunity of pointing out that we have been informed by the Baird International Television, Ltd., that the photograph in question was taken in London, as stated above.

THE TELEVISION TEST.

AS has been forecast several times of late in POPULAR WIRELESS, a secret television test has now been held. Exactly why all the "secrecy" was necessary, and why the guests invited to witness the demonstration were pledged not to reveal any of the facts concerning the demonstration to the Press, we are at a loss to explain.

But we have our own methods of ascertaining these things, and we are able to

(*Continued on next page.*)

THE TELEVISION TEST.

(Continued from previous page.)

tell our readers that the test was held on Tuesday, March 5th. A number of well-known M.P.s were present, including Commander Kenworthy, Mr. Ian MacPherson, Mr. W. Smithers, Major Courtauld, Mr. Ammon, and Sir Robert Hamilton. Lord Clarendon, the chairman of the B.B.C., the Postmaster-General, Sir William Mitchell-Thomson, Sir Ambrose Fleming, F.R.S., and Captain Eckersley were also present.

Test from 2 L O's "Stand-By."

Mr. Baird and other officials of the Baird Television Company also were in this closely guarded room at the G.P.O., and for an hour on Tuesday morning television was transmitted from the old stand-by Marconi House transmitter, for the benefit of the guests at the Post Office.

Each one of the guests was given a pamphlet which, we understand, had the approval of the President of the Board of Trade.

This pamphlet briefly explained the television system in non-technical language, and pointed out to the guests that they were not there to criticise technically on the merits of television, but to give an opinion as to its attractiveness and general public utility potentialities, etc.

A copy of this pamphlet has come into our possession, and we certainly find it interesting reading; judging by one clause in it, no intelligent guest at the television demonstration could possibly fail to understand why the B.B.C. turned down the television scheme on technical grounds.

The Prime Minister, Too.

The demonstration, as we have said, lasted about an hour, during which time those present were able to see and hear simultaneously what was broadcast from 2 L O's stand-by transmitter at Marconi House. Amongst others, Mr. Jack Buchanan broadcast and allowed himself to be "televised."

It is understood that the Prime Minister has seen, or may shortly see, a demonstration of television. He was not present on Tuesday morning; but our representative, who was visiting the Post Office, recognised Sir Edward Manville, the Chairman of the Baird Company, as well as other well-known members of the House of Commons.

An Official Statement.

Later it was announced in the House of Commons by the Postmaster-General that it had been necessary to restrict to the minimum the number of M.P.s to attend this demonstration.

Sir William Mitchell-Thomson, the Postmaster-General, said that there were a great many factors to be considered before he could make any recommendation about television, but that all relevant facts would be taken into consideration.

It is understood that a report connected with the test will be issued in the near future, throwing light on the television situation, which has been somewhat obscured since the B.B.C. refused to adopt the Baird system in October, 1928.

THE "P.W." "WHITE PRINTS."

A UNIQUE SERVICE FOR OUR READERS.

White Print No. 15 :: Three-Stage Resistance Amplifier.

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

DESPITE the fact that the latest types of L.F. transformers give wonderfully even amplification over a very wide range of musical frequencies, many of us still feel that resistance coupling is really the thing if we want the last word in perfection of reproduction.

In sober fact, of course, it is very doubtful whether the difference is really audible on any ordinary loud speaker. However, it cannot be denied that there is satisfaction in the thought that one's amplifier is reproducing even very deep bass notes properly, even if the loud speaker isn't!

When It is Worth While.

For the moving-coil type, of course, it is arguable that a resistance amplifier is really worth while. Here we have a speaker which, in its better versions, will go down to very low notes (below 100 per second) and reproduce them fairly faithfully, and it is worth while to see that the amplifier deals with those frequencies as adequately as possible.

Be all this as it may, many people prefer the resistance amplifier, and we have accordingly prepared a design for this series which will show how a really powerful one can be arranged. It has three stages, and although the magnification of each is not high (deliberately kept down to ensure stability) the amplifier as a whole will deliver a very large output, and with suitable valves and H.T. will work a moving-coil speaker excellently.

A Super Quality Unit.

The design as it stands is for a separate self-contained amplifier, but it is intended to serve also as a suggestion for the L.F. side of a set on these lines. A study of the circuit and the values of the components will therefore probably interest any intending constructor of a super-quality outfit, whether as a complete set or a separate amplifier and set.

As a matter of fact, if you aim at super quality at all times, it is rather a good scheme to build a separate amplifier like this, because then any new set you construct in the future can stop short at the detector stage. Building a new receiver thus becomes a fairly simple matter, and having completed it up to the detector valve you just hitch on your special amplifier and have a complete outfit right away. This is obviously a good deal easier than actually building your super-quality L.F. amplifying circuits into every set you make.

The design provides for an arrangement of the "anti-motor-boating" type in the input circuit which will be found helpful in preventing instability due to battery coupling. This anti-coupling filter is arranged so that it is in series with the input circuit, i.e. so that it really acts on the detector valve which precedes the amplifier. This is practically always the most effective spot.

The device consists of a resistance of about 50,000 ohms (40,000 or 60,000 will do practically as well) in series in the circuit, and a 2-mfd. condenser shunted from one end of this to the filament circuit. A capacity of 4 mfd. is rather better here, so if you get any troubles try putting another 2-mfd. condenser in parallel with the one shown. A volume control is provided on the first stage, of the customary high-resitances potentiometer variety. It actually replaces the grid leak on this stage, hence it is necessary that its resistance should be of a suitable value.

Another point to be noted is that no output filter is indicated in the design. The reason, of course, is that readers likely to build this amplifier will probably already possess a filter as a separate unit which can be connected up to the output terminals in the usual way. A filter should certainly be used, and if you do not possess a separate one it can be worked into the amplifier itself, since there is plenty of room on the baseboard.

COMPONENTS.

- 1 Panel, 12 in. × 7 in. × ¼ in. or ⅛ in.
- 1 Cabinet to fit, with baseboard 9 in. or 10 in. deep.
- 1 Volume control, 1 or 2 megohms, potentiometer type.
- 1 L.T. switch.
- 1 Anode resistance of 250,000 ohms and holder.
- 2 Anode resistances of 100,000 ohms.
- 1 Resistance of 50,000 ohms (either an ordinary anode resistance or one of the special type now sold for "anti-motor-boating" purposes, which are a little cheaper).
- 3 Sprung valve holders.
- 2 Grid leaks and holders, one of 1 meg. and one of ½ meg.
- 3 ·01 mfd. fixed condensers (mica).
- 1 2 mfd. Mansbridge type condenser.
- 1 Terminal strip, 10 in. × 2 in. × ¼ in., and 8 terminals.
- Wire, screws, G.B. plugs, etc.

Connecting Up.

The rest of the design seems to explain itself, and calls for no particular comment, so we can go on to operating matters. First of all, note that the input leads must be connected up the right way round (if in doubt, try reversing them). Next, as usual, remember that H.T.— should not be connected to the amplifier when the same batteries are used on the set. This connection should only be made with separate batteries, or when the amplifier is used by itself, as in gramophone pick-up work.

Now about valves; the first should be of the H.F. type, with an impedance of from 20,000 to 30,000 ohms. The second should be one capable of handling a rather greater "grid swing," and one of the L.F. type (7,500 to 15,000 ohms impedance roughly) is suitable in most cases. For the last (power) stage a good-sized valve is very necessary, and one of the large super-power type is strongly advised.

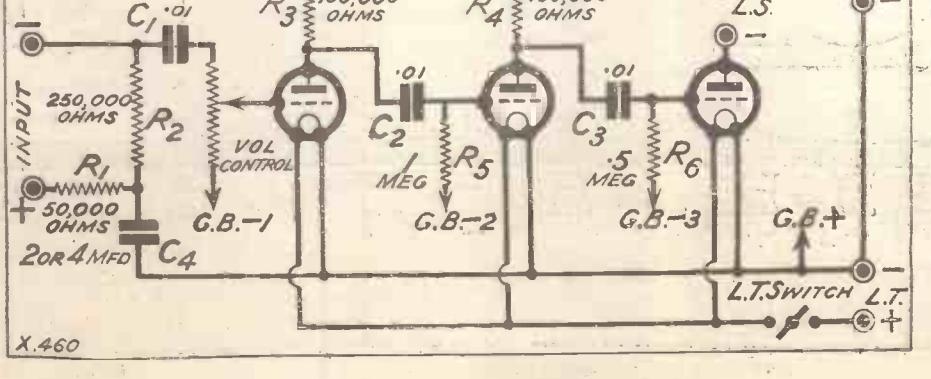
Don't Stint the H.T.

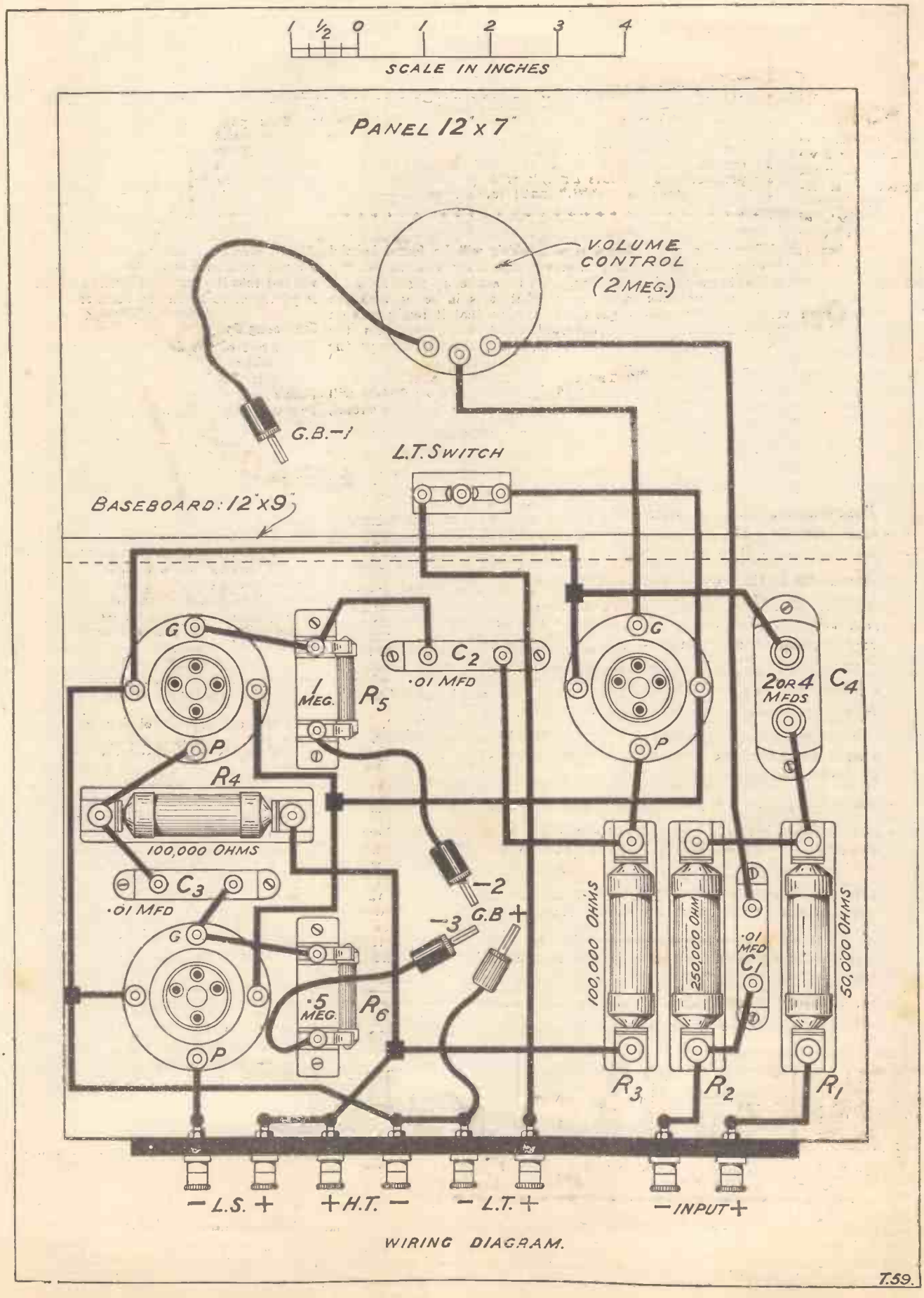
Plenty of H.T. is obviously essential for a powerful amplifier like this, if you are to enable it to handle properly the strong signals it will produce. About 120 volts should really be regarded as the minimum. Grid bias should be adjusted with a little care on the first two valves, for the valve makers' curves do not help you much here (it is very difficult to estimate how much H.T. is really reaching the valves through the anode resistances).

As a rule, 1½ or 3 volts bias on V_1, and 4½ or 6 volts on V_2 will be about right, but a little testing is desirable. V_3 can be treated exactly according to the makers' instructions, since the H.T. on this valve is known.

A little general adjustment is often needed with any three-stage amplifier, and a few points sometimes requiring attention are these: to handle very powerful signals try 50,000 ohms for R_4 to get more H.T. through on to the second valve.

To get greater stability, try reducing R_6 to ¼ meg. and R_5 to ½ meg.





WIRING DIAGRAM.

T.59.

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LOWEST CONSUMPTION-HIGHEST EFFICIENCY!

Enormous H.F. amplification without the use of any external neutralising is the outstanding advantage of the new Mullard P.M. Screened Grid valve. So great is this amplification factor—actually from 60 to as much as 80 per H.F. stage—that one Mullard Screened Grid Valve may advantageously be employed where two H.F. stages are now necessary. Moreover, reaction can often be dispensed with entirely, thus simplifying receiver design and greatly improving quality.

The screened grid is additional to the usual filament, grid and anode, and is situated between the grid and the anode, effectively screening one from the other and reducing capacity feed back to a minimum. The connection to the screen is through the normal anode pin, the anode being connected to a terminal on the top of the valve. Thus the Mullard Screened Grid Valve can be plugged into any standard type of valve-holder.

PERFECTED SCREENED GRID VALVES BY MULLARD —GET DOUBLE THE DISTANCE!

¶ *The lowest possible anode and filament consumption is achieved by the skilful design and construction of the new improved Mullard Screened Grid valve.*

¶ *The 4 volt (P.M. 14) takes a filament current of only 0.075 amp, while the 2 volt valve (P.M. 12) requires no more than 0.15 amp. This is due to months of laboratory research, testing and counter-testing and to the remarkable efficiency of the wonderful Mullard P.M. filament.*

Mullard

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Famous Bi-duplex Wire-wound Components

The word 'Bi-duplex' is known by wireless enthusiasts in every corner of the British Isles as a guarantee of efficiency and reliability. This famous winding which dates back as far as 1896 has been perfected in succeeding years, and its use has enabled us to-day to produce components of whose performance we are justly proud.

RESISTANCE CAPACITY COUPLER

Type A £1 1 0 : 0
" C 17 : 6
" D 16 : 0

Look at our Bi-duplex wire-wound Anode Resistances—they are regarded to-day as the standard for comparison not only in this country but in many parts of the world. Not only do we make a complete range of standard Anode Resistances, but in addition, tapped and variable resistances—both Bi-duplex wire-wound—can be had in a wide range of values suitable for practically all requirements.

The R.I. & Varley Bi-duplex wire-wound H.F. Choke first became popular because of its wonderful degree of reliability—this advantage was later eclipsed by its phenomenal range of choking efficiency, and to-day it is probably the most popular H.F. Choke on the market.

Our Bi-duplex wire-wound R.C. Couplers—specified for the original Mullard Master Three—played no small part in popularising Resistance Capacity Coupling. The results obtained with these R.C. Couplers—as shown in the National Physical Laboratory Curves—stamp them for ever as being one of the big achievements of modern radio science.

H.F. CHOKE 9/6

ANODE RESISTANCES
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