

S.T.900! WHAT WILL IT BE?

Popular Wireless & TELEVISION TIMES

SPECIAL ARTICLE
By
JOHN SCOTT-TAGGART

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John Scott-Taggart's **NEW SET**

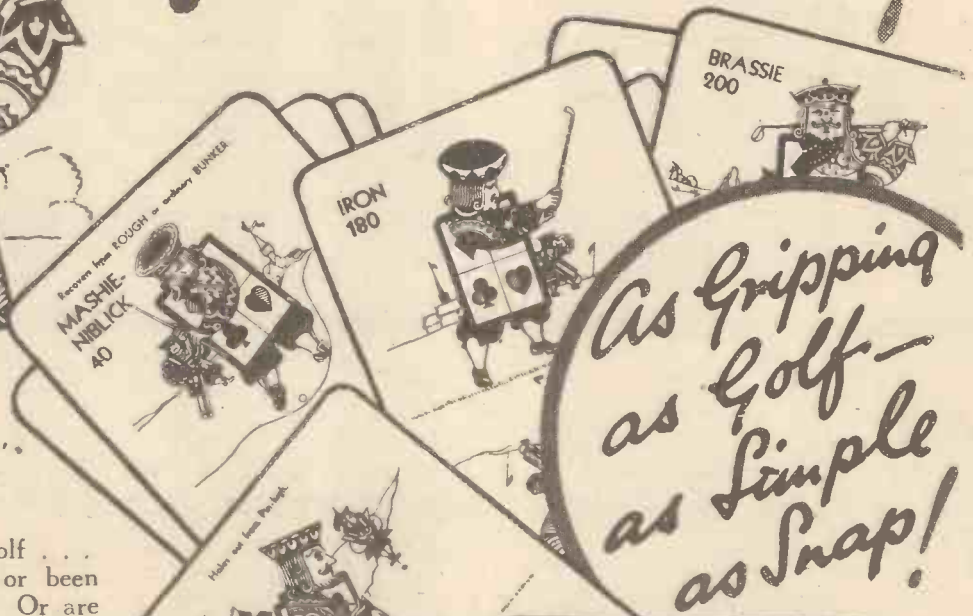
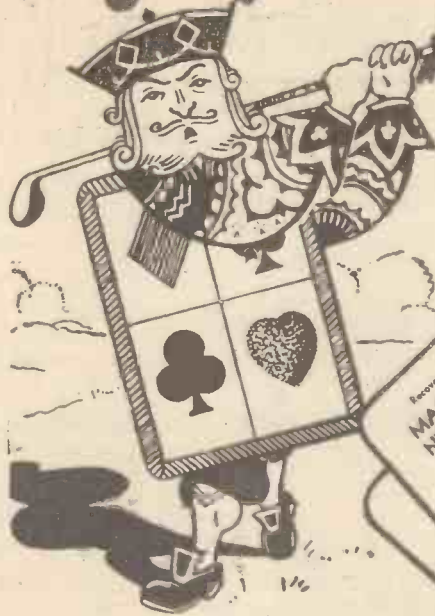
S.T.900



**NEXT
WEEK!**

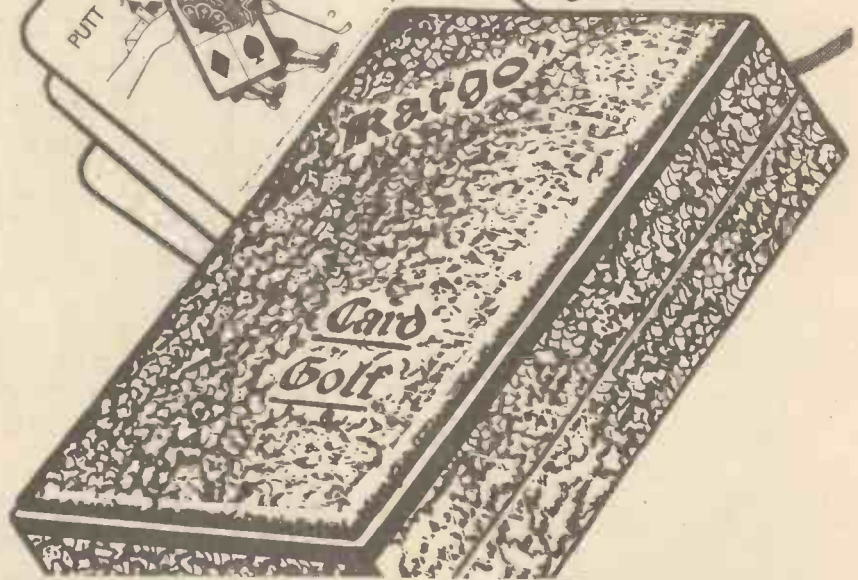
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TRAIN RADIO
FRENCH LEAVE
HERE AND THERE

RADIO NOTES & NEWS

COURT NEWS
FAST TANKS
WHALE OF A TIME

To Encourage Radio Research

THE Cambridge University Senate has been notified by Mr. J. W. O. Hamilton that he wishes them to accept the sum of £500 so that a prize may be founded for radio research.

It was at Cambridge that Lord Rutherford's epoch-making researches into the electron were carried out; there could be no better place in which to probe for further secrets.

The donor has expressed a wish that the names of Professor James Clerk Maxwell and Sir Ambrose Fleming should be associated with his gift, which is made in the belief that radio development will be one of the greatest factors in the maintenance of peace among the nations. Other gifts with the same object in view are £300 to the University of Tasmania, and £200 each to the Universities of Melbourne and Sydney.

Permanent Way to Deafness

ACCORDING to a message from Sofia all the principal main-line trains in Bulgaria are to be fitted with radio equipment, enabling passengers to keep continually in touch with the programmes of the new broadcasting station at Sofia. The main receiving set will be capable of tuning-in other powerful European transmitters also, and, if necessary, the guard or other official can cut out the radio stuff and switch in a microphone to make announcements about the train service, next stopping place, and so forth.

All this seems reasonable enough, but reading on I come across the statement that "The amplifying apparatus to be used is of unusual power. The loudspeakers will be easily heard above all the train noises and the rattle of the wheels."

You see the idea? Sleepers, awake!

A Romance of Radio Trade

BEQUESTS to members of the staff of A. C. Cossor, Ltd., are a feature of the will of Mr. W. R. Bullimore, whose death I recently recorded.

It will be remembered that Mr. Bullimore, who was responsible for those famous first Cossor valves, rose to be managing director of the firm, and saw it grow from small beginnings to one of the greatest of its kind. His fortune was a large one—£473,223, with net personalty £376,722 (Estate Duty £114,223).

those who had worked with him for so many years.

French Leave

THERE have been so many rumours from Paris lately about the possibility of radio prices being raised there that it is good to know of a new Bill that is to be introduced in the Legislature which proposes that all disabled French soldiers should be given leave to listen-in without payment of radio licence fees.

The free licences would not only enable many of the men wounded in the war to enjoy their enforced leisure, but would also be granted to other soldiers and ex-soldiers who have deserved well of their country.

And, by the way, have you noticed how well the French stations are coming in now, and how greatly improved are the programmes compared with those of a year or two ago?

WELL LIKED BY LISTENERS



REGINALD DIXON, well-known organist, whose recitals from Blackpool are so popular, with his wife and two-year-old daughter Jacqueline.

He left his real estate to his wife, absolutely, and the residue of his personal estate to her for life, and then to his son for life.

One of the last activities upon which Mr. Bullimore had been engaged concerned the starting of a pension fund for

H.Q. Improvements

B. B.C. headquarters in Portland Place, London, W.1 will be nearly doubled in size by the alterations now contemplated. We shall probably be hearing a lot about the new scheme soon, but it is not expected that it will be complete for another three years or thereabouts. When the site which was formerly 10 to 22 Portland Place is incorporated with Broadcasting House it will make the building ship-shape; at present the bows are there, but the resemblance to a liner is spoilt because there is no after part to the "ship."

Indications are that the new section will have no central studio, insulated from outside noises by surrounding office accommodation, but will have an office block above ground level and the studios underground.

Here and There

BRITISH MALAYA. The Broadcasting Corporation has now begun the construction of a short-wave station to supplement the existing medium-wave

(Continued overleaf.)

S.T. 900! NEXT WEEK! TELL YOUR FRIENDS!

LISTENING BY RADIO TO THE SONG OF THE FROGS

station. It is hoped to have the programmes on the air in six months from now.

Germany. The two high-altitude television transmitters are not progressing as quickly as had been hoped. It may not be possible to have them working by the end of the year, as originally planned.

Geneva. The daily 8 p.m. broadcasts of League proceedings, on 26.31 metres from League of Nations station, have been well received in many distant parts of the world.

Holland. The Huizen short-waver, PHOHI, is being fitted with turntable aerial towers, to enable its beam to be swung with great accuracy in desired directions.

Radio Photographs of News

REPORTS from Moscow are jubilant about the successful application of the telephoto process to propaganda. With apparatus recently installed at Moscow it is possible to send from there, in a few hours, radio photographs of the whole of a Moscow newspaper, column by column, to Novosibirsk, 2,000 miles away.



With the copy in front of them, the Novosibirsk printers can set it up again locally, and thus all the Moscow news, pictures, advertisements, etc., can be duplicated in Central Siberia almost simultaneously.

So far only one hitch has occurred. That was when one of the Moscow paper's strip cartoons was so funny that everybody at the receiving end stopped at the same moment to laugh at it.

Frog Prime Donne

WE are indebted to Tokyo and the Japanese Broadcasting Company for the enterprising notion of a special concert by the world's champion singing frogs.



In the province of Karagawa on the banks of the River Sagami are marshes of such paradisaical muddiness that millions of frogs burst nightly into songs of praise. On a still night they can be heard

for a mile or more, so the plan is to steal down the sludgy, suddy stream with a microphone, and eavesdrop on the chorus for the benefit of radio listeners.

Most Japanese frogs can sing creditably, but these particular frogs are the recognised stars of the frog concert world, and their serenade in the night is unforgettable.

Court News

THE police courts are continually dealing with cases in which wireless comes into the evidence; but not long ago there

was quite a minor sensation at Clerkenwell County Court when a woman witness declared: "I complained about the way the wireless set was working, and the engineer came and said it was all a matter of osculation."

Mr. Registrar Friend: "Good gracious! I hope not! You don't mean to say that the engineer kissed you?"

The blushing witness: "Oh, no!"

"Then I think," said Mr. Registrar Friend, "that osculation is the word you want."

There were smiles and nods all over the court at this unexpected reference to romance. But then business was resumed, the next witness was called, the next case came on, and all that remained of the happy little interlude were a few lines of cold print.

"MIKE" SLIPS AND QUIPS

Advertiser during sponsored programme: Remember, all you pay on signing the agreement is one guinea. Remember, one pound, ten shillings.

Announcer, recommending the use of a certain make of embrocation: Be sure to take along a bottle of — in case you sprain an ankle or become a stiff—what I mean is, become stiff in muscles or joints.

Lady commentator describing frocks at races: I can now see Mrs. — coming across quite close to me, wearing a mauve tunic frock and toque of the same material, well off her head.

Announcer during interview: In one, you are guilty till you prove yourself innocent: in another you are innocent till you prove yourself guilty.

During a talk to housewives: Now, mother, take a look around your bedroom. Can you see anything you'd like to get rid of? Not father—I'm talking about the furniture.

Advertiser during sponsored item: For sixpence per week you can have your set repaired, free valves, and all parts thrown in.

Tanks Very Much!

AT the recent United States Army manoeuvres at Indiantown Gap, Pa., the big surprise was a squad of pocket tanks, travelling at fifty miles an hour, and receiving their orders by radio.

Special day and night guards had surrounded them until the last moment. When the tanks' surprising turn of speed was disclosed it was stated that no other army had anything to compare with these little fellows. They carry one machine-gun forward and two others in a turret.

Instead of wheels a rubber-padded endless belt is used, and the tanks operate in companies of five. One in every five carries a transmitting as well as a receiving set, and communication is said to be very reliable considering the speed at which the tanks move.

Where Radio was Conceived

HIGH up in the Alps, where a pass connects the Lys Valley with the Oropa Valley, the Italian Alpine Club proposes to erect a chapel and hut to the memory of Marconi. For it was in the Oropa Valley, at Andorno, that he first conceived that long-distance communica-

tion might be made possible by developing the newly discovered properties of electromagnetic waves.

It was a momentous realisation, and it is said that Marconi always remembered clearly how and when it came to him. A tablet on the wall of the house where he was staying records its association with the young visitor whose fame was to become imperishable.

The Oropa Pass is 6,800 feet above sea-level, and the commemorative chapel and hut will be built there as soon as possible in the coming spring.

Exchange Is No Robbery

ORIGINATING with Mr. Royal, of the National Broadcasting Company, there has recently been talk of the benefits of an exchange of announcers between this country and the U.S.A.

The guest announcers would familiarise themselves with radio practice generally, and take turns in the studios of the country in which they were staying. But what would happen when a convention-free announcer came back to us from a sojourn in the States?



Suppose he forgot where he was for a moment, and hailed us after the six pips with: "Say, folks, before the news here's one SOS from the Scotland Yard boys. Will any guy who saw a gink knock a skirt off a trolley car . . ." and all that.

A Whale of a Time

MANY a short-wave enthusiast will envy the wireless men of the research ship William Scoresby, which recently left St. Katharine Dock, London, on a whale-marking voyage to the Antarctic.

Whale marking? Yes, the research people want to know all about the migrations of the whales, so the William Scoresby's job is to fire small steel darts into the whales, which swim off highly indignant at being mistaken for dartboards. They soon forget about the small darts embedded in them, but when they are caught by whalers the darts are found and forwarded to headquarters, thus disclosing the whales' movements between-times.



The William Scoresby will be entering the icefields south of the Falklands in November, and will spend Christmas in the Antarctic, returning to this country in May. She will cover about 25,000 miles, and radio will keep her crew of twenty-three in touch with London all the time.

ARIEL

S.T.900! WHAT WILL IT BE?

By JOHN SCOTT-TAGGART

CIRCUIT cats are never let out of my design bag before the day appointed. You will have to wait until October 27th for the shock. As you open POPULAR WIRELESS on that most important Wednesday of the year for me, for this journal, and, I hope, for all constructors, you will certainly receive a shock.

The set is, of course, waiting ready. Not one set has been made but several, and these are in the hands of amateurs up and down the country. They will, in due course, report to you, their fellow amateurs. Let me say at once that these tests in other hands than mine have proved to the hilt my own prophecies of what the S.T.900 will do.

I said you would on October 27th receive a shock. Well, the reason is that the S.T.900 is like no set I have yet designed, in certain respects. The cat is fiercely struggling to get free of the bag in which it is for another week to be imprisoned. When released there will be many anxious to see which way it will jump.

Home Construction Snags

The least concerned is myself, not from any personal conceit but because I naturally know the set inside out, and because

I know the constructor—after the first shock—will study with an open mind my reasons for the design steps I have taken. The design features of the S.T.900 are unlike those of any popular modern receiver. Some will say they are revolutionary, and use the word in not too flattering a sense. Revolts are, in the natural course of things, apt to be revolting. But it is I who have revolted because I have been so often revolted.

What are the great snags about home-construction? I put them down as uncertainty of 100 per cent. performance and slowness in delivery of components.

Hitherto there has been a delay in the case of all my sets. I have this year gone into all the reasons most carefully and made arrangements that make

such delays virtually impossible. By now, I know what firms can ruin a set by slow delivery of parts. I know whom to trust and I also know that the choice of designs affects production enormously.

A very complicated new component, for example, is sure to cause delay. On the other hand, if I use apparatus which the manufacturer regards as a standard line he does not mind laying-in a specially large stock. Again, if the component has an alternative just as good the constructor is amply protected.

This year I have, through disgust in previous years, tackled the matter scientifically as regards "deliveries." I realise what a great power I can wield on behalf of constructors by bearing in mind how my design will

or money-back" offer, so anxious are they that the public should have every confidence in ordering. This is a step I have been urging for years, and now, through advance ordering, and the firmest conviction that the S.T.900 will be an overwhelming success, it has been made possible.

"We have taken a huge gamble on its success and have already ample supplies in stock," one firm told me. I smiled at the word "gamble," but was reassured when they said: "We have never been so certain before that you have a real winner. It's an unconventional set, but the more we think about it the more certain are we that the public will support it to a greater extent than any set of previous years."

But some of those who have seen the S.T.900 have shaken their heads. They say you won't stand for it. Or that you won't stomach this or that feature. The reasons are not technical. Those who have seen the S.T.900 and know the secret of its circuit admit that it should set a new standard in efficiency. But will the constructor like the very severe jolt I am going to give him? We shall see on Wednesday, October 27th.

"The S.T.900 is miles ahead of all my previous annual national sets: 300, 400, 500, 600, 700 and 800 . . . it delights me enormously. Its sensitivity and its selectivity are a joy. Never have I felt so enthusiastic about a creation of my own. I delight in demonstrating it, showing its paces to all and sundry. And what paces!—thousand-league boots that stride across the world."

J. S.-T.

affect the manufacturer. Also I have obtained promises and undertakings from members of the industry ensuring that a repetition of delays will not occur.

Kit makers have been given a long notice of the parts used in the S.T.900. They have placed their orders to manufacturers and have a large number of kits and parts ready for constructors on October 27th. Everyone is ready. The tables are laid. The waiters are waiting. When the guests arrive on October 27th they will be able to ACT in OCT.!

This alone will contribute enormously to the success of S.T.900. You will see both what I have done and what manufacturers and kit people have done. One kit firm, I understand, are going to make a great "quick delivery

Meanwhile, keep an open mind. Do not imagine what it may be like. I shall merely let the cat's whiskers out of the bag by saying that the S.T.900 is miles ahead of all my previous annual national sets, 300, 400, 500, 600, 700 and 800. The S.T.900 will not herald the millennium, but 900 is getting on that way!

Previous Designs Compared

Those who have followed my articles carefully will realise that I do not always say that this year's set is miles ahead of the previous years'. It is not a habit of mine. Sometimes I have definitely soft-pedalled a set in comparison with a previous one. The S.T.600 was probably a much better set in many ways than the S.T.700, or, as regards the medium and long waves,

(Continued overleaf.)

S.T.900! WHAT WILL IT BE?—Continued

the S.T.800. But the S.T.700 had the Triple Extractor and audio-reaction, two valuable features, while the S.T.800 put the short waves on the constructors' map in a big way.

The S.T.500 was definitely not a long-distance set, and I confessed as much at the time. It was a Class B receiver giving greater volume than any of my other national sets.

Rarely have I advised a constructor to scrap last year's set for the sake of getting recruits for the new receiver. But this year, now, I advise with every confidence the building of the S.T.900 even if you have the S.T.800. Good as last year's set is, it is far behind the S.T.900.

I have suggested that the S.T.600 is a very good set. It is, although ganging it was a blunder, as ganging always will be with the constructor. That was an example of the folly of trying to please a small but noisy section who cry for "simplicity." With separate tuning and the Triple Extractor of the following year the S.T.600 would—on the medium and long waves—have beaten the S.T.700 and S.T.800. But the S.T.900 easily beats the S.T.600.

I can hardly wait till the 27th to tell you all about the "900." It delights me enormously. Its sensitivity and its selectivity are a joy. Never have I felt so enthusiastic about a creation of my own. I delight in demonstrating it, showing its paces to all and sundry. And what paces! Thousand-league boots that stride across the world.

An All-Wave Set

It is, of course, an all-wave receiver. The short waves have come into their own. They are coming in excellently on the S.T.900, and it is child's play to bring in a fine collection of American stations. You will find that on the short waves the S.T.900 is superlatively good, and when you see the design and circuit you will readily see what causes the improvement.

The other night I calibrated the dial—or most of it. I picked up and carefully tuned and marked about 90 stations all excellently received, and that figure excludes many good but not adequate signals. The aerial was 20 feet of wire running up a few inches from

the outside wall of the house to a window on the next floor.

Technically it was the worst aerial I have ever used. In fact, it was a bit of lead-in rather than an aerial.

But I was keen to see how the S.T.900 would perform under the very worst of conditions, and I was delighted with the scores of stations on all wavebands that filled the room with sweet music—and nasal or guttural speech!

The S.T.900 is a grand set, though I shouldn't say it. On October 27th I shall leave to others the reporting of what it does. But I want you to get interested in advance because on that day I shall have a great deal to say—and quite a lot to defend. For, as I have hinted, I get these magnificent results by—frankly—ignoring what people say you will object to.

Tell all your radio friends about the S.T.900. There is a huge army of owners of home-constructed sets who

the same results as the designer—is one I tend to exaggerate. It certainly does not seem to deter constructors. But if only 1 in 500 fails, it worries me very considerably. I have made a very close study of the causes of failure. Occasionally it is due to faulty wiring-up, but most frequently it is the manufacturer who is to blame. The other great reason is that very many constructors depart from my list of components in order to save a penny here or there, and end by ruining their set for a ha'porth of component.

But, here again, I have analysed very carefully the reasons for faulty components. Some components never give trouble, others always do. A thing like a potentiometer, for example, is always (I do not care who makes it) a source of trouble and uncertainty.

In the S.T.900 I have avoided all those types of components that lead to trouble. The constructor knows that he will build the S.T.900 with absolute confidence of a straight-off performance. How I have done this will appear on October 27th.

On no set have I expended so much time on non-technical aspects. Hitherto I have done my part and trusted others to do theirs. This year I have put my finger into several pies and upset several apple-carts. In general, I have taken up the constructor's viewpoint as a crusade. The fruits of this attitude will be apparent on—yes, I think I have told you the date.

Act in Oct.!

You will find my solutions to all these problems interesting even if you do not build the S.T.900, but once you have seen what the set does I am sure you will want to build it. I am convinced that you will help to beat last year's figures of 13,046 for the S.T.800 by ACTING IN OCT.!

Remember, next Wednesday.

J. S-T.

A TREAT FOR S.W. LISTENERS



The comic antics and quips of these two popular artists provide many a pleasant half-hour over the American N.B.C. network. British listeners should try for them on W3XAL's wavelength. The gentleman at the mike is Bob Hope and his charming partner is Honeychile.

do not regularly buy wireless papers. Someone has to tell them about October 27th. Within a week it will be impossible to buy copies of POPULAR WIRELESS, if previous experience is anything to go by.

The second objection to home construction—the fear of failure to get

and Mr. Jetsam, the two popular radio characters, have just signed a contract with the B.C. to make two appearances in forthcoming Variety programmes. Each of their appearances will be in productions by Ernest Longstaffe of "Palace of Varieties," the first on October 30 (Regional), the second on November 27 (National).

FLOTSAM AND JETSAM RETURN

TELEVISION TOPICS—Collected by A. S. Clark

"TELEFRAMES"

Items of general interest

TUBES MADE BY STUDENTS

BECAUSE of the expense of television tubes and the difficulty in obtaining them in America, one television institute has been making its own. The students assist with this work, and the cost of the tubes works out at no more than the cost of commercial tubes really unsuitable for television work, being intended for oscillograph purposes.

WHO WANTS TO ?

The following story, claimed to be true, appears in the Murphy trade publication. It comes from their new television training school.

Q. : State advantages and disadvantages of having the main switch of the television receiver operated by the lid.

A. : The advantages are . . . this, that and the other. There is only one disadvantage, namely, that when the lid is shut you can't see the programme.

SINGLE AND DOUBLE SIDE-BAND SETS

Some may have been puzzled by the terms single and double side-band reception as applied to vision receivers. In the double side-band receiver the intermediates take in both lots of side bands, the fundamental frequency coming in the middle of the band of frequencies passed.

In a single side-band set only one set of side bands (as near as this is possible) is passed, and the fundamental frequency is to one side of the band of frequencies passed.

GETTING SIMPLER

A recent patent that has been taken out concerns the provision of tube exciter voltages and time-base operating voltages from the same power pack. Anything like this, which helps to simplify the television receiver is greatly helping on the day of really cheap receivers.

WHAT WILL IT BE ?

It is interesting to note a reference to television in an Old Moore's Almanack for 1938. It refers to January, and the reference is as follows: "Pleasing news about progress with television comes to hand, and there will be a notable invention announced about this time." It is not quite clear whether the notable invention will concern television, but we should not be at all surprised to find the forecast concerning television entirely accurate.

MARCONIPHONE AT PINEWOOD

During the recent television transmissions from the Pinewood film studios, it was only natural that those present not actually being televised, should wish to see how the transmissions appeared on a receiver. To enable them to do this in comfort, Marconiphone receivers were installed in the Pine-

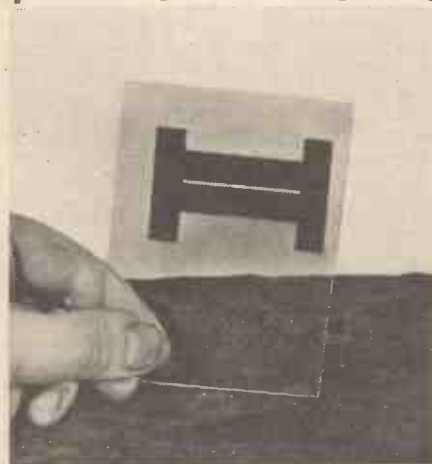
wood Club, where the film stars and others engaged in picture work at the Pinewood studios foregather. And so pleased was everyone with the results and the attractions of television reception, that the Marconiphone sets have been left installed

A LIGHT APERTURE

WHEN carrying-out experiments with photocells it is often convenient and, indeed, sometimes necessary, to pass the incident light through a very narrow slit of accurate proportions.

There are many methods of providing such slits, but perhaps the simplest of them all—and certainly not the least efficient—is that illustrated in the photograph accompanying this article.

Obtain a small sheet of glass and paste down upon it a length of opaque paper having a perfectly straight edge. For this purpose there is nothing to equal the black strips which are used for the binding of lantern slides and which can be procured at any photographic dealer's. However, provided that perfect



straightness of its edge can be secured, any type of thin opaque paper will suffice.

One of the strips having been pasted in position, a similar one is pasted parallel to it and at a very short distance from it, thus leaving between the two strips a narrow slit of clear glass.

The illustration herewith shows merely the glass sheet after the slit of the necessary dimensions has been formed on it. Subsequently, of course, the remaining area of the glass is pasted over with opaque material and, in order to protect the slit, another sheet of glass is placed over it and bound up at the edges.

By careful working it is possible to produce a light-slit of as little as a sixty-fourth of an inch in width. Usually, however, a 1/32nd-inch slit will suffice for most light-cell purposes.

to enable people in the club to see other television programmes.

Incidentally, we hear that these same programmes from Pinewood were also seen at Bexhill on a Marconiphone instrument, the locality being only 15 feet above sea level. Which is certainly some going.

DISCHARGING CONDENSERS

DURING experiments with cathode-ray tubes many adjustments prove necessary, and certain precautions are naturally taken by the experimenter to see that no shocks will be received from the high voltages that are in use.

The mains plug is always removed before any adjustments are made, and steps are taken to see that the high voltage smoothing condensers are fully discharged. But these should not be short-circuited to discharge them.

Such a sudden discharge is not good for fixed condensers, and in time might produce trouble. Also it is not necessary, because if the circuit of an exciter pack is studied, it will be seen that due to the potentiometer effect of the various resistances there is always a resistance path across each condenser.

Sparks Can Be Obtained

This discharge effect might not always be realised at first, because a heavy discharge can be obtained if the condensers are shorted immediately the tube is switched off. The resistances do not discharge the condensers immediately, but take a minute or so to do it.

There is no harm, after waiting a minute or so, in then shorting the condensers to make sure they have fully discharged.

Even if you use the shorting test as a handy method of seeing whether a condenser will hold its charge or not, it is not desirable to completely short-circuit it. A resistance of a value which gives a spark, but a less "hefty" one, should be in series with the discharge path.

THE ELECTRONE

MARTIN TAUBMAN, who plays a curious musical instrument known as the Electrone, has just triumphed over difficulties which might have prevented him from ever giving an electrone recital in television. The electrone produces musical notes by means of the same oscillation effect as that causing wireless receivers to whistle, but unfortunately it is susceptible to the more powerful forms of electrical interference, and when Mr. Taubman attempted a television recital a year ago it was found that radiation from the adjacent transmitter set up uncontrollable whistles and shrieks in the electrone's loudspeaker. During the last week, however, Mr. Taubman and the inventor of the instrument, Monsieur Theremin, experimented in a waiting-room near the transmitter at Alexandra Palace for three days, finally screening the electrone so effectively that it was pronounced "fit for service" in Number 1 studio. As a result, Mr. Taubman can now give his recitals with freedom from any electrical interference.

THE DIAL REVOLVES

By LESLIE W. ORTON

THRILLS FROM W2XAD :: 20 METRES :: LIVELY S.W. BROADCASTERS :: ON THE ULTRA-SHORTS

NEWS "scoops" invariably make interesting relays, but seldom does the DX-er have the chance of receiving such a thrill as that provided by the National Broadcasting Company when they yanked listeners from their evening meals and deposited them in war-riddled Shanghai the other day.

Dramatically and vividly the commentators (themselves in considerable danger) described the horrors and terror, the crumpled buildings and the shattered roads that war had brought to the great city. Indeed, the description was so lurid that I imagine that many a hardened DX-er spent a restless night as a consequence.

I heard the broadcast from W2XAD, Schenectady, and I propose that you DX hounds keep your ears "cocked" for further relays. Besides providing excellent peace propaganda the transmissions are decidedly thrilling.

Less sensational transmissions may be heard from XGOX, Nanking, on 43.99 metres, and JZJ (25.42 metres), and JZK (19.73 metres) at Tokyo.

Time Marches On

"Time Marches On!" I beg your pardon, it should be "back" this time! That cunning old rascal Father Time has taken a slice out of our daylight! Nevertheless, despite the addition to our electric-light bills, no DX-er worth his mettle will complain. No, sir—he'll be delighted!

The extra hour of darkness has acted like a tonic to the 20-metre band, and I've "bagged" HC1XE, Ecuador; K4SA, Porto Rico; LA5N, Norway; CO2EC, Cuba; SV1PA and SV1CR, Greece; SP1XE, Poland; VO6L, Labrador; VE2GA, Canada; CN8AI and CN8AM, French Morocco; YV5AA, Venezuela; PY2AJ, Brazil; EP1BR, Persia (or a pirate!); and G8SB and G8BA at—guess where? O.K., correct first time! Don't tell me it's a miscellaneous bunch, I know it!—reminds me of Joseph's multi-coloured coat!

Not to be outdone, the U.S. stations have showered upon me, and my log includes W1JZA, W1JSB, W2BH, W2JN, W3CR, W4CYU, W5LJ, W8AAT and W9BKK. Sure a swell log, eh? Needs mor'n gum chewing ter pull'n a pack like that—sez me! You see I can speak American, the "Yanks" have acclimatised me!

And now comes the sad part of my story, so be prepared to switch on the "weepers"! After a "bag" like the above I feel so proud of myself that if I were a contortionist I'd pat myself on the back. Then one or other of you fellows rock my castle in the air to its foundations with a sensational report. This time the culprit is Bob Everard of Sawbridgeworth. He has verified a "VO" on 40 metres—why can't I duplicate such reception?

From O'er the World

How have you fellows been finding the broadcasters of late? With numbed fingers and chilled ears I've been pulling them in in fine style.

The bands between 20 and 50 metres have been particularly lively and stations have romped in as if the boggy man were after them. W1XK, Millis; W2XAF, Schenectady; and W3XAU, Philadelphia, have renewed their struggle for supremacy on the 31-metre band, whilst KZRM, Manila; LKJ1, Jelöy; HJ1ABE, Cartagena; COCH and COCQ, Havana; and CO9JQ, Camaguey, on 34.64 metres have made a fine background.

On 25.23 metres HP5I, Panama, has maintained its strength whilst W2XE, Wayne; W1XAL, Boston; and W8XK, Pittsburg, have rivalled Zecen for "punch." These U.S.A. stations are truly extraordinary as regards volume.

Unfortunately the reverse is the case on 19 metres. Fate has dealt W2XAD, Schenectady, and W2XE, Wayne, a nasty blow. Frequently they are swamped by powerful Europeans, including our linguistic friend PCJ at Huizen. Indeed, the din has been so great that on one occasion my cats paused during a meal to listen—a miracle!

S.W. STATION IDENTIFICATION

CONCLUDING THE AFRICAN "VISIT"

By F. A. BEANE

THE Spanish Civil War, though a great evil in itself, has one merit in the eyes of the short-wave listener in that it has brought into prominence a great number of new radio stations, and one or two new countries to log.

Most prominent of the stations in Spanish territory is, perhaps, with the exception of EAJ43, the insurgent EA9AH of Tetuan, operating in the 20-metre amateur band. It is not a difficult "catch" since its news bulletins in English are given at about 22.10, or earlier, the call being "Hallo, here is EA9AH, Tetuan, Spanish Morocco, at the service of the National Movement" or in Spanish "Hola, Hola, Atencion, Atencion Manila y Filipinas, Aqui la Estacion de Norte Africa, EA9AH, Tetuan, Marreucos Espanol," and sometimes the news from "Radio Nacional de Espana" is heard, given by a lady announcer. The programmes are concluded with the slogans "Ariba Espana, Viva Franco, Saluda Espana" and the rebel anthem. Reports are verified by an attractive card and should be addressed to Apartado 124, Tetuan.

Spanish Morocco can boast of yet two other transmitters, one of which is heard with little regularity on about 46 m., the title being "Radio Melilla" and programmes consisting of news bulletins in various languages, including Arabic. On a slightly higher wavelength of 46.26 m. is heard a powerful transmission emanating from Tetuan. Gramophone recordings of dance music may be logged at 21.30 and at 21.45 a news broadcast in Spanish, the rebel anthem at 21.50; single note gong, call



Listen for Nova Scotia amateurs on 20 metres, around midnight. Here are a few to search for.

9-494-metre Stations

Isn't it astonishing how well ultra-short-wave stations are coming in now, considering the difficulty experienced a week or so ago when we couldn't pull in anything?

Now thrills are two a penny, and even Sir Malcolm Campbell would think it tame to rip along at 300 m.p.h. in Blue Bird after five minutes at the dials of Dynamite—my set!

Personally, I've been extremely active hounding down the broadcasters on the jumble popularly known as the 9-494-metre band, and, boy, oh, boy, proudly I report hearing W1XKB, Boston; W8XAL, Rochester; W9XHW, Minneapolis, and in the region of 8 metres, W2XDV, Wayne.

A hop up the dials brings one to the amateur band and more thrills. Indeed, I've almost thrilled myself to death by logging VU2PR, Bombay; W1AFS, W1COO, W1ADM (but not Eve—worse luck!), W4BTS, W4EDD, and a mysterious stranger, W10BGK—not bad going, is it?

My postbag indicates that you DX hounds have been equally active and records have sprung into being like so many jacks-in-the-box as a consequence.

"Radio Guardia Civil de Tetuan, Marreucos Espanol," two gong notes, more announcements, then "Hasta Manana," another rebel anthem and close down at about 22.00. The quality, and modulation of this station are both rather bad.

Recently Tunisia presented a station on 48.68 m. employing the call "Poste Bizertin Tunisie" and a single gong note identification signal, the programmes consisting of European and native music with announcements in French, but, unfortunately, "Poste Bizertin" appears to have left the air for good, for not a whisper has been audible on 48.68 m. for months. Other African stations which occasionally radiate music or special programmes are TPZ, Algiers, on either 24.6 or 33.5 m., and CNR, a former regular Sunday night broadcaster, on 23.38 or 37.33 m. TPZ is most easily recognised by the fact that it sometimes relays the P.T.T. programme from "Radio Alger," and CNR by its title "Radio Maroc" and mention of Rabat where it is situated.

COBC Sends Attractive Card

Finally I should like to mention that COBC, which has already been "introduced," verifies accurate reception reports with a handsome card bearing the call letters CMB-COBC, slogan "El Progreso, Cubano" and giving COBC's frequency as 9.35 m/cs., but no indication of power or schedule.

ON THE SHORT WAVES

ALL-WAVE AERIALS

By W.L.S.



SHORT-WAVE listeners (and probably all other listeners as well) seem to fall into two classes—those who make an appalling fuss about getting an aerial that is just right, and those who stick up any old thing and hope for the best.

Just lately, however, the lives of all of us have been rendered a little more complicated by the popularity of the all-wave receiver and the necessity for finding an all-wave aerial to go with it.

Apart from one or two commercial products which have been definitely de-

inserting series condensers so as to use it on short waves.

Something has got to be done about it, and, as usual, we look round for a compromise. I may as well say right away that if you don't want any elaborations at all, and are prepared to put up with a little loss on one waveband or another, the thing for you is a really nice aerial about 60 feet in total length and as high as possible.

Alternatively you may like to try out one of those nice dipoles that all the boys write in about—although an all-wave dipole, I'm convinced, is something that exists only in the imagination of the confirmed short-wave fan.

Noise-reducing Properties

Still, it is well known that for receiving purposes a dipole will give quite passable results on frequencies miles away from those for which it is designed. It will not have the directional properties which it possesses on its own frequency, and it will not have the full efficiency—but some of its noise-reducing properties will still be left, apparently, and it will pick up quite a lot of stuff from the ether surrounding it, which, after all, is the main requirement.

For broadcast reception, however, a short-wave dipole will be just about useless. So you will have to use it some other way. I have suggested an easy change-over in the sketches on this page. In Fig. 1 you see the two feeders of the dipole brought in through the window, together with an earth lead. Three terminals accommodate the three ends.

Fig. 2 shows two alternative ways of coupling them to a set. The upper arrangement (a) shows it as a pukka dipole. The lower (b) shows the ends of the twisted feeders joined together, thus making the thing behave as a kind of "T" aerial. In the first arrangement the feeders go to the ends of the coupling coil and the earth-lead to the centre. In the second the earth goes to one end and the joined feeders to the other. In each case the coil may be untuned if its coupling to the next circuit is tight enough, but it must, of course, be somewhere near the best size for the wavelength being covered.

If you want to get really pretty results from a dipole, the aerial should be cut to

the exact length—one quarter-wave on either side of the centre—and the input coil should be tuned and loosely coupled. Particular people even use a Faraday screen between the input coil and the first tuned circuit of the set, to make sure that only inductive coupling is used.

For All-round Results

Suppose, however, that you're not a dipole fan. Few people are, really. What is your best plan? If you put up the kind of aerial that will give you real results on the longer waves, are you sacrificing any efficiency on the shorter waves? Well, you needn't—if you plan your aerial carefully in the first place.

Don't tolerate one of those Serpentine affairs that rush round and round the loft looking for their other end. No good at all—for short waves! Put up an aerial of decent length, by all means, but do keep it clear of all obstructions. Don't lead it out from your window, straight up the side of the house, just in front of a gully and then up to within a few inches of a chimney stack. Let all those corners be made up with rope, and take your wire out at 45 or 60 degrees from your window so that it soars up "into the clear."

Be just as careful with the other end. If it's hitched to a tree, make sure that the actual aerial ends well short of any of the branches, and make up the extra length with rope. If it's a metal mast, or a wooden one with a wire halyard, use plenty of insulators, well spaced out, between the end of the aerial and the beginning of the halyard. You want your aerial to have as low a capacity as possible—and that thought will probably be as useful to you as any when you are planning it.

If your aerial is a good one, but still on the long side, then reduce its apparent length for short-wave listening by using a small condenser in series with it. Put the condenser inside the set.

Use this, whatever form of aerial coupling is installed, and even if you have an H.F. stage at the front end of the set. It will give you the effect of a smaller aerial without making it necessary for you to perform the actual operation of cutting several feet off.

JOINED TO A TERMINAL STRIP

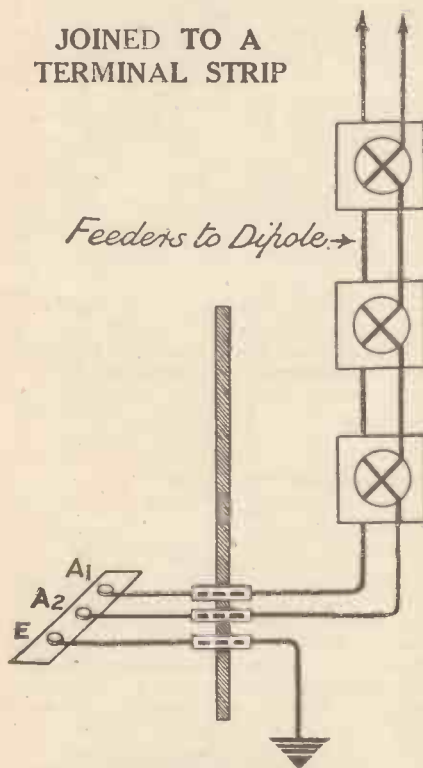


Fig. 1. The two feeders from the dipole and the earth lead may be brought to a terminal strip, as illustrated here.

signed as all-wave aerials and work very well, there don't seem to be any aerials which will really do the job at 100 per cent. efficiency all round. (And I don't think even the makers of the commercial jobs would claim that 100 per cent.!)

Think of your ideal short-wave aerial, and then ask yourself how much good it would be for Droitwich on 1,500 metres. Conversely, if you like, think of your ideal long-wave aerial and see how much of it would be left by the time you had finished

ALTERNATIVE METHODS

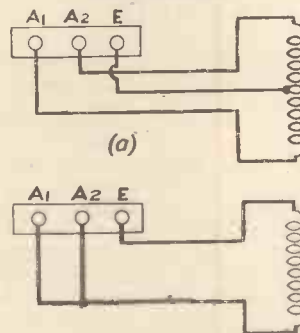


Fig. 2. The upper arrangement shows the normal dipole connections. Below, the ends of the feeders are joined together, thus making the dipole behave as a kind of "T" aerial.

ON THE SHORT WAVES—Page 2.

POINTS from the POST-BAG

W.L.S. Replies to Correspondents

L. E. S. (S.E.23) reports a good bag of DX on all bands, mostly the kind of thing that he describes as "interesting oddments." L. E. S. has recently moved, and all his listening lately has been carried out on a 12-ft indoor aerial. He seems to get things all right, though. By the way, he remarks that V U 2 C Q was on 10 metres last April. I had an idea that he had recently opened up on that wavelength for the first time.

P. A. Y. (Bedford) had a mishap with his two-valver and has had to come down to one. He finds the stations still rolling in, but can't make up his mind whether it is as efficient as it should be. Then he asks, "Am I right in assuming that an R 1 signal on a one-valver, just audible enough to read, although amplified to, say, R 3 on a two-valver, would still be only just readable?"

Well, this "R" scale business is the confusing factor. Personally, I should say that an R 1 signal on one valve would still be R 1 on two valves. I subconsciously adjust my "R" scale to the set I am using. The background level of mush seems to be the base-line, and one fixes one's signals by their relation to that. A signal that is weak but readable on one valve shouldn't be any more readable on two valves.

An American "Portable"

J. W. (Hammersmith) sends along a list of 20-metre DX and wants "some dope on a 10-metre receiver." That's easy, to my way of thinking; it's a good 20-metre receiver with the appropriate coils for 10 metres firmly plugged in their sockets!

L. J. C. (Maidstone) writes as follows: "Heard on the 20-metre band: 'This is W 2 A W L, a portable station at So-and-So, calling British phones.' Eventually a contact was made, and this description of the gear followed: 'CO, an R K 20; buffer, two R K 20's in Class B; final, two 250 T's in push-pull, with 4,000 volts on the plates. Power, 1 kw.' How about that for a portable field day?"

As it happens, I heard W 2 A W L myself, and he was just about the strongest Yank I have ever heard. But these American "portables" are often just the main stations operating at someone else's location, and when they are outside their own district they have to designate themselves as portables, I believe.

H. E. N. (Sheffield) has been struggling down to 10 metres with a mains-operated set. His immediate trouble was a devastating hum, which he eventually cured—how d'you think, children?—by putting the receiver within a foot of the power pack. When it was six or more feet away he couldn't do anything for hum—not with all the screened cable with which his dealer could supply him.

He recommends reaction on the H.F. stage, produced by using a cathode tap and potentiometer control of feed-back. It makes tuning terribly sharp, of course, and that introduces ganging troubles. But

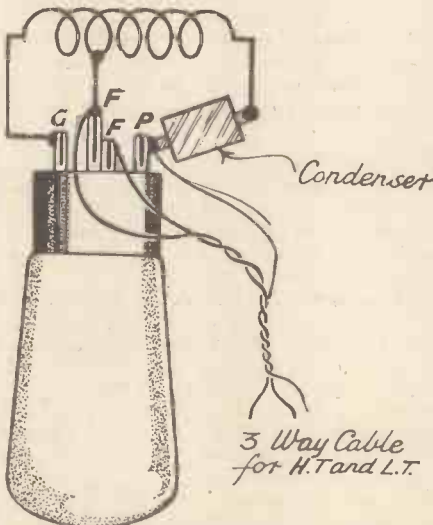
H. E. N. can't get on with it on 10 metres, although it is marvellous on 40.

Will anyone in the neighbourhood of Chester who is keen on the formation of a local club—or even of meeting other enthusiasts—please make himself known to Mr. P. L. Mather, 31, Brunswick Road, Buckley, near Chester? P. L. M. has a friend near by, but the two of them find it very difficult to get to know any other local fans, and would be glad to hear from someone.

Keeping Out H.F.

W. R. E. (S.E.26) wants a hint or two on taking H.F. out of headphone leads. My first suggestion is usually "Use choke filter output." This alone may cure it, but it doesn't always work out so simply. If it doesn't, connect an ordinary H.F. choke in each headphone lead. If this still doesn't do it, connect two .0005 condensers in series across the ends of the chokes remote from the phones, and connect their common point (the "centre-tap") to earth.

D. C. (Glenalmond) encloses a nice little bag of 10-metre DX phone all heard on the loudspeaker. Of course, it includes the inevitable V U 2 C Q, who, now that he has got going regularly down on "ten," is



An oscillator circuit suitable for test purposes.

giving lots of European listeners the thrill of hearing their first phone signal from India.

F. W. (Saltash) also sends in a 10-metre log for a single day. It includes a nice little batch of W 6's—stations I'm always glad to see or hear. (Yes, V U 2 C Q is there, too!)

J. G. R. (Brighton) reports nice reception of the television sound transmissions down there. A little while back I would probably have been surprised, but I have just come back from a week-end on the south coast with a friend who gets perfectly good pictures with complete regularity. One night we had a little trouble with a fading signal—it went "out of syno" twice during the hour, but generally it is rock-steady. Apart from the severity of ignition interference (due to low signal/noise ratio) the picture was comparable with some of the best that I have seen in London.

The sketch on this page shows a nice little oscillator circuit that I have recently used for several test purposes. The coil is adjusted so that it comes somewhere in the 5-metre band without any capacity across it. The H.T. wiring forms the H.F. choke! More of this later.

AMATEUR BAND NEWS

THE 10-metre band is still the main item of news—and it is likely to remain so throughout the whole of the autumn and winter. So far as one can judge, 10-metre conditions are even better than they were last year, which is saying something. But on top of that we have the fact that hundreds of stations have got down there for the first time this season. Those who got really interested in "ten" at the end of last season didn't hurry to build new transmitters, but during the dead period they have been getting down to it and they have now been rewarded by being able to put them on the air under really marvellous conditions.

DX Stations on 10-Metres

Of course, what is attractive to the average short-wave listener is the high proportion of phone to C.W. work. There are many more DX phones on 10 metres than I have ever heard on any other band, even including 20 at its best. Taking the United States alone, I should imagine that the phone stations now outnumber the diehards of the key by at least three to one. And the reason for it is obvious—that almost any sort of gear will put into Europe a C.W. signal that is sufficiently strong to make the other man ask, "Can you do phone, old man?"

The disadvantage of this appears to me to be that C.W. will become a lost art, as far as receiving enthusiasts are concerned. There is no doubt whatever that phone is more interesting to listen to, but there will come a time when conditions get bad again and phone is not so easy to receive—and then what will happen to the bright lads who have grown up without realising that there is such a thing as the Morse code? It will be a queer state of affairs.

The Question of "Ham News"

One or two readers have been taking me to task for not giving more "Ham News"—by which they mean gossip items about individual stations and their goings-on. Well, I don't know that "P.W." is the place for that news, anyway. I know lots of "hams" personally, but I shouldn't like to give away the secrets with which they entrust me (although I can say definitely that many of them would make very interesting reading!). On the other hand, I hear many interesting remarks passed over the air, but my licence states quite definitely that I'm not allowed to divulge that sort of thing to third parties (which means you, dear readers). So what?

What it really comes down to is that "ham gossip" should be confined to ham publications, in which the news is supplied at first hand by the men concerned. News about the way in which individual stations come in is quite another matter—but, after all, what is the good of that with more than 100,000 amateurs on the air, and at least 30,000 of them coming in every week?

W. L. S.

IMPROVING SELECTIVITY

Mr. Chester does a spot of experimenting with aerial coupling and obtains some interesting results

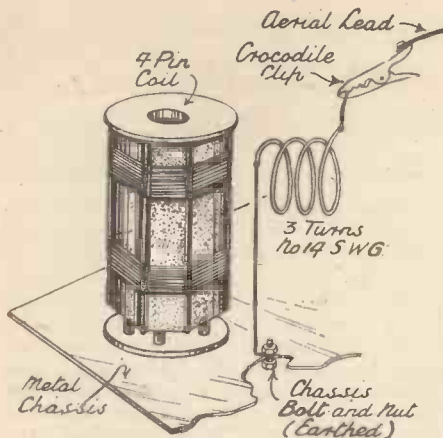


Fig. 1. Showing how loose coupling to the aerial was obtained with a few turns of wire.

AS I type this article out for your delight (I hope!). Bound Brook is coming over nicely on my W.B. Cadet loud-speaker. It is the French session (Bound Brook having gone all international these days), and odd it sounds to hear the announcer thus:

"Doubler vav trois Ix Ah Ell!"—instead of the usual W 3 X A L of the excessively Yankee announcer. Oh, I might add that I am hearing this on a two-valver, using only ordinary three-electrode valves, an H210 detector, and a P220 triode power output.

And there goes the Arlington time signal—so let's switch off the set and begin at the beginning. For, of course, this suave sort of reception is possible only at the end of the day's fun and games with circuits, layouts, false alarms and other excursions dear to the heart of the experimenter.

Well, I've been monkeying around again. Having come, like others more expert than I, to the conclusion that simple sets are the meat and drink of the home-constructor, and having regretfully put aside my ambitious ideas about superhets, I returned to the detector type of circuit with new resolves.

Blind-spot Troubles

First, I wanted to make up a little set that would give me rather more selectivity than any preceding hook-ups I have described to you. Secondly—but let's stick to one thing at a time, perhaps. You know my leaning is towards capacity-coupling for the aerial on to a four-pin coil—but it's not selective enough always.

I begin to see why some people use six-pin coils, with a separate aerial winding. Assuredly, the aperiodic aerial circuit, if loosely coupled, must in theory, anyway, give greater selectivity than when the aerial goes straight on to the tuning winding through a fairly large—relatively, anyway—coupling capacity.

So I had another look at one of my neglected six-pin coils. I looked at it a long time, musing thus: "You may have latent selectivity—but what about all those blind spots?"

And that was my trouble—or had been, whenever I had tried to make a six-pin coil work with a simple detector outfit. Indeed,

you may remember that is why I went over to my condenser coupling—a .0001 pre-set direct on to the grid winding of a four-pin coil.

It seemed to me that the weakness of my six-pin coils was not so much due to any inherent inability to deliver the goods as to the fixity of the coupling itself. I wondered, idly, what would happen if that coupling between the aperiodic winding and the grid winding were varied.

My first experiment was, therefore, with a one-valver that is nobody's business—using a four-pin coil with the top sawn off and a crazy-looking three turns of No. 14 gauge wire dangling over the top, very close to the grid winding.

Obtaining Reaction

I got no reaction at all when this thing was switched on. It was not until I had bent the aerial winding right away from the coil that oscillation could be produced. But, here's the point, it was very nice oscillation when it did come. Smooth, and apparently good for the whole tuning range of the coil—which happened to be the 12- to 26-metre one.

What, no blind spots? No, not one. This indeed was a cheering discovery, which I hasten to pass on to other tenderfoots with rather large aerials in their inexperience.

the "P.W." draughtsman can decipher my awfully rough sketch. And Fig. 2 shows you the little circuit I have used for the two-valver. I have taken each earthed terminal to the nearest chassis point.

By the way, the chassis layout also includes a .0001 pre-set not shown by the circuit—this being tagged on to the main tuning condenser so that I might try comparisons between condenser and aperiodic couplings.

The Experimental Circuit

As you see, the two-valver is perfectly simple, with detector and resistance-capacity-coupled output, the only extra being a bandsread condenser in parallel with the main .00016 tuning condenser.

It worked like a charm at once, this circuit. By moving my little aerial coil about half an inch away from the four-pin coil I found oscillation easy—and signals very much all round the scale.

I found dear old Bound Brook easily enough at 60 degrees on the main tuning dial. I chose this station because I wanted to see how it came in while Daventry G S G just below its wavelength was working, but not a trace of G S G could I find!

So I went over to my pre-set coupling, simply pulling the home-made coil right away from the four-pin coil, changing over the aerial lead from the end of the aerial coil to the free terminal of the pre-set.

There was Bound Brook, at 53 degrees this time, and, not far below, G S G. What do you make of that? Back I went to my aperiodic coupling—G S G gone again! Well, well, that bit beats me!

Better Separation

Actually, I could not complain of interference from G S G—either when present or doing its ghost act. But some way above Bound Brook's wavelength there was an Italian—I think—phone station bellowing "Pronto, pronto!" and

this badly spilled over into Bound Brook's channel with the pre-set—but not nearly as badly with the aperiodic coil.

The lesson I have learnt from this experiment—Schenectady W 2 X A D came in at 90 degrees, by the way, almost as loudly as Bound Brook at 5 p.m.—is simple enough, yet instructive, too.

It is that blind spots can be avoided with aperiodic coupling—so long as the coupling is loose enough.

Even with my limited experience of aperiodic coupling, it is now obvious that the system has great merits, not only for signal strength, but for selectivity. And, never forget, those blind spots are now nailed down as due to too close a coupling. At least that's my opinion with a simple detector arrangement.

What say, fellers?

A "TWO" WITH VARIABLE COUPLING

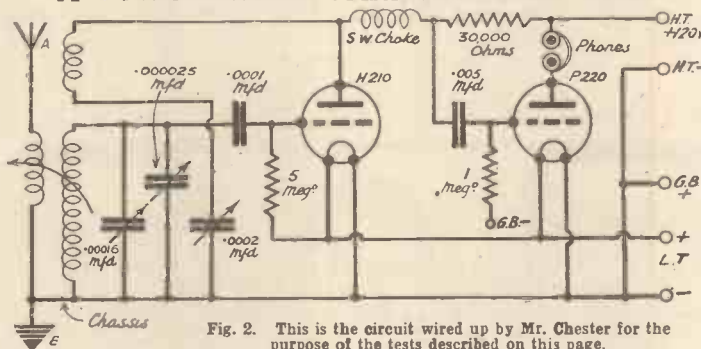


Fig. 2. This is the circuit wired up by Mr. Chester for the purpose of the tests described on this page.

So then I thought I might as well give the experiment a fair trial. I made up a two-valver on a metal chassis—or rather I re-assembled an existing chassis that had been ruthlessly taken to bits a few weeks back.

My aerial winding, you must understand, consists of three turns of this thick gauge wire, with one end sticking up in the air so that it can be gripped by a crocodile clip with the aerial lead itself in tow, and the other end of the home-made aerial winding going down to a bolt and nut on the metal chassis.

Thanks to the thick wire, the thing is rigid enough to be self-supporting. But not so rigid you cannot move the little coupling coil more or less away from the four-pin coil. The home-made coil is, actually, at right angles to the four-pin coil.

Fig. 1 may give you the idea, that is, if

REGINALD FOORT

—B.B.C. Wizard of the Organ

By K. D. ROGERS

[RECENTLY spent an afternoon with B.B.C. Wizard No. 1. He is Mr. Reginald Foort, who ever since theatre organs became popular has been in the public eye—and ear. He is now official Theatre Organist to the B.B.C., and lives during office hours in a room right up in the roof of St. George's Hall.

That is when he is not rehearsing and working out new programme ideas on the giant Compton organ in the hall itself.

Reginald Foort plays that mighty organ, £10,000 worth of ingenuity, with the same huge enjoyment as an engine-driver sends his massive charge thundering down the metals, eases her up for difficult corners, or makes her trickle in unassuming greatness into the station.

Always Works Out Right

There is only one thing that Reginald Foort can't do on that organ. That is to make a mess of it. Whatever he attempts in the way of stop combinations and whatever effects he tries seem to work out all right.

If difficulties should arise, as they sometimes do, Reginald is imperturbable and impregnable. There was one instance some time ago when he had to contend with the noises of a cleaner who did not realise there was an 8 a.m. Empire broadcast on in the hall, and was sweeping lustily on the stage just out of sight of the organist.

Right in the middle of the Liszt Rhapsody came the rhythmic noise of the broom—swish, swish, swish, swish. For some time Mr. Foort thought it was something wrong with the organ, but eventually he spotted the cause and motioned to her with his hand to desist. She misread the signal and waved back. It was some time before the control engineer came down out of his glass house and shoed the offending cleaner away.

Cutting Off the Air

A nasty five minutes, but the organ went on playing in spite of frenzied signals and a rapid searching among the stops for one that was causing the noise—before the cleaner hove in view.

It needs perfect nerve as well as organ control to carry on like that.

But if it had been the organ making the noise what could have been done?

I asked Mr. Foort that question. His answer was to pull out a small drawer on the right of the console. In it were three rows of tiny switches.

"If any pipe begins to 'cipher,' as we call it (continuing to sound when it should

stop), I just pull this drawer out, flick the requisite switch, and the rank of pipes containing the offending one is cut out. Look."

A note was played on the keyboard. The switches were tried one by one until the right one was found. Then a click, a moment's pause, and the wind to the pipe was cut off. The organ was silent. With that switch "off" the certain rank of pipe is out of action but the rest of the organ is unaffected, and can be used quite normally.

"What's the other side?" I asked. I felt sure that if the makers had put one drawer on the right-hand side they would have another on the left. The symmetry of the organ called for it, even if the drawers were practically invisible.

There was another drawer—on the left. Same size, but containing rows of white knobs instead of switches. They were the comedy effects—fire bell, crockery smash, aeroplane, and other things. The Chinese gourds are operated by keys on the left of the manuals, and the xylophone, marimba harp, piano, etc., have their own stops and are worked from the keys of the organ itself.

The piano is a wonderful gadget. It is a complete grand piano of normal make, and is situated on the stage, whereas the rest of the organ is housed in the special chambers in the two sides of the gallery.

The hammers on the keys of the piano are worked electrically from the organ keyboard. That is all the difference between that piano and an ordinary grand.

As you probably know, the organ console is on a huge movable platform. It can be wheeled with its great snake of cable to any position on the stage in St. George's Hall. When I saw it, it was tucked away round the corner of the stage, while a rehearsal was in progress on the main part of the stage.

Some idea of the delicacy of the giant organ and of the care with which the B.B.C. instruments are serviced may be had from the fact that the organ receives four hours' tuning and overhaul every week, and every single piano is tuned every week also.

Not that they go out of tune all that rapidly, but the B.B.C. takes no risks on that score. Everything must be in perfect tune, and in the case of the organ the slightest change of temperature throws the pipes out of tune.

Engineers' Big Job

Matching, or more technically balancing, is one of the biggest jobs in the St. George's Hall. The control engineers in the little glass house have no easy job. They have to balance for transmission the voices of the singers or patter of comedians, the various effects, if any, and the B.B.C. Theatre or Variety Orchestras. Then on top of all that there may be an organ accompaniment!

When I was there, they had just finished rehearsing for a broadcast by Reginald Foort together with two trumpets and two trombones! And not only had those trumpets and trombones to be musically balanced so that they sounded at just the right prominence for the programme, but they had to be balanced so that at their worst or most vigorous blasts they would not overload the transmission. And in addition there was the umpteen horsepower, full blooded, double strength organ.

No wonder that Mr. Foort spends far more time rehearsing than he does broadcasting. And when you consider that such an accomplished player needs to rehearse even simple things, you get some idea of what it means to get a balance.

Long Rehearsals Required

Those trumpets and trombones together with the organ received about four hours rehearsal for about forty minutes programme. And that was not a matter of learning the notes. It was a matter of fitting the instruments into each other and of balancing the whole so that no portion would "blast" and no portion would fade away so that it became insignificant.

And the whole lot was done with one microphone, the players being grouped in such a manner that the organ microphone was sufficient for the whole lot. It takes a bit of doing when you remember the relative sizes and powers of the trumpets and trombones and the giant £10,000 organ.

When you next listen to St. George's Hall, picture the extended stage sticking well out beyond the proscenium of

(Please turn to page 166.)

REGINALD FOORT AT "ST. GEORGE'S" ORGAN



FROM OUR READERS

NEW INSIDES FOR OLD RECEIVERS

The Editor, POPULAR WIRELESS.

Dear Sir,—It seems that manufacturers of receivers are viewing with some disquiet the present state of the wireless trade, for they have stated that a more or less complete degree of saturation now exists and that sales must be more in the nature of replacements than the bringing for the first time of radio programmes into the homes of their customers.

Is it not time that some new avenue of trade should be explored? The original cost of a receiver of decent class is divided between the actual working portions and the cabinet, which latter is often a handsome article of furniture. What happens when the actual works become out of date or incapable of dealing with modern conditions? The dealer, who is approached to supply a new set, cannot offer more than a merely nominal sum for the old one, because he knows full well that the sum thus offered is so much off his profit and the old set will simply stay in his shop until it is almost given away for breaking up. On the other hand, the careful housewife does not like to part with what has become, for her, one of her cherished household possessions.

The way out for manufacturer and owner seems to me so simple that it is a wonder it has not been thought of long ago. Let the manufacturer make an up-to-date series of chassis to replace those which were used in the cabinets of his best selling models of, say, three years ago (grouping of controls and size of chassis remaining the same), and he will find he has embarked on a very profitable venture.

As an illustration: I know of a radiogram of first-class make in a beautiful cabinet, but five years old. The circuit is old and inefficient, yet the owners do not care to purchase a new set because they are so much in love with the old cabinet. What could be more satisfactory to both owner and manufacturer than the substitution of a new chassis, if such were procurable from the makers of the original set?

E. FISHER.

33, Freeth Street, Oldbury, near Birmingham.

AFTER TWO YEARS

The Editor, "Popular Wireless."

Dear Sir,—I think that this photograph may be of interest to readers who are radiogram enthusiasts.

This arrangement of pick-up, turntable and amplifier is the outcome of two years' experimenting.

I started with a second-hand portable gramophone for playing nursery records, and soon part exchanged this instrument for a new model. Being an enthusiast on classical organ recordings, I soon concluded that the portable was incapable of giving really good reproduction of my records and at the same time was causing excessive wear. I then fitted a No. 11 H.M.V. pick-up head and connected this to my home-made battery radio—effecting a tremendous improvement in reproduction.

Needle alignment was still very bad—and so was record wear! I bought an old pedestal gramophone for a song, fitted a new double spring motor and constructed a balanced mahogany pick-up arm to fit my existing pick-up head. Great attention was now paid to alignment and levelling. After trying several modern radio sets, including all-mains models, I purchased the five-valve superhet illustrated. As the result of experiments with a separate speaker, I adopted the illustrated mode of suspension for the radio set.

The set is supported from the picture rail by ordinary fold-over picture chain, on which it rests without the use of any positive fixing. The set is perfectly rigid and hugs the wall slightly. I find this is the best position in the room acoustically—all extraneous resonances are avoided.

Regarding radio, the aerial descends to the set from the corner of the picture rail and the earth wire leaves the set at the bottom on the left.

I use Universal needles and the reproduction on radio and gramophone, it is generally agreed,

An interesting suggestion by a reader concerning commercial sets, which certainly has considerable possibilities



is superior to that of the average self-contained all-mains radiogram.

E. R. J. ROBBINS.

334, Hanworth Road, Hounslow, Middlesex.

IN AGREEMENT

The Editor, POPULAR WIRELESS.

Dear Sir,—I am sixteen years old, a regular reader of "P.W.," and very interested in short waves. I am writing to say that I agree entirely with Mr. Millington on the subject of O.V-I's. My first short-wave set was an adaptor which I made in February last. It was hopelessly inefficient to say the least, but the first station I heard was W 2 X A D, on the speaker, with an indoor aerial. I was very proud of that, and of the QSL I subsequently received from W 2 X A D, even if I did tune-in by walking about the room!

My present set is an O.V-Pen. on an aluminium chassis, which was copied from Mr. Chester's, the main difference being that the reaction condenser is sub-chassis, and I have used chassis valve holders, so that the only wire above the chassis is to the fixed plates of the tuning condenser. I finished this set a fortnight ago, and within two days had heard every continent but Australia, all listening being done between 13.00 and 21.00 G.M.T. Although most of the parts are new, this set only cost about nine or ten shillings, excluding valves, which are "borrowed" from the family broadcast set, when I want them.

Most of my listening is done on 14 m/cs. amateur band, as I find this more interesting than the broadcast bands. I am at present busy learning Morse, as there is so much QRM

UNORTHODOX MOUNTING



How Mr. Robbins has arranged his radiogram outfit. His letter appears on this page.

from the C.W. on the amateur bands, that I'd like to know what it is all about.

Incidentally, I disagree entirely with W. L. S. on the subject of transformer coupling. I use it, and have no threshold hold, and reaction is so smooth that I can't tell when the set begins to oscillate, without having to "kill" the transformer with resistances across the secondary, etc.

Wishing "P.W." the success it deserves and 73's. J. E. FRITH.

113, Worple Road, S.W.20.

MR. SUGDEN TAKEN TO TASK

The Editor, "Popular Wireless."

Dear Sir,—I feel obliged to correct one or two errors in Mr. P. Sugden's interesting letter, printed in the issue dated September 25th.

WORTH WRITING FOR

Just as you enjoy reading the letters on this page, so other readers will find yours of interest. And remember, in writing, you may win a guinea that will cover the cost of the new valve or batteries you are wanting. So drop us a line now and have a shot for the guinea which is awarded each week to the sender of the letter, which is best in the opinion of the Editor. This week it goes to Mr. E. Fisher.

He says that the planets left the sun millions of years ago, and have since been cooling off. If that is the case, surely, since Mars is farther away from the sun than the earth is, it must have broken away first. In that case it would be considerably colder, having had longer to cool. Its atmosphere is certainly similar to that of earth, but it is very doubtful if there is any water vapour in it. If there is, it is considerably less than on earth.

He is mistaken when he says that by reason of its greater magnitude it must necessarily have a greater force of gravity. According to Young's General Astronomy, the diameter of earth is 7,917.6 miles, that of Mars is 4,230 miles. Taking the mass of earth as 1, the mass of Mars is .107. The density of earth (water = 1) is 5.55, that of Mars is 3.92. From these figures it is obvious that the gravity of Mars is considerably less than that of earth. By reason of this, the air pressure on Mars is less than that on top of Mt. Everest. As it is the thickness of the air blanket that decides the range of temperature, the inhabitants of Mars, if any, must be accustomed to greater extremes of temperature than anywhere on earth, for in the daytime the temperature rises to about 40° or 50° F., but at night it falls to about -150° F., or lower.

One of the objections to communication with Mars is that the intensity of any radiation obeys the Inverse Square Law, i.e. it is inversely proportional to the square of the distance. Here is an example. Suppose at a distance of one mile from a transmitter a receiver can pick up 1 watt. At three miles it would pick up only 1/3² or 1/9th of a watt. At four miles it would pick up 1/16th of a watt. At the distance of the moon, it would pick up 1/200,000² of a watt or 1/40,000,000,000. At the distance of Mars—well, Mr. Sugden can work that out for himself. If a beam transmitter were used, it would be very difficult to train it on Mars, and also the Heaviside Layer, etc., would in all probability refract the beam off its course. In the case of cosmic rays, they are not directional but come from all directions, being produced by the creation of new matter in various parts of the Universe.

I am not writing this, because I disbelieve in life on Mars. I cannot see any reason why there should not be. On earth there are animals and plants adapted to various environments. There are bacteria which survive the temperature of boiling water and others which can live at the temperature of liquid hydrogen. Certain bacteria contain no oxygen while others, in the

(Please turn to page 167.)

RANDOM RADIO REFLECTIONS

By VICTOR KING

P. A. Assists the "Cheering Sections" :: Electrical Interference :: Steel With True Diamond Hardness

LOUD CHEERS !

WHEN they play team games in the U.S. the opposing players don't constitute the only warriors in or connected with the arena. There are also the "cheering sections"—one for each side. These are composed of lusty-voiced partisans who spur on their champions by bawling as loudly as possible at them.

This is all done in a properly organised manner, each section being led in its cheering by a director. I have long wondered when loudspeakers were going to be brought in to amplify the efforts of "cheering sections" and, at last, according to *Radio Craft*, this is about to be done.

Says this American journal:

"Thus the volume of a few men in the cheering crew may be amplified and directed at team mates to produce an effect equivalent to or greater than that obtained by a larger cheering section in the opponent camp."

But where is this likely to end? What is to prevent the "opponent camp" turning out for the next match with a more powerful loudspeaker outfit? And so on and so on. To what end will the watts go? And what about the spectators?

But perhaps there won't be any spectators! Perhaps there won't even be any players in due course; just a couple of public address outfits bellowing at each other! Instead of a football match two expert sound engineers each trying to roar the other into silence.

TO BE EXPECTED

A LOT of people go over from battery sets to mains sets during each succeeding year. I've seen the figure mentioned somewhere. About half a million, if my memory serves me correctly.

It is to this fact, I think, that must be debited the continually growing number of complaints about electrical interference. Not that the sets themselves are causing it. Oh, no! Oh, dear no! And I mean that to be read with "curate" intonation. If you can get my point, which you probably can't. And I'm not surprised. I've never been partial to the written word for conveying the more serious messages of life. Not that I've got any serious messages for you.

I mostly reserve those for the income tax inspector. And I go along and see him in preference to writing. The written word lacks the finer shades of expression such as can be imparted by tone and pitch of the voice.

Even the voice alone is not complete. That's why I prefer seeing people to talking to them on the telephone, whenever that is possible. You then bring in another battery of expression-conveying ammunition such as facial contortion, limb waving, finger wagging and body wriggling.

What chance has a poor scribe? He is restricted to a mere marshalling of symbols. One of these days I'm going to invent a new system of writing which will introduce signs. Perhaps it could be done with numbers. 1, equals a wink; 2, a nod; 3, pursed lips; 4, shrug of shoulders; 5, a cynical grin; 6, a reflective smile; 7, grave expression of face; 8, palms of hands turned upwards; 9, head on one side; 10, head bowed; 11, nostrils dilated; and so on and so on—see Victor King's Dictionary of Written Expressions. (In the press, but not likely to emerge from it!)

A CABINET-MAKING HINT

RADIO constructors who do their own woodwork may often have noticed that when a narrow piece of wood is sawn off a plank with the grain of the wood running in the same direction as the saw-cut, the material is very liable to split. This liability increases with the narrowness



By holding the saw as shown you will obviate the danger of splitting the wood.

of the sawn-off piece and occurs particularly in "brittle" and "splittable" woods such as oak and ash.

In nearly every instance, however, the above difficulty may be overcome by adopting the tactics shown in the photograph.

Instead of holding the saw at its usual oblique angle, hold the saw so that its blade is very nearly parallel with the surface of the wood to be cut.

Use as fine a toothed saw as is available and saw the wood with a slow and steady motion.

Taking these precautions, the narrowest of strips may be sawn cleanly and neatly off any variety of wood. J. F. S.

Then one would be able to convey one's thoughts to paper very realistically. Something like this:

"Dear Readers (1-6-9)"

And you might start your letter:

"Dear Victor King (5)"

Hi! I was talking about electrical interference (7).

Well, then, as I was saying. There seems to be an increase in NOISE. But I've found that the complaints tend to come from (a) People who've just started in with radio (b) Those who've switched over from old sets to new sets—especially from battery to mains sets.

Modern sets are more prone to be affected by electrical interference than the very much older sets, for the simple reason that they will be more sensitive. They will pick up more stations—and more disturbances from the ether. Obvious, isn't it?

Mains sets will get more crackles on 'em than battery sets, generally speaking, for exactly the same reason—they are more sensitive, valve for valve and coil for coil—all the other conditions being equal. Also, of course, there will be a tendency for crackles to creep in via the mains themselves, unless very elaborate filtering is introduced, which is so often not the case with the less expensive sets.

So those of you who have purchased new mains sets must not feel worried if you hear a little more popping and crackling in the background. It may be rather unavoidable—the price you must pay for greater sensitivity. On the other hand, if you have A.V.C. the set will de-sensitise itself on the more powerful stations and may become quite mouse-like in regard to electrical interference. If you get loud crackles all the time whether you are tuned to the local or a distant station, then indeed you shall have my sympathy. Yes, indeed. (3-7-10.)

SO HARD

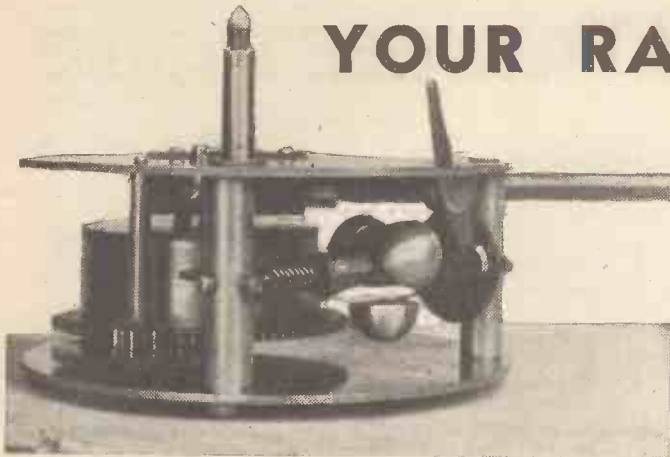
I WAS informed by a friend in the engineering industry that a tremendous advance in metallurgy has been made. You've all heard the expression "as hard as a diamond." But, says my man of metal, hitherto there has in fact been nothing of such hardness made by man and the phrase has been used more as an expression of pious hope than a statement of fact.

But now it has been accomplished; the production of steel with a true diamond hardness. Apparently a semi-chemical process is used, and the result is a metal which just can't wear out. I made my friend promise to send me a couple of lumps of this wonder metal. And now I've got 'em. Two little blocks weighing about two ounces each. I'm not an expert in such matters, but, you know, I'm a bit sceptical. I don't think, judging by my tests, that this metal is quite as hard as a diamond. At any rate, I'd prefer to have two diamonds of equal size!

Any of you lads capable of supplying a commentary on this matter? I'm interested.

YOUR RADIOGRAM MOTOR

Some Notes on the Design and Upkeep of Spring-Driven Gramophone Motors



A typical light, single-spring, modern motor.

RADIOGRAM and gramophone motors of the spring-driven type are still popular, despite the admitted advantages which the more recently introduced electric motor possesses for such purposes.

Spring-driven motors are relatively inexpensive productions, and since they can be used anywhere and have absolutely no running costs, they still possess a considerable following among the radiogram fraternity.

Two General Types

Modern spring-driven motors may be divided into two general types. In the first place there is the heavier type of spring motor in which the large toothed wheel on the spring case engages with an intermediate gear, which latter drives a pinion mounted on the turntable spindle. The other general type of spring-driven motor is the one which embodies a worm wheel driving a worm gear on the spindle shaft.

These two types of motor may appear to differ but little. Actually, however, they differ quite considerably in working principle.

The latter type of motor, i.e. the worm-driven one, has the decided advantage of being light in weight and having a minimum of working parts, so that wear is reduced as much as possible. On the other hand, however, the worm type of drive is somewhat a power-wasting one. Hence it is that well-built motors working on this principle contain strong, broad springs to make up for the loss of power set up at the worm gears.

The intermediate-drive type of motor runs very reliably but, in time, it tends to become slightly "rattly" in character, due, mainly, to mechanical wear and tear. Springs last longer in this type of motor and, usually, after long use any worn pinions may be replaced with ease. Such motors belong to one of the earliest types and, from many points of view, this pattern of spring-driven motor has never been excelled.

Regular Oiling Needed

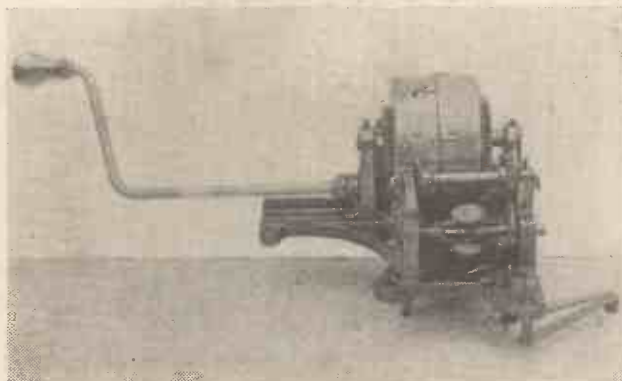
If a radiogram motor is oiled periodically, it ought never to give rise to the slightest degree of trouble. But the oiling, however,

should be carried out correctly, using a high-grade non-corrosive medium-thin oil for the bushings and a medium-thick grease for the gears and worms.

The spring, of course, requires a special type of grease. Such can be made by mixing very finely powdered graphite with good-grade petroleum jelly, but the preparation is messy in the extreme and, in most cases, it will be found infinitely preferable to purchase a tube or a tin of the ready-prepared spring grease for this purpose.

When a spring requires re-greasing, it will soon let everybody know about it. The coils of the spring, when they become dirty or lacking in grease, tend to stick together when they are unwinding. Then, with a sudden jerk, the coils will fly apart, giving rise to an ominous and characteristic noise in the spring-case of the motor. Such a spring should be taken down, washed in paraffin and repacked with grease. If care is taken, the spring itself need not be removed from its case during this process, thus rendering the task of spring-cleaning and greasing quite an easy one.

WITH INDIRECT DRIVE



In this double-spring motor, of heavier type than the one illustrated above, indirect drive for the power is employed.

A good deal of rubbish has been written in the past on the supposed necessity of maintaining the various gears in a radiogram motor in a literally oil-bathed condition. If the gears are lightly smeared with medium-light grease and the bearings are treated with medium-thick oil (a drop per bearing is sufficient), the motor will retain itself in efficient condition for a long time. There is absolutely no point in swamping the gears of a spring-driven motor in oil and making such internal parts resemble the oil sump of a motor-car engine.

Indeed, such over-oiling is more injurious than otherwise.

The majority of motor noises have their origin in maladjustment of the worm drive on the spindle, wear and tear on the pinion teeth or faulty governor mechanism.

Many motors possess worm wheels cut from a fibre material, the use of this material being to reduce noise. Unless, however, the fibrous material is of the very highest grade, it will sometimes soften in time. Or, alternatively, it will begin to absorb grease and/or oil, with consequent warping or distortion. All this, of course, means that the fibre worm will no longer run accurately. Wear will be set up in it, and with wear will come noise.

There is only one cure for troubles of the above nature. Scrap the fibre worm and fit a new one.

Fibre-Drive Troubles

In some of the very old types of motor the larger pinions were cut out of fibre discs. These, also, warped and gave rise to all sorts of trouble. They are not often seen nowadays, however, but occasionally the radiogram mechanic may be called upon to deal with a motor of this antiquated pattern.

The governor mechanism forms the "brain" of any spring-driven motor. No matter how perfectly the motor may have been constructed it will function imperfectly if there is the slightest trouble with the governor mechanism.

Not unfrequently, the brake-pad bearing upon the governor disc becomes hard and lumpy. This tends to cause the governor disc to revolve erratically. The trouble can be dealt with to a certain extent by pricking the brake pad with a pin in an endeavour to soften out its hardened areas, but the only certain cure lies in the fitting of a new brake pad.

If, for any reason, one of the governor springs breaks, it is *always* advisable to scrap the two unbroken ones and to fit three new ones. It is a good plan, also, to see that the governor balls, springs and screws are of exactly the same weight. Such a process of weighing is, perhaps,

little tedious, but it will ensure that the weights on the governor are perfectly equally distributed all round it, an exacting provision which makes for sweetness of running, accuracy and constancy of motor speed and utter noiselessness.

Ensuring Smooth Braking

The governor disc should have *one drop* of the lightest possible oil applied to it from time to time. Also, give the brake pad the merest touch of a similar oil very occasion-

(Continued overleaf.)

RADIO REVELRY

By Alfred T. Fleming, M.I.W.T.

Tit-bits from letters received in the sales department
of a large radio firm

DON'T imagine that the daily tasks which confront the staffs of the sales departments of radio manufacturers must inevitably be dull. They are often the reverse. In fact, very often! For, amidst the routine, amidst the shoals of daily correspondence, there appear letters which must perforce provoke a smile.

As an example, take the case of one correspondent who had a smattering—just a smattering—of technical terms. He wrote to ask us the lowest price at which we could supply him with a receiver “guaranteed not to consume more than ten milliamperes.”

Domestic Troubles

But, strangely enough, the humorous passages appear more frequently in the letters of those who already have a set than in the letters of those who are embarking for the first time on the Great Adventure of purchasing or constructing a radio receiver.

For instance, one correspondent has possessed a radio for years and tells us that, till recently, it has brought nothing but happiness into his home. But the spell has apparently now been broken by a minor domestic tragedy. He sums it all up in one short sentence. This distressing report reads: “My accumulator is upset over the carpet. So is my wife!”

This one sentence almost compels us to visualise the scene of destruction, but we in the Sales Office are quite accustomed to reports indicating slight domestic upheavals. I recall one inquirer who wrote for some advice regarding his accumulator. We answered his questions and he put our recommendations into practice. Overjoyed at the results, he wrote to thank us, concluding with the remark: “Thanks for the advice. The accumulator is now, like my wife, gassing freely.”

Husband or Set?

Before we leave the realm of domestic misunderstandings, let us cite one more example, only this time it comes from the lady in the case. However, let us also give her the benefit of any doubt which may arise from her wording and assume that the double meaning was not intentional. Her communication read as follows: “I am writing on behalf of my husband and my set. The behaviour is not so good as it was in the early days. What should I do about it?”

I don't mind admitting I was rather stumped for a reply, so I tactfully passed the letter over to the Technical Department for their attention.

But do not imagine that all our funny letters are founded on a basis of domestic strife. Not at all! Here is one of quite a different type. It comes from that never-ending stream of correspondence asking us to send someone to call on them for something or other. Very often it takes the

form of a request for a service call to investigate some alleged defect in the family receiver.

This particular specimen—I mean the letter, not the receiver, came from a hair-dresser. It is this which introduces the element of humour into the postcard he sent us. It read: “My superhet is wrong on the short waves. Send a man to give it a trim.”

Curiously enough, we got another postcard from him the next day cancelling the request. True, he did not manage to insert any of the technical terms of his own profession, but the cancellation was not very tactfully worded. He said: “Do not send anyone from your place as I have got a gentleman to do it.”

Now that the grid system is spreading its tentacles over the countryside, large numbers of constructors are contemplating the conversion of their sets to all-mains reception. The less experienced sometimes hesitate to tackle the job themselves and make inquiries from the manufacturers of

their existing battery set. One such inquirer asks us if we can carry out the conversion for him, but wants a quotation first as he is afraid he “will get a shock.” We do not know whether he was speaking in terms of electricity or of finance.

This cryptic reference to “shocks” calls to mind another correspondent who wished to carry out the all-mains conversion himself. We sent him full instructions. He wrote to thank us, and expressed the opinion that he would soon have “a firm grasp of the wiring of an all-mains receiver.”

Facing Things Bravely

Among the minor tragedies which rear their ugly heads in this never-failing fountain of wit are letters from those who, through some misfortune, are unable to continue paying their hire purchase instalments. Yet, in asking us to collect the set, instead of asking for further cash, some manage to keep smiling.

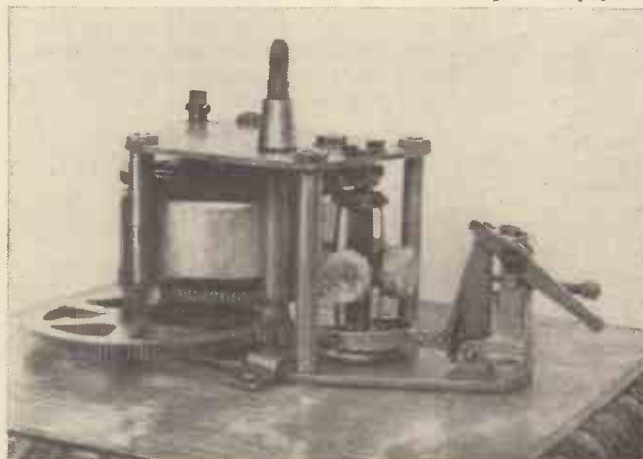
I admire the calm courage and fortitude of the amateur poet who made the request in the form of verse, concluding:

“I am out of work and cannot pay,
So call and take the set away.”

To conclude on a less tragic note, I will refer to a very recent incident. A battery-set user had just installed a panel for charging his accumulators at home. Full of pride, he wrote to tell us that his accumulator was “thoroughly run down,” so he had “put it on the panel.”

YOUR RADIOGRAM MOTOR

(Continued from
previous page.)



An old type of spring motor in which there are four governor balls and two brake pads for regulation of the speed.

wheel and the worm gear on the governor. This degree of contact may be too tight. The slightest easing-off of the contact at this spot by means of a slight turn of the screw holding the worm bushing will, frequently enough, be sufficient to convert a sluggish motor into a freely running one.

Be Careful

Do not, however, attempt to make this adjustment, à la the expert mechanic, when the motor is running. If you do, the probabilities are that the governor will slip-out of its

ally in order that the braking friction at that part may not be too violent.

With the repair of broken springs we will not deal in this article. The extraction and replacement of broken springs is not an easy job, nor is it devoid of danger. It calls for skilled and, more particularly, experienced handling. Hence my advice to all spring-driven radiogram owners is to have all spring-breakages trade-repaired and not to embark upon such tasks themselves.

Sometimes a motor may be found to work sluggishly, although it may be adequately lubricated and apparently in perfectly good order. In most instances of this nature, the trouble may be located in the adjustment of the contact between the worm

bushing, with disastrous results.

Note, also, of course, that if there is too much play at the above part, the motor will run noisily and possibly erratically.

Sometimes the bolts which secure a motor to the radiogram motorboard become loose and permit the motor assembly to rock slightly. This is a prolific source of faulty running. Hence, when examining any spring-driven motor, it is always as well to check up these parts and to make sure that the securing nuts are tightly screwed up.

Finally, a small but important point, see that the turntable is a good fit on its taper. Any movement here would result in shaking during running with consequent poor results.

MARCONI—THE MAN AND HIS WIRELESS

CHAPTER XXIV—MARCONI LOOKS INTO THE FUTURE

He comments on power transmission—He crosses the ocean for the eighty-seventh time—A tea-party with newspaper men—He talks about ultra-short-waves and television—An old friend's impression of the inventor—He inspires an editorial—Visiting A Century of Progress Exposition—He goes home across the Pacific—"Blind" navigation micro-wave system is demonstrated on Elettra—Marconi's broadcasts to America—Marconi's view of life and its mysteries—He sees the old order of wireless change

MARCONI might be described as a fashionable, scientific intellectual, possessed of multifarious interests, with wireless always omnipotent. He belonged to the intelligentsia of Old Rome, yet he was ever eager to get away from the social whirl to learn by experiment. Electrical devices in existence were merely tools with which to dig out the secrets of space. He was not one to invent the tools. He merely used them to create, to stir immensities that called for a new order of things and still newer instruments. He revolutionised. Men of a more complex mathematical mind applied their skill to invent the gadgets and machines for which his genius revealed the need. In this way Marconi placed fingerposts to fame along the highways of science just as Maxwell and Hertz did before him.

Then old theories were ripped asunder; old wireless structures tumbled. His discoveries rocked even the foundations and shook out of the electrical circuits old devices which for years seemed indispensable. In this way Marconi was the beacon light of wireless.

He was a searcher in the skies for information, for new scientific clues; never in coils and valves. They were but the telescopes of science through which he hopefully reached out across the universe. He had that superb faculty of seeing great meanings in little things, which other men of research were likely to skip as trivial or insignificant. Anything appearing futile on its face only aroused his curiosity to learn what it was all about. His aim had always been to know everything about everything in wireless.

He seemed to have a multiplicity of eyes, yet he had only one. Coupled with his keen perception was an imagination that foresaw new wonders in radio. Constantly this fired him with impatience to bottle up something new. Time alone overwhelmed him. Possibly a bit enviously, he hoped beyond hope to harness space completely for wireless; to give television to mankind, to light homes and run factories by radio power. Nothing could divert him from it.

His vision always led him on, but it was like reaching out to touch the moon to ever hope to catch up with all he could see in the silver ball of science. He could but point the way for the next generation.

"Mankind is on the verge of discoveries quite as momentous as the discovery of fire," exclaimed Marconi.¹ "Who knows where the future will take us?"

"With regard to the transmission of power—"

"I must leave that to your imagination," he quickly rejoined. "The beam system may be adopted for transmission of power. Employing the beam, power can be sent in fixed parallel lines. Without the beam system the power spreads out as an open fan and most of it is wasted. Again, much of it could be stolen by Tom, Dick or

practical solution of the power transmission problem," he continued. "It is a far cry to the time when all the power man requires for his needs will be delivered to him through the air in full force and at the exact spot where he requires it. A great deal is still to be done before such a thing can become an actual fact, but I believe it is coming.

"I can hardly conceive of power being so transmitted over a range which would carry it beyond the curvature of the earth from the point of generation; beyond what might be termed the point-blank range there would be too great a loss of energy through diffusion and reflection. But up to perhaps 25 miles, where economic considerations permit, electric power will, I believe, some day be carried without wires."

Wireless power transmission is discarded

by many as fanciful, chiefly because the very nature of radio is to spread its cargo in all directions, and even in beam form to be absorbed quickly, leaving only a fraction of power to serve a useful purpose. Marconi, however, was never so sceptical.

Once he projected a short wave 11,000 miles from the Elettra at Genoa to Sydney, Australia. There the signal was intercepted, amplified and local currents were caused to actuate circuits in which electricity flowed to light an electric lamp. On another occasion he touched a switch in Rome, thereby flooding with light the figure of Christ that juts into the sky above Rio de Janeiro; on a mountain peak 3,000 feet above the level of that beautiful harbour.

This was not power transmission by radio as some were quick to interpret. Energy travelling across the sea is too feeble

to light directly a lamp. It is merely, as in this instance, the signal for strong local currents to turn on the illumination.

There are visionaries, however, bold enough to suggest the day will come when homes will be heated and lighted by radio power. To get electricity will be like turning on a radio set to hear music. Micro waves may warm the body but not the air in the

(Continued overleaf.)

MARCONI VISITS R.C.A. HEADQUARTERS



The great inventor and his wife on the observation roof of the 70-storey R.C.A. building in New York during a visit to the U.S.A. in 1933. Also in the picture are M. E. Aylesworth, President of the N.B.C. (extreme left), and David Sarnoff, President of the R.C.A. (next to the Marchese Marconi).

Harry who cared to put up the proper receiving set for utilising it."

"Will we have one or more great power stations with numberless parallel beams, carrying power through the air to a definite destination?"

"There is much to be done before a

¹ Address of welcome at opening congress of scientists at the Royal Italian Academy in Rome, October 12, 1931.

MARCONI—THE MAN AND HIS WIRELESS—Continued.

dwelling. Already ultra-short waves are used to create artificial fevers in the body to fight various diseases. And the impulses can be so controlled that they can cook the white of an egg while the yolk remains uncooked, or the yolk while the white is unaffected. Professor F. L. Hopwood, member of the Grand Council of the British Empire Cancer Campaign, reported this discovery to the London congress of the Institute of Radiology in 1933.

This ability of radio to act as an internal poultice foreshadows a new weapon in the war on bacteria and disease. Medicinal radio has become a most important and interesting field of research. Medical scientists wonder if certain membranes and tissues of the human body as well as malignant growths might be affected by micro waves of different lengths. This branch of science is called radiothermy and radio-therapy.

Out of the morning mist of an Indian summer day in 1933 the Italian liner Conte di Savoia proudly nosed up the Hudson River to her pier at the foot of Forty-sixth Street, having brought Marchese Marconi and his charming wife into port, completing his eighty-seventh transatlantic voyage.

"I am, of course, very glad to be back in the country which has been so encouraging to me in my work, and so hospitable," said Senatore Marconi to the newsmen. "It has been a long time since my last visit. I greatly look forward to seeing everything at the Century of Progress Exposition in Chicago, and especially the exhibitions of radio progress."

He came down the gang-plank, stepped into a limousine and was whisked across the city under motorcycle escort to his hotel. But like every sightseer he was soon on the street again bound for Radio City in Rockefeller Centre, built since his last visit to New York. On the fifty-third floor of the newest skyscraper he met a group of radio editors to whom he declared with a smile: "I am here to have Americans put me wise, as you say, on what is taking place."

It was late in the afternoon—tea-time—so Marconi invited his guests to a party. At one end of the long table, designed for a board of directors meeting, was the silver kettle; at the other end the coffee urn for Americans who might prefer Java Oolong. Marconi, always a perfect host, was extremely thoughtful and considerate of the welfare of those around him.

With a china cup and saucer in one hand and a cigarette in the other, he walked around the room chatting and becoming acquainted with newcomers. It was suggested that the Senatore sit in a large chair at the head of the table.

"Oh, no," he said. "I'll use one of these regular chairs; they are more efficient."

The inventor was in a gay mood; his first hours in New York were to him a tonic, like the June days for a schoolboy aware that the bell is silenced for vacation.

His secretary whispered that he seldom saw the Senatore in that spirit. The problems that always seemed to occupy his mind and veil him in an air of mystery apparently vanished, leaving him free for an hour or two. Marconi was enjoying the occasion; his smiles and humour told the story.

He stood up, made a brief informal speech on how happy he was to be in the United States; recalled the encouragement he had found on the American side of the sea; confessed he had much to learn about wireless—and then invited questions.

"Will it be possible to talk across the Atlantic on ultra-short waves?" he was asked.

Recalling how early predictions relative

WITH JOHN BARRYMORE AT HOLLYWOOD



During his 1933 visit to America, Marconi went to Hollywood, where he saw many of the film celebrities. He is seen here with the Marchesa and John Barrymore.

to wireless had gone astray, he replied: "If we succeed in sending micro waves over long distances we may revolutionise the whole art of radio. And I stake my reputation on it—the micro waves are not affected by static. I have listened to them in thunder storms, but the static did not bother reception. We use a short receiving element (aerial)," he said, holding up a table fork to illustrate the length of the aerial rod or wire.

"Curious as it may seem, day and night do not seem to influence these waves. We might think daylight would hinder them, and darkness increase their range as in the case of longer waves, but no. We are puzzled for an explanation. Further research may solve the mystery."

"Are the micro waves useful in television?"

"They will no doubt be utilised in image

transmission," Marconi continued. "The importance of television, however, is problematical. I believe conveyance of information by sound is more important than conveyance by sight. For example, if one wants to sell stock in London he prefers to get the information across the sea as quickly as possible, and doesn't care to see a television picture of the man who takes the order at the other end.

"We must remember that animals can see, and some have eyes superior to those of man, but man can express thoughts in words and thereby convey information. Speech gives man tremendous power not possessed by animals no matter how sharp their vision. Think what broadcasting has done. A politician can reach a vast audience. What he says is likely to be more important and more appealing than his picture. Broadcasting will survive, despite television. They will supplement each other—sound and sight together.

"We must cheapen the transmission of television pictures, which is at present a rather expensive process. I do not share the opinion that television will kill the motion picture. The relation between television and the films will be the same as exists between wireless and the talking machine. Television and radio will tell us about things that are taking place, but this will not appeal to everyone.

"The secrets of extremely short waves greatly intrigue my curiosity. The fact that they are not influenced by static is a factor of great importance in television. It makes possible clear, distinct pictures. They will not have the appearance of 'rain' which streaked the early motion pictures. Blank spots and distortions in television pictures are not generally present when ultra-short waves are utilised.

"I am known as a man who deals in cold scientific facts and practicalities," said the inventor, "not in Utopian fantasies. As to the talk of a saturation point—a limit of radio progress—there is no limit to distance, hence there can be no limit to wireless development.

"I believe the next twenty-five years will see developments in wireless quite as important as those marked on the pages of the first quarter of this century. Looking into the future I am confident of the perfection of television or motion pictures by radio. Both have been accomplished in a small way."

When bulletins from Rome had indicated Marconi had succeeded in "bending" miniature waves there was much conjecture in American engineering circles as to whether he had actually bent the waves by means of reflectors or other devices, or whether the waves had been reflected by Nature from the Heavenside "roof." Apropos of this he was asked if the waves penetrated mountains or merely glided over the tops.

"You've got me there," said the inventor. "I really do not know. They may be reflected from the Heavenside surface as are other short waves. But we must continue to investigate before being sure."

(Continued from previous page.)

"How far down in the ethereal spectrum can you go?"

"Oh, we haven't plumbed the depth yet," he replied. "We have used waves less than a centimetre in length. That radio region offers great opportunity for experimentation. We have much to learn about micro waves."

Taught by experience that the financial contributions of business go hand in hand with science, if an invention such as television is to be lifted from the stage of an electrical toy to that of a world-wide industry, Marconi said:

"The money aspect of the development of radio must not be forgotten. For example, my first experiment in wireless across the Atlantic cost more than \$200,000. Governments are not so constituted that they can afford to encourage something which has not yet been proved worth while. A great deal of credit must be given to business men who had the faith to put money into the development of wireless. Scientists cannot get along without money to back them."

Someone shyly announced that he wanted to ask what he termed foolish question No. 1, and good-naturedly the inventor said he would try to answer it.

"Have you ever sent messages to other planets?"

"I've sent lots of messages that never got anywhere," chuckled Marconi.

A young executive, alert to an old trick of rescuing a busy man from a crowd, stepped into the room, touched Marconi on the shoulder and whispered: "You are wanted on the telephone, Senatore."

That ended the tea-party.

"Marconi is the same old Marconi; he doesn't change," remarked a veteran American business man as he left the party scene. "Fame never spoiled him; he is always just as boyish. No man in the world has such a conception of wireless, and I mean that sincerely. There is nothing in wireless too simple for Marconi to devote time and attention. That's a big secret of his success. In the little things he finds clues for big things."

"I have been with him at Cannes, in London and in Paris; I have crossed the Atlantic with him, and have been with him on the Elettra. Marconi has the uncanny sense of discovering a need. That was also characteristic of Edison. Marconi ably points out the need for certain instruments, and then his men like Mathieu carry it out. That is a powerful combination if geared to function properly."

"Men of wireless really never knew Marconi. He never mingled with them socially. They knew him only in an engineering way. He is surrounded usually

by his own coterie of people. He never likes large social affairs. He attends them only because he believes it is politic. In his own quiet way he prefers a good party within his own little circle, and is at times quite frivolous.

"He holds himself aloof, and that is well demonstrated by the fact that I have seen him at dinner in the Savoy with his wife, and during the evening no one would go over to interrupt with a greeting or shake hands, as certainly would be the case should he try to dine in public in New York. While visiting in America he is 'hounded' to death, and he telephoned to say he would like to steal away to my home in the suburbs and hide. He cares nothing for ostentation.

"His second wife is from the Roman aristocracy; and I think this lovely lady's greatest fear is that some of her husband's prominent friends may think she has 'high-hatted' them because she fails to recognise them; she is very near-sighted."

Marconi had not been long in New York before newspapers observed that he had lost none of the optimism and courage that imbued him a generation ago and that ultimately enabled him to realise "the long-cherished dream of remote peoples

of less than a foot. We have lately heard much of micro-wave transmission. Again the impossibilities are stressed. The short waves are so readily absorbed by buildings and mountains that signalling over vast distances seems hopeless. But not to Marconi.

The solution of the problem is to be found not on earth but in the heavens. Just as he divined the mirror in the sky early in the century, so he divines that it will serve him again. He turns his beams upward and lets the mirror on high carry his micro waves to ever greater distances until at last he is convinced that ultimately they can be made to reach any destination on earth.

It is not that the principle is daringly new but that it is applied with such success in the face of familiar opposition. What the outcome may be Marconi himself will not venture to predict. "It is dangerous to put limits on wireless," he says. The point is that so little is known about those ever-rising and ever-falling mirrors in the sky that there is still room for Marconi in the young science of radio engineering, still room for the imaginative experimenter to fly in the face of scientific theory.

As the final September sunset of 1933 faded in New York an express train dipped through a tunnel under the Hudson River bound on a night run towards the West, speeding the inventor of wireless and his

wife in a private car to A Century of Progress Exposition in Chicago, where he was dined and honoured; Northwestern University conferred a Doctor of Science degree.

"Marconi Day" at the exposition was designated in tribute to the distinguished visitor, and on that occasion the Western Society of Engineers invited Marconi for luncheon. Just as the engineers were seated a note came from President Roosevelt, who was also a guest of the Ex-

position on that day, inviting Marconi to pay him a brief call. The Senatore excused himself, and some twenty minutes later returned. His face wore a puzzled expression; as he sat down at the luncheon table he turned to Dr. Arthur H. Compton, and exclaimed:

"Where did I meet that man? Mr. Roosevelt described the exact details of a meeting in 1917, but for the life of me I cannot remember the occasion."

It was apparent that on the earlier occasion of their meeting, when Marconi was visiting the United States on behalf of the Italian Government, there was no reason for him to remember an Under-Secretary of the Navy, who was one of the many guests at a reception in his honour, whereas, to the Under-Secretary, Franklin D. Roosevelt, the inventor of wireless was the man of the hour.

A week later Marconi returned to Manhattan Island, stepping off en route at Niagara Falls to marvel at the thunderous

(Please turn to page 168.)

H.M.V. SCIENCE MUSEUM EXHIBIT



This is an exhibit prepared by H.M.V. for the Science Museum to illustrate the development of gramophone pick-ups. The instrument at the back is an oil-damped pick-up. Then, left to right, we see a magnetically-damped type; a pick-up with a counter-weighted arm; the standard pick-up fitted to H.M.V. radiograms with the exception of the Model 801, the pick-up for this being on the extreme right.

bridging the ocean with waves carrying their thoughts."

In looking ahead, *The New York Times* recalled:

When Marconi sent the letter "S" across the Atlantic it was in the face of the best scientific opinion of the day. His waves were like those of light, he was told. Who ever saw in New York a glare in London? The curving earth raised a mountain of water that cut it off. If now we talk and telegraph through space around the world, it is because something urged a divining inventor to experiment in spite of theory. We know that if we can signal across the ocean it is partly because intangible mirrors in the sky collectively known as the "ionsphere," reflect our waves to their destination, and thus circumvent the curving earth.

Radio engineering is now faced with a situation not unlike that which Marconi overcame in his early transatlantic experiments. Crowded as the ether is with waves that carry images, voices and code messages, the engineers have been driven to find new paths. From waves measuring yards and even miles from crest to crest they turn to ripples

QUESTIONS AND ANSWERS

By K. D. ROGERS

CURING HUM IN A FOUR-VALVER

H. I. B. (Watford).—*I have a quite simple sort of set, with one H.F. stage, a detector and a couple of L.F. I made it myself and it is quite efficient except for one thing—how it hums! I have tried all I know regarding the hum, but nothing seems to be any good. Extra smoothing has been added until the whole space (it's in a radiogram chassis) is filled with chokes and condensers. The set is O.K. on gramophone; it's only on radio that I get this persistent hum. It's not tunable but constant. I've tried a "hum-dinger" across the heaters but it makes no difference. What can I do next?*

That's how I like a question asked. Long perhaps as they usually go, but it is to the point and it does tell me something.

What would you do if you were faced with the problem? Give it up and keep rabbits? It's not so bad as that. If smoothing and the "hum-dinger" do not get rid of the hum there is probably only one thing—or two things at the most that can be done.

The first is to make sure that no long leads—grid leads especially—are running through the set. Earth leads do not matter, but those grid and anode leads must be kept short or they are likely to pick up hum from the fields set up by the power pack chokes and transformer. Grid leak on detector valve, H.F. anode lead; detector anode and reaction leads; L.F. grid and anode circuits are prone to cause trouble in this way.

But before you go messing about with the leads try two things—branches of one test. Move that power pack a long way away from the set and see if it hums. Try orientation of the power pack so that the fields from the chokes and what-not cut across the set (if they've got to cut across it) in a different direction.

Try to put your chokes so that they are at right angles with one another and don't use more than two chokes. Two should be enough if they are all in the same main circuit. I believe in a choke in each H.T. feed if the H.T. is split up for feeding to the different sections of the set, but if you use one main feed to the receiver you will find that two good chokes and hefty condensers should do the trick.

Make sure, however, that they are placed at right angles to one another so that their fields cannot induce hum into each other and thereby nullify to a large extent the action of the chokes.

I feel particularly sympathetic about your hum at the moment, because I am faced with one very like it in my own recently constructed receiver. Yes, we blokes get the same troubles as you sometimes, even though we are supposed to know how to avoid them.

As a matter of fact, between ourselves, we not only do not manage to avoid them sometimes, but we actually find great difficulty in curing the troubles when they occur!

That's a fact. Now you won't read me any more, or if you do you won't believe me.

I've tried to be awfully clever with my set. I've got it packed in its cabinet—oh, so beautifully! Compact, neat (or at least it WAS neat before I started to hack it about), the receiver and power pack were models of good home design.

They worked beautifully. Plenty of stations, clear and pure. But behind it all, and coming to the front when no modulation was present, was a nice rich 100-cycle hum. I say "was," but, as a matter of fact, it's still there. I have not cured it, though I have the nerve to tell you how to cure yours.

However, confession is good for the soul, they say, so I may as well tell you that to cure my hum I shall simply HAVE to reconstruct the whole affair.

I can't turn my power pack round. There isn't room. So I shall have to reconstruct the thing to a different shape and plant the power-pack portion (say that quickly) some place else away from the receiver part.

I might tell you how I cured the trouble in the end—or I might not. Of course, I may not cure it—ever. I may have to design the whole affair so completely to get rid of it that it cannot be said to be cured so much as eliminated; if you get the subtle difference.

That's radio. So take heart; you may have to do the same if my few kind words don't get you out of the mess.

WHAT DOES HE DO?

T. P. (Exeter).—*I saw in "P.W." of October 9th that Victor King has been chasing a crackle. He says that when he is faced with that sort of trouble he usually gives the set a thorough run-over. What does he mean? Does he go over every contact or does he go systematically through the set, starting at the output valve?*

Why ask me? You should write to Victor. He's quite a nice quiet chap and you might get a reply from him direct. He gets a lot of letters and cannot answer them all personally, but I feel sure that if you wrote he would at least say a few words to you in the paper.

Anyhow, I've asked him and he says that he goes over every joint and every wire, pulling and twisting while the set is on. It's a very good way, too.

I do the same except that I invariably start the process by pulling out the valves one by one, starting at the H.F. end. That's

not conclusive, for an H.T. trouble in the H.F. circuit can make a noise even when the output valve only remains in, but it is a nice, lazy way of getting a possible indication where the trouble is situated.

Starting at the output valve is all right if you don't pull it out. You can start with the speaker flex, then go on to H.T., L.T. valve, anode and grid, and so on backwards through the set, but the whole trouble of the crackle chase is that when you wobble a valve, for instance, you also shake the set chassis slightly—you can't help it. That may shake the faulty contact that is making the noise, and it may be "miles" away from the valve you are testing.

SOS

I have been asked to put in an SOS by the writer of the letter regarding my "Ferro-Power 1936," in a recent "P.W." He says "I find I am being swamped with inquiries concerning the dates of issue of 'P.W.' containing constructional details of the set."

"Most letters include a stamped envelope for reply and I am doing my best to answer them."

"Little did I think that I should be called upon to answer so heavy a correspondence."

The Editor cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped, addressed envelope must be sent with every article. All Editorial communications should be addressed to the Editor, "Popular Wireless," Tallis House, Tallis Street, London, E.C.4. All inquiries concerning advertising rates, etc., to be addressed to the Advertisement Offices, John Carpenter House, John Carpenter Street, London, E.C.4. The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialties described may be the 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.

It must have greatly interested a good many of your readers, and I can readily understand their eagerness to learn of a really good quality powerful set. (Pause for blushes.)

"Can you publish the details or describe the 'Ferro-Power 1936' in an early issue of 'P.W.'?" I think K. D. R. would be pleased to describe the set briefly and the approximate cost under 'Questions and Answers.'"

I will quote no more. It is undeservedly laudatory, but I have discussed the matter with the Editor and await his decision. Meanwhile, those who have written to Mr. S. G. Thomas, 41, John Street, Blackhill, Durham, please accept his apology for not answering promptly and his assurance that he has no copy of "P.W." available with the details in.

For the sake of those who are interested in the set, I should be glad if they would send me their names. Whether or not we publish further details, or rather concise details of the receiver, will depend on the number who want them. If only a few really want details, perhaps an SOS will bring copies from other readers who have them on hand.

So if you want the set revived drop me a line. I will then go down on my knees and see if I can coax some space out of the Editor. It rests with you.

MAINS VALVES

"Interested" (Chester).—Is the mains valve constructed so that the heater is in contact with the cathode, or is it insulated from it entirely?

It is entirely insulated from it. Frequently valves of a few years ago developed faults in the insulation between cathode and heater and a crackling noise was set up with final refusal to function.

Nowadays the leakage is not so frequent, though it does occur sometimes. It is essential for the two to be kept apart if hum is to be avoided. That is the whole idea, for it makes the cathode equal-potential throughout its length, a state of affairs that could not be obtained if it were joined to the heater.

In the latter case the fluctuations of the mains A.C. or D.C. ripple would be communicated to the cathode, with the result that the set would hum badly.

It would be as bad as running a battery valve with A.C. or imperfect D.C. on the filament.

There is a long porcelain tube in the mains valve on which the electron emitting compound is deposited. This gives off electrons when heated. The heat is supplied by the ordinary type of filament (not coated for electron emission), which is run along the length of the porcelain tube INSIDE. This filament or heater is connected to the mains, or to a transformer, and supplies the heat which warms the porcelain tube up to a dull red glow.

What you see when looking down into an indirectly-heated valve (note the term, which really answers your question) when it is hot is the end of the heater wire. It looks quite bright, whereas the actual cathode is not so hot. A dull cherry red used to be the term given to the cathode when properly heated. Some of the old valves showed it very well, but the modern method of valve construction tends to hide the cathode.

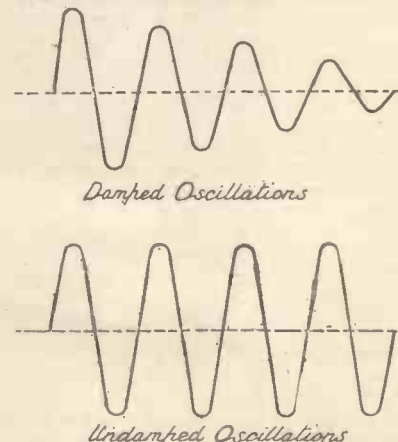
TECHNICALITIES EXPLAINED—No. 69

DAMPED OSCILLATIONS

These are oscillations that are getting less and less powerful. If an oscillation is generated in a circuit—say a coil and condenser—and is not kept going by any external or applied force the resistance of the circuit will cause loss of energy in the oscillation and it will rapidly be damped out. It can be likened to a pendulum which is set swinging and which in the absence of any added energy applied to it will gradually swing less and less far on either side until it comes to rest.

In the case of oscillations, of course, the rate of damping is very much greater than in that of the pendulum, and the frequency of "swing" is very much greater.

The carrier waves from a broadcasting station and the continuous waves from commercial telegraph stations are undamped waves in that they are kept going by applied forces all the time and never die away until the station is switched off.



== SEEN ON THE AIR ==

*News and Views on the Television Programmes by our
Special Radio-Screen Correspondent*

L. MARSLAND GANDER

THIS week I am able to use those witching words "As forecast in 'P.W.'" with special satisfaction. Many months ago I prophesied that St. George's Hall would be converted into an extra television studio in order that the B.B.C. could begin to merge the sound and vision programmes into one, thus rationalising the organisation and economising.

The idea was first suggested in January last, and I find on reference back that I cannot do better than reproduce some of my remarks on that occasion to which ten months of experience has added weight. But first let me say that St. George's Hall is, in fact, to be converted to television, and it is the first sign of a definitely forward policy which the B.B.C. has given for some time.

The project is not so simple as it sounds. Considerable rearrangement will have to be made of the auditorium, while special lighting and wiring will have to be introduced. I imagine, without definite knowledge on the point, that some thousands of pounds must be spent. It is evident, then, that the other proposal to convert the Alexandra Palace theatre will temporarily be shelved.

A Sound Policy

And, for once, I agree with the B.B.C. conversion of St. George's Hall is far sounder policy. Once again the B.B.C. will lead the world as the first broadcasting organisation to tackle the task of merging sound and vision. Visual, dressed shows will cost more, but will not cost so much as two entirely separate shows, one at Alexandra Palace and the other at St. George's Hall. The difficulty I foresee is that some managements which have reluctantly consented to the appearance of artists in sound programmes are now banning their appearance on the television screen. But this business of Canute and the tide has happened before, and will happen again, and I am not going to play courtier by telling the managers that their ban will have the slightest effect on the incoming tide of television.

Still I have not returned to my remarks of January. I said then that many listeners have objected to the claue in studio variety, the audience equipped with free tickets which roars with sycophantic glee at the feeblest humour. I added that the studio audience was not merely an asset to television, but was essential. The situation is quite different when television is compared with the ordinary sound programme. The applause and visible appreciation of the audience help 'a' television show in a remarkable way. In fact the viewer becomes a part of the audience. There is accommodation in St. George's Hall for an audience of just about the right size.

Incidentally, television from St. George's will also probably help to sell sets on the "Can you see me, mother?" principle. Pictures will travel from St. George's Hall to Alexandra Palace on the special cable connecting Broadcasting House to Muswell Hill, first used for the Coronation procession. Extension to St. George's Hall will be a small matter.

The St. George's project has been helped forward by the completion of experiments on the new camera to which I have made various allusions in these Notes. This new camera, I believe, is approximately ten times as light-sensitive as existing cameras. It is fully panchromatic; and its depth of focus is equal to that of a film camera. This delicate new television eye will, obviously, be able to work with less light. But what is more important, it will overcome focusing

with it all. Things worked out quite differently. I have seen motor racing at Brooklands, and whether from stupidity or inexperience I cannot say, I was bored and could not make head or tail of it all. Yet I enjoyed the televised race from start to finish.

The Crystal Palace race was presented very clearly. The commentators concentrated on the leaders and showed long stretches of the track with the first and second cars fighting for the lead. One camera was stationed very happily at a hair-pin bend, and the cars came skidding madly round, the drivers struggling to regain control.

In the finish two cars were seen flashing past the winning post almost together. An interesting point was that the cars did not seem to be travelling very rapidly on the small screen except when the camera viewed them at right angles. But Mr. W. R. Westhead, on whose set I watched the race, had also rigged up an experimental big screen. On this, measuring about thirty inches by twenty, the speed of the cars was much accelerated. This particular set, operated with a cathode-ray projection tube, produced results somewhat similar to those on commercial sets of the type which I have already described in "P.W."

An Excellent Picture

I was greatly surprised at the quality of the picture as seen at Brighton. Except for the snowfall caused by car interference, it was as good as the picture which I receive at Barnes, only nine miles from the transmitter! But it must be remembered that Mr. Westhead's house is on the Downs, and he uses an exceptionally lofty aerial.

If further evidence is needed that an increase of power will "fill up the gaps" in the service area, it is provided by the news received while I was writing these lines. Mr. M. K. Taylor, television manager of Ferranti, at Moston, Manchester, reports that he picked up the car race pictures there at a distance of 160 miles from Alexandra Palace. This, I believe, is a record for the reception of vision, though the accompanying sound has been heard in New York and South Africa.

"The Jar," a typical comedy by the great Italian dramatist Pirandello, is to be televised on October 28th and 30th.

The scene is set in an Italian village with a chorus of villagers who sing and dance to mouth organ accompaniment. Presentation will be by Jan Bussell.

A piece of stop press news is that the Lord Mayor's Show—a Pageant of Empire this year—is to be televised on November 9 for the first time.

CHELSEA CHINA COMES TO LIFE



Guelda Waller and Vera Maconochie in a "Chelsea China Pastoral," recently televised from the B.B.C. studios at Alexandra Palace.

difficulties. Hitherto viewers will have noticed that while persons near the camera could be focused with great accuracy, anybody a little farther removed would have blurred outlines. This sort of problem will be overcome.

Incidentally, the camera was recently demonstrated to Lord Selsdon, chairman of the Television Advisory Committee.

Easily the most exciting television programme which I have yet seen was the transmission of the motor race for the Imperial Trophy from Crystal Palace on a recent Saturday. I watched the pictures at Brighton, so that the images had travelled twelve miles from Palace to Palace across the roof-tops of London and then had taken another leap of fifty miles to the South Downs.

I had candidly expected the transmission to be a failure, imagining that viewers would see objects hurtling across the small screen and become thoroughly confused and bored

TECHNICAL JOTTINGS

Items from an expert's notebook

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

OFTEN when you are reading the constructional description of a new set, you will notice non-inductive condensers specified in certain positions. Readers have often asked me what is meant by a non-inductive condenser, as they are usually under the impression that a condenser is a device which has only capacity and not inductance anyhow. Some of my readers are aware that there are such things as inductive condensers, but they in turn seem to have the idea that a non-inductive condenser is simply a mica condenser whilst a paper condenser is always inductive. As this matter is important in connection with set construction, I think it may be as well to make it clear.

Inductive Components

In the first place *any* component has some inductance; there is no such thing as an entirely non-inductive component, so that the term in any case is only relative.

The simplest form of condenser is one in which flat sheets of the conductor, tinfoil or whatever it may be, are separated by layers of insulating material. This is the form which has the least inductance. Since mica comes in flat sheets it is obvious that a mica condenser will be of this type, and

that is why people sometimes think that a non-inductive condenser means a mica condenser. A mica condenser will be non-inductive, but a non-inductive condenser need not necessarily be mica. If a condenser of larger capacity is made up by using larger sheets of tinfoil separated by similar sized sheets of waxed paper, this will be just as non-inductive as the mica condenser (I say just as non-inductive but, of course, to be strictly accurate the inductance will depend upon the actual size of the condenser).

Paper Condensers

If, however, a condenser is made by taking a long strip of tinfoil and a similar strip of waxed paper, laying the two together and then rolling them up, this condenser will obviously have appreciable inductance, because when the current flows into it it passes round a coil, and the same when it comes out. This type of condenser, which is often used where larger capacities are required, will be unsuitable in a place where the designer of a set has specified a non-inductive condenser.

Larger Capacities

A strip-wound condenser of this general character may, however, be made non-

inductive by separating the strips of tinfoil into parts and connecting them together in certain special ways so that the inductive effect of one set of strips neutralises that of another. As you generally see a paper condenser contained in a flat metal case, I should mention that, although I have spoken of the strips being rolled up, they can be rolled into a "flat cylinder" instead of a "circular cylinder."

To sum up: If a non-inductive condenser is specified, and a mica condenser will give sufficient capacity for the position in question, you can be sure that the mica condenser will be non-inductive. If, however, the required capacity is much larger and a paper condenser is called for, then you ought to ascertain whether the paper condenser is non-inductive or not.

The other week I had something to say about the need for improved fixing lugs on components and the danger of breakages occurring in screwing down to a base-board or chassis. One point that occurs to me is that it is safer to use a round-headed screw than a countersunk screw (even if the hole is countersunk), as the countersunk screw acts as a wedge and is, in fact, made to order for splitting the composition.

A further point is that the holes for fixing screws are often placed in an inaccessible position, perhaps beneath some overhanging part of the moulding, so that it is virtually impossible to get a screwdriver into action at all.

These and similar things are, I suppose, just sent to try us, but it does seem a pity, (Continued on next page.)

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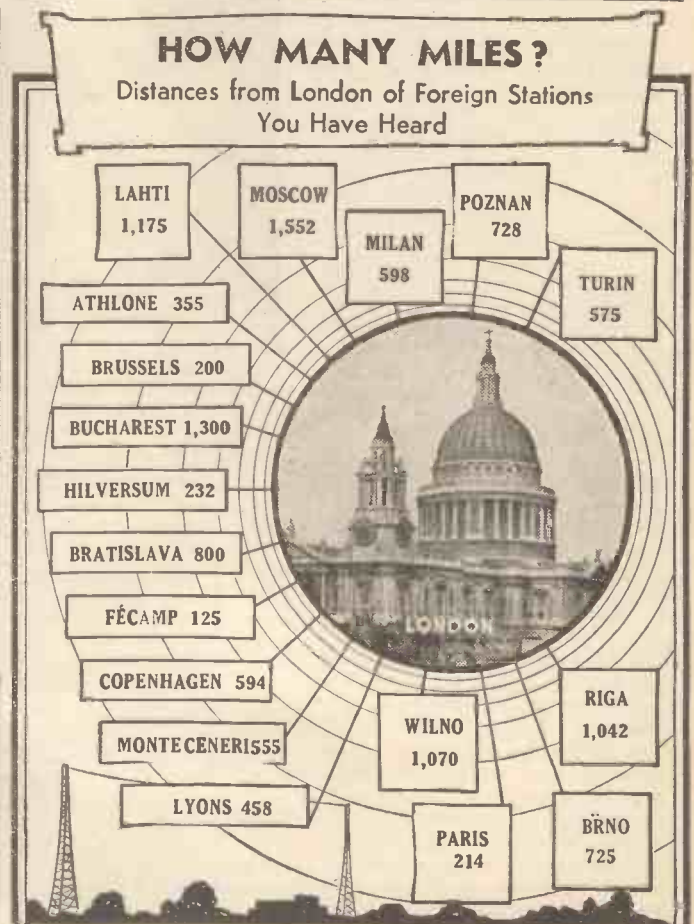
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TECHNICAL JOTTINGS

(Continued from previous page.)

when it is just as easy to make things right as wrong, that some manufacturers cannot take the trouble to go through the routine of using their own products themselves and getting to know the experience which their customers are going to have.

Commercial Receivers

Matters in this direction are not nearly so bad nowadays as they were a few years ago. Since the trend has been more and more in the direction of manufactured sets—"custom-built" sets as they call them in the States—and away from amateur construction, there has inevitably been improvement in the design and make of the various components used. As I said, things are a great deal better than they were, and there is no comparison between the general run of radio components to-day and those of a few years back. But one still comes across aggravating incidents such as I have indicated. I came across one myself only the other day—hence these remarks—and there is, therefore, still room for improvement.

Standardisation

A further point which I did not mention, but which is related to what we have just been discussing, is the standardisation of size and shape of fixing holes, plugs-and-sockets, types of lug and so on. In many trades this kind of thing has willy nilly had to be standardised; a good deal of progress has been made towards standardisation of these matters in radio practice, but there is still a long way to go. I cannot see what earthly reason there can be for manufacturers adopting quite arbitrary dimensions, sizes, styles and so on in these small matters. One can quite understand set-makers having their own distinctive styles and designs of cabinet, and one can also understand that there may be other directions in which they wish to keep their products distinct from those of their competitors. But in these small matters, like the shape of lugs, size of fixing holes, size and style of resistances, etc., it is difficult to see any reason against standardisation.

Those Soldering Jobs

I expect many of you have various soldering jobs to do, not only in connection with your radio experimental work, but also odd jobs about the house. The radio experimenter soon gets handy with the soldering iron and finds himself called upon for all the other hundred-and-one jobs that crop up.

No one can get very far with soldering without realising the disadvantage and inconvenience of an ordinary soldering iron which has to be heated repeatedly in a gas flame or in the fire. Of course, you can get along with it if you haven't much of this work to do, but if you have a lot of soldering to do, especially if it is fairly fine work and is continued over any period, you will soon find the immense advantage of an electrically-heated iron. There are various electric soldering irons on the market, perhaps the best-known one being the Solon, made by the Henley Cable people. I have used soldering irons of this type myself for years and would never go back to the messy and inconvenient ordinary

irons. The advantage of the electric iron is that it is clean and easy to use—the outside doesn't get all crusted up with oxide and dirt—it is convenient for reaching awkward spots in delicate electrical work, and it doesn't keep cooling off before the job is finished.

Electrical Efficiency

These soldering irons are very efficient in the sense that the heat which is produced by the electric element goes pretty well all into the copper "bit." The iron for general use takes about three or four minutes to heat up from cold and runs about 16 hours actual working on one unit of electricity. If you know the price of electricity per unit in your district you can easily work out what it will cost you, but in any case you will find the electricity consumption relatively insignificant.

Points About Flux

A very handy accessory to go with the electric iron, especially for electrical work, is the resin-cored solder, which is made in tubular form and contains a core of pure resin. The solder itself is made of 50 per cent. lead and 50 per cent. tin, and as the resin core has a lower melting-point than the solder itself, it melts out before the solder commences to flow. No additional flux is necessary, and the resin goes on to the job exactly where it is wanted and in the right proportion to the amount of solder used. Some people think that resin is not very easy flux to use—personally, I prefer the spirits—but at the same time the resin is very safe and does not corrode the joint afterwards. If you use spirits, although it is quicker at the time, it probably takes longer in the end because you have to clean the joint very carefully with a tiny brush dipped in water or with a speck of wet cotton-wool held in tweezers.

However, a very good flux for general use, including radio work, and which does not produce corrosion, is the well-known "Fluxite."

Crackles

If you are troubled with crackles, one of the first things to do is to overhaul all switches and movable contacts and make sure that every part is doing its job properly. This is the very first thing I look at myself whenever anything goes wrong with a set. Don't waste your time looking, at any rate in the first instance, for such things as transformer breakdown, valve electrodes and things like that which, although they do happen, happen only occasionally. Go right for the mechanical parts of the set, and it is pretty certain that, in nine cases out of ten, that is where your trouble will be.

Candid Opinions

If a friend comes in to listen to your set and doesn't seem quite as pleased with the quality as you are, don't take any offence, because he may unconsciously be doing you a good turn. It has been proved that when you are continually using a set you tend to become oblivious to some of its minor faults, and if the quality gradually deteriorates you will not notice it. A friend, however, who may perhaps have an up-to-date set with first-class reproduction, will at once notice the difference when he hears your set—that is, if there is any difference.

Distortion may be creeping into the

(Continued overleaf.)

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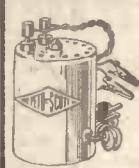
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TECHNICAL JOTTINGS

(Continued from previous page.)

reproduction either from a failing battery or from a dozen other causes, and it may need an outsider to point it out to you. Of course, some people think that no set could possibly be as good as theirs. I am not alluding here to mere prejudice; I refer to the helpful criticism of a friend whom you can rely upon to tell you the truth.

Making Comparisons

It is not a bad plan now and again to listen to other people's sets and compare them with your own, as in this way you get ideas, not only as to how your own set is going on, but as to whether a somewhat different type of quality might please you better.

People often think that distortion, when it crops up in a receiver, is always due to the low-frequency end, but this is a mistake. It is true that, more often than not, distortion will be attributable to the low-frequency amplifier, but it often occurs in the detector stage and, perhaps not quite so often, in the H.F. amplifier. Although it occurs not so often in the high-frequency part of the set, when it *does* happen there it is generally more difficult to trace. Distortion in the high-frequency part is generally due to some form of oscillation, but this may not give rise to howling or whistling. You may, however, notice when a set is just slightly off-tune for a station, that there is the faintest suggestion of a whistle.

H.F. Instability

The causes of this instability in the high-frequency part may be various; for one thing, the screening grid of the S.G. valve or H.F. pentode may not be getting its proper voltage, or the valve may not be sufficiently biased for the conditions in which it is working. When a variable-mu potentiometer control is used, the H.F. amplifier is sometimes kept on the verge of oscillation if the control is set to the full-volume position, and this may be due to insufficient screening.

★ ★ ★

New Book on Condensers

In view of the increasing importance of electrolytic condensers, and of my remarks on this subject in "P.W.," several readers have written to ask me whether there is any book or other literature available in which a comprehensive treatment of this important subject can be found.

As the development of this type of condenser is comparative new, most of it having taken place within the last few years, there has been an inconvenient absence of any proper literature on it, but it so happens that a very excellent volume has just come to hand; it is by Mr. Phillip R. Coursey, who is, of course, very well-known in the radio world, and technical Director of the Dubilier Condenser Company. The book is entitled "Electrolytic Condensers: Their Properties, Design and Practical Use." I need hardly mention that the author is one of the foremost experts of to-day in the condenser field, and no one is more fitted to compile such a volume than he.

This book is published by Chapman & Hall, Henrietta Street, W.C.2, at 10s. 6d., and can be thoroughly recommended to all my readers who have reason to take a serious interest in the important subject of electrolytic condensers.

REGINALD FOORT

(Continued from page 154.)

a small theatre. Picture the solo artists on that extended portion with its carpet, and one or two microphones hanging above them or on stands at various odd places. Then behind them picture the orchestra, some on the floor and others raised up on rough platforms. And another microphone perhaps hanging from the roof at some distance in front and well above the orchestra.

Then, round the corner is the great organ console, unless it has been pulled out so that it comes into view of the audience. And right up high in front of the proscenium another microphone, by which the sounds of the organ are picked up.

All those mikes have to be balanced by the lads in the glass house. Every instrumentalist in the orchestra has his own place marked in chalk on the floor. Every singer or solo artist has his or her place marked. If it is a custom of any particular artist to lean towards the mike when broadcasting, allowance is made for that and the mark where the artist has to stand is set a corresponding distance (just a matter of inches) farther back.

Yes it is a matter of inches, and inches count in these days of highly-developed radio art. The whole blend of the show depends first on accurate and proper placing of artists; after that, everything depends on the balance and control men.

St. George's Hall to-day sees a form of wizardry of which Maskelyne and Devant never dreamed when they used to put over their mystifying shows a few years ago.

CLUB NEWS

TOTTENHAM SHORT-WAVE CLUB

THE Tottenham Short-Wave Club will be holding three Visitors evenings on the 11th, 12th and 13th of November, from 7.30 until 10 o'clock, and welcomes all radio enthusiasts to the club's premises on those dates. Members' apparatus made on the club's premises will be on view, and other items of interest to radio amateurs.

Complimentary tickets will be gladly forwarded on receipt of a postcard to the Hon. Sec., Edwin Jones, 60, Walmer Terrace, Palmer's Green, N.13.

GLASGOW S.W. SOCIETY

Meetings of the Glasgow Short-Wave Radio Society are held every Thursday in the Masonic Hall, 75, Berkeley Street, C.3; at 8 p.m. Instruction on short-wave radio reception and transmission is given, including Morse. Ample opportunity is available for all interested in this branch of radio. Beginners are cordially invited.

EDGWARE S.W. SOCIETY

A society has been formed under the title of the Edgware S.W. Society, and meetings are now held every Wednesday at 8 p.m. and Sundays, 11 a.m., at the above address.

All in the Edgware area who are interested in short-wave work or transmitting are requested to communicate with Hon. Sec., 40, Raeburn Road, Edgware. Phone: Edg. 4917.

A PHILCO RADIOGRAM

WHAT exactly does the term "enormous power" convey to you? It is used in a catalogue description of the Philco "Empire Five." Well, we have seen the words employed in connection with sets giving what, in our opinion, could more fairly be described as a thin, reedy output. But it is also said of this Philco set that it provides 3 watts undistorted output. Again, we have had sets on test for which more watts than that have been claimed, and the result has still been, in practice, thin and reedy.

A question: Can the two Philco statements be lined up? Is 3 watts a power to which the adjective "enormous" is fairly applicable? In the ordinary course of events, we should have been inclined to answer these queries with a couple of pretty definite negatives, but not since testing the Philco Model A537 Radiogram, which embodies an "Empire Five" chassis.

We were quite amazed at the volume and quality given by this instrument. They are out of all proportion to what one might expect from "3 watts." "Enormous" is hardly so much an exaggeration as a plain statement of fact. With the volume control turned right up there is much more than enough loudness for the largest ordinary room, and the quality is quite superb. It is an example of modern sound engineering at its best.

An All-Wave Superhet

The A537 is an all-wave superhet using five valves, and its station-getting powers and selectivity also contribute to a first-class all-round performance. An interesting feature is that the on-off switch is combined with the tone control, and not with the volume control, as is more often the case. At first sight this might seem a rather strange departure from conventional practice, but the reason is that any setting of the volume control can be maintained. A good reason, for tone settings are not necessarily so critical.

The waveranges covered are as follows: 16.6-52.6 metres, 176.4-545.4 metres, 937.5-2,000 metres. The dial is calibrated in station names and kilocycles, and when illuminated reveals a three-colour indication of the three wavebands.

The cabinet is walnut, and there are fluted walnut pillars at the sides. The dial and controls and, of course, the turntable, are at the top, the lid shutting down on them. The gramophone has an automatic stopping device which switches the motor off at the end of a record's playing tracks, whatever the size of the record. You do not have to adjust for different sizes.

Practically any of the European medium and long-wave stations can be tuned-in with anything at all of an aerial, and there are always dozens of them available at full programme value. The set is equally successful on the short waves, where the A.V.C. holds up well even against considerable fading.

In short, it is an excellent set, and we can unhesitatingly recommend it to the attention of our readers. The price is twenty-one guineas.

FROM OUR READERS

(Continued from page 155.)

soil, absorb nitrogen direct from the air, which should prove to Mr. J. N. Parry that life is possible in an atmosphere of nitrogen.

To my mind, life is probable on Mars, but the form of life would almost certainly be unlike anything on earth. On Venus, however, the beings are more likely to be "earthly," as the atmosphere is very like that of earth, containing large amounts of water vapour and carbon dioxide (proving the existence of plant life). It is only slightly smaller than earth, with a density intermediate between that of earth and Mars.

I am seventeen years old, and rapidly getting older, but I know my figures are correct. I have been interested in all science subjects since I was about twelve. If there is any one, of either sex, who would like to write to me, I will try to reply, and thus make another friend.

Here's to "Popular Wireless," the Martians, and W. L. S.!

PHILIP A. SIM.

65, St. George's Road, Ilford, Essex.

THANK YOU

The Editor, POPULAR WIRELESS.

Dear Sir,—Some weeks ago I read in POPULAR WIRELESS a report on the new G.E.C. All-Wave receivers.

In this report the writer described the slow-motion tuning systems used on these receivers, and said that he wondered why the idea of dual ratio tuning by means of the one knob had not been thought of before.

I happen to be in the radio trade and, when turning out some old junk a while ago, I came across a tuning condenser which incorporated the same idea as the writer mentions in his report, the only difference being that it was a single condenser and its tuning ratios were 1:1, and I should say about 3:1.

Unfortunately I am unable to describe how this condenser works exactly, because after having seen what it was it got buried with the rest of junk again, but I have an idea it was made by Jackson Bros., and it must be at least six or eight years old.

So actually the system which Messrs. G.E.C. use is not new—it is just an improvement on an old idea.

J. T. RUNDLE.

60, Edgcombe Avenue, Newquay, Cornwall.

MORSE IN THE WRONG PLACE

The Editor, "Popular Wireless."

Dear Sir,—As the result of listening on the medium and long waves all one evening, I have decided to write and tell you my grouse against radio. My grouse is not, as in many cases, against the programmes; no, on the contrary, I can always find something to amuse; my grouse is against Morse.

To whatever English programme I tuned my radio this evening, I found that the programme was periodically interrupted by a loud burst of Morse which completely drowned the programme and destroyed its entertainment value. Whether this is entirely due to where I live, I do not know, but after trying to listen to every Regional except Midland, I am beginning to think that the "Morse juice" follows me wherever I go.

Cannot something be done about this form of interference? Couldn't Morse transmissions be restricted to the shorter wavelengths, where they can be received without being heard by people who do not welcome them?

Surely this suggestion is practicable; surely one day we will be able to listen to the North Regional without expecting the programme to be destroyed by Morse, without hoping that the period between the Morse transmissions will last until the end of the programme.

G. GOOCH.

"Woodside," Long Copse, Fawley, Hants.

KENTUCKY MINSTRELS AGAIN

Harry S. Pepper's black-faced minstrel show, "Kentucky Minstrels," will return to broadcasting on October 29 in the National programme and will repeat their performance on the Regional wavelength at tea-time the following day.

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MARCONI—THE MAN AND HIS WIRELESS

(Continued from page 161.)

cataract for the fourth time, and to show it to the Marchesa for the first time.

Back in New York he was conducted on a tour of Radio City; through the elaborate broadcasting studios and back-stage of the magnificent Music Hall. To the showman who pointed out the features Marconi did not appear to be impressed. His mind seemed to be looking ahead—to something even greater? Or was he puzzled at the vast outlay of money in this field of radio which might change overnight and render much of it obsolete?

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Marconi gave the impression of being perplexed; when a novel device was explained the only word he found to express surprise was, "Indeed," with an exclamation point. It all seemed as if modern radio had run ahead of Marconi. But had it?

Possibly he was comparing the present wonders with the future in which he could see new marvels for micro waves. Perhaps again he wondered at the American extravagance and audacity in such a nebula as radio; possibly he marvelled at the courage and optimism of the Americans. And well he might, for all of his triumphs had emerged from apparatus extremely simple compared with this electrical temple of modern broadcasting—a citadel that would long tower as a monument to the American spirit of progress in the face of a devastating business depression.

He was enthused about it all the next day when met in his private suite at the Ritz. A dapper man, who looked more as if he had come from London than from Rome, smart, handsome and perfectly groomed in a double-breasted blue suit, a starched collar, and a purple tie with pocket handkerchief to match, slipped into the room through a french door.

Marchese Marconi calmly approached his guest, shook hands, and commented on the sunshine, but every move was guarded with a formal mask behind which he awaited questions, for he was aware the motive of the meeting was an interview. He was on the defensive. Having met him before, there was no expectation that he would manufacture the conversation. His answers were generally brief, of the "Yes" or "No" variety; the reporter who sought a story soon began to wonder if he would get enough news to cover one typewritten page.

"Please sit down here," invited Marconi, pointing to a sofa, and he was careful to sit on the right to keep his good eye towards his guest.

A clipping from the morning paper on his arrival in New York the day before was handed to him to "break the ice." He donned a monocle and quickly scanned the column commenting on the reporter's accuracy. His smile revealed he was pleased—that he enjoyed seeing his name in print—he turned from the clipping with a sheepish smile and confessed he had been too busy to read the morning paper earlier.

The inducement for Marconi to talk was to turn to the past; reminiscences of his triumphs in wireless were a lure to conversation. In the light of his glories he was seen as Marconi the man and not the scientist or Italian Senatore. The cold reserve would begin to melt. He would become more friendly. But should an interviewer seek to lead him into the rôle of prophecy, with a gesture and a puzzled frown he would wave the future aside. He almost gave the impression that he was so busy with his experiments that the rest of the world's activities were a mystery to him. For instance, if one should ask him if Fascism would be good in the United States, he would not answer the question directly, but might dispense with it briefly by commenting upon its success in Italy.

He never belonged to any political party, but when he saw Fascism saving Italy he said, "I am a Fascist by conviction. Fascism is a régime of strength necessary for the salvation of Italy."

He liked the past because he was sure of it. It was definite. The present was too fleeting to catch with accuracy; Marconi cherished accuracy and precision. The future to him was powerfully full of promise. Wireless, the task of his youth, could not be completed in a lifetime; it was destined to go on from generation to generation.

To get off the subject of wireless an interviewer ran the risk of terminating the visit, but taking this chance, to see another side of him, he was asked, "How is your little daughter Elettra?"

The cool smile of the inventor immediately changed; Marconi had that same warm, fond smile of any proud father as the little girl was mentioned. Wireless might be in his mind but Elettra was in his heart.

"I must give you one of her pictures," he said, standing up and then returning to the sofa to add, "I forgot, my wife has gone out and I don't know where she put them."

"What did your mother and father think when you first experimented with wireless?" he was asked.

"Mother encouraged me; she had faith in what I was doing," he reminisced. "Father was sceptical until I got results," and he smiled as he recalled the triumph of youth in convincing his parent that there was something in wireless after all. "I'll tell you, if you set your heart and soul in a thing you can do it."

A glance at his wrist-watch reminded him of a luncheon engagement at Radio City, and whether it was for luncheon or for a banquet, to catch a train or board an ocean liner, Marconi liked to be there a few minutes ahead of time. Time seemed to prod him, and he became uneasy as the clock approached the hour of an appointment. If he ever happened to be late, even a few minutes, he was apologetic the minute he entered the room. The interview concluded, he accompanied his visitor into the hall to the elevator, shook hands and said, "I shall expect to see you next week when I return from Washington."

That afternoon he left Manhattan Island again and stepped off at Camden, N.J., to be amazed at Dr. Vladimir Kosma Zworykin's television; then on to the national capital with his wife to dine with President Roosevelt at the White House; to Indiana for an honorary degree, Doctor of Laws from Notre Dame; then across the Rockies to Hollywood to see how movies are filmed.

The broad Pacific was near at hand; it looked enticing, and when the Japanese steamer Chichibu Maru sailed through the Golden Gate on November 2nd, the Marchese and Marchesa Marconi were on board bound for Yokohama en route around the globe to Italy. He abandoned his plans to return to New York; new ideas about a "radio lighthouse" were buzzing in his mind. He was anxious to get back home at 11, Via Condotti in an historic part of old Rome; back on the Elettra's deck.

Via Condotti was a narrow street running through the heart of the city from the Corso Umberto I, the main thoroughfare, up to the Piazza di Spagna, the background of which was formed by the great Spanish steps leading up to the Pincio Hill, one of the seven hills of the Eternal City.

The Bezzi-Scali Palace, where Marconi lived, was an ordinary façade with a portico leading into the courtyard from the narrow Via Condotti, noted for its elegant shops; it is quite an English-American centre.

(Continued on next page.)

MARCONI—THE MAN AND HIS WIRELESS

(Continued from previous page.)

Marconi's typical Roman apartment had spacious rooms, darkened by shutters to keep out the summer sun, while stone steps and tiled floors added to the cooling effect.

The comforts of home could not win Marconi from his laboratory, even under the glare of a mid-summer sun; on July 30th, 1934, a new application of micro-wave radio—a safety system for ships to permit blind navigation in a fog—was demonstrated to a large group of Italian and British marine experts. The Elettora steamed into the port of Sestri Levante, sailing in a narrow space between two floating buoys, piloted by the indications of the new instrument and without being guided by any landmarks. To guard against the navigator being influenced by the ordinary indicators the yacht's bridge was screened, making it impossible to see ahead. With absolute accuracy the skipper placed the craft on the line that ran into port, followed the mark unerringly until the ship was safely berthed in the harbour.

If the yacht deviated to the slightest degree from the safe course the deviation was instantly signalled by the instruments on a panel that informed the navigator whether the shift had been to the right or left. Constantly it was possible to determine the Elettora's exact position from the wireless "lighthouse."

The transmitting apparatus comprised two small short-wave outfits described as "twin searchlights" on a single mounting with a dark zone between the two beams." Each of the beams, right and left, had distinctive characteristics. The right-hand beam flashed signals of a low-pitched tone on a 60-centimetre wave.

The left-hand beam transmitted a note of much higher pitch. By having the two notes in exactly opposite phase a zone of silence was created in a central zone between the beams. That "dark" area was where the two notes cancelled out.

To guide the ship the system was swung from left to right of the centre line similarly to the manner a searchlight seeks an object on the water. The beam sounded a low note when swinging to the right and a high note when swinging to the left. The change of tone took place when the zone of silence coincided with the line of entrance to the harbour. It was necessary that the beams swung back and forth, for if the signal was fixed the pilot might assume he was in the silent zone, in case the apparatus failed to operate.

The yacht's installation consisted of a receiving set, loudspeaker and a galvanometer, the quadrant of which was painted half red and half green. When the vessel entered the area of the radio beam a succession of rapid clicks was heard and the galvanometer's needle shifted to the red or green section of the quadrant as the ship moved to the right or to the left respectively of the hypothetical line leading into the harbour.

In demonstrating the operation of the equipment, Marconi saw fit to make adjustments, and he picked up some hand tools which he used as an expert. Dr. Arthur H. Compton, who was standing near by, com-

mented that he evidently did much of his experimental work with his own hands.

"Yes," said Marconi, "how else can one think?"

After watching him on board the Elettora, Dr. Compton later remarked that it would be difficult to ascribe his success to any one personal attribute.

"In my judgment," he said, "it is rather the fine balance of technical knowledge and skill with an appreciation of the economic and personal factors involved that have made it possible for Marconi to continue to occupy a leading place in the application of the highly refined science to human needs."

To which Dr. Robert A. Millikan added, "I have known Senatore Marconi slightly for the past thirty-three years, and have had rather intimate association with him on a number of occasions within the past five years. I regard him as a man of excellent poise and judgment. He is a man who has contributed in an altogether outstanding way both to our scientific and to our industrial developments. In addition to all this, he is a human being of great friendliness and of the finest sort of human sympathy and much personal charm."

After the "radio lighthouse" demonstration, Marconi was free to devote attention to other applications of micro waves. He flew to London and secreted himself in his laboratory. News reports had it that television was whirlpooling in his mind. War interrupted.

Premier Mussolini sent hordes of black-shirted troops into Ethiopia in the autumn of 1935. Marconi made a hurried trip across the ocean to Brazil to inaugurate a radio station, while reports intimated he went on a mission to arrange a loan for Mussolini. Within a month he was back in Rome with rumours attracting front-page notice that he had invented a "wireless death-ray" designed to plummet aeroplanes from the skies and to stop motorcars on the highways.

The story circulated afar. Scientists were doubtful, but imaginative writers thrived upon it. They recalled how ever since wireless became a reality "engineers have been racking their brains to discover a way of concentrating radio waves in long, thin pencils." Nevertheless, success so far has not been conspicuous. Even the Marconi western beam from England widened out across the Atlantic into a cone that embraced the North American continent. Some one had written that "the energy required at the source of a deadly radio beam could not be much less than that of Niagara Falls."

"I prefer to think of the lives that have been saved by wireless," said Marconi, "rather than the uses to which it might be put in wartime."

From the powerful station 2 R O, Rome, he went on the air for a broadcast to America, and as an introduction to his plea for American sympathy for his country's position, scouted the reports of a machine to paralyse aircraft: "If you are eager to hear from me about an alleged new invention by which I could stop motor engines at great distance, or do worse tricks than that, then let me reassure you at once by saying that you may fly to your heart's content as there will be no stopping you—for the present, at any rate."

Turning to the war issues, Marconi said in part:

(Continued overleaf.)

² October 30th, 1935.

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MARCONI—THE MAN AND HIS WIRELESS

(Continued from cover iii.)

"Europe is just emerging from the narrowest escape it has had for the last seventeen years, from another clash, the horrors of which would have eclipsed all the horrors of the Great War.

You Americans, who, luckily for yourselves, are outside the League of Nations and breathe the free, invigorating air of two oceans and of great spaces, somewhat different from the confined atmosphere of Lake Geneva will be able to form your own unbiased opinions, and you won't fail to recognise the justice of Italy's claim."

The Marchesa Cristina Marconi also went on the air in an international broadcast, the theme of which was high praise for the state of Italian women under Fascism.³ Expressing "great faith in women's mission in life," the Marchesa said there were 5,000,000 working women in Italy "on an absolute equality with men—equal work, equal pay."

"It is only since the advent of Mussolini that all professions have been open to women," she explained. . . . "As a rule Italian women are not politically minded, but they play their full share in our constructive human effort. They proved that throughout the Italian-Abyssinian conflict."

Those were the busy days for the Italian people; Marconi was seen in the news pictures with the Grand Council at the head of which sat Mussolini. While Italian radio tossed lines of communications across the Mediterranean to Marshal Pietro Badoglio's troops in Ethiopia, and the waves in other directions protested against "the economic conditions most unjustly inflicted upon Italy," radio in other lands also played new rôles befitting modern times.

A million-dollar television field test was initiated in New York from atop the lofty Empire State Building; in London images were dancing across the roof-tops from Alexandra Palace. It was the evolution of a new industry.

And on the high seas wireless was advancing too. Great Britain's 1,004-ft. 80,733-ton super-liner R.M.S. Queen Mary sped proudly into New York Harbour, boasting ultra-modern radio instruments, which proved their multiplex efficiency by broadcasting and sending messages all the way across the sea. The eight separate lines of communication, four in and four out, all working at the same time independently of each other, were never silent. The fourteen radio operators were busy day and night. Even the passengers in any one of 500 state rooms might pick up an ordinary telephone and talk by radiophone with friends in towns far distant. In fact, while one man was chatting with Cape Town, South Africa, another was talking with Chicago.

Old-timers marvelled at the equipment; just the touch of a tiny switch turned the conversation into ethereal jargon sometimes called "scrambled speech," yet those talking were unaware that their words were being wobbled and all mixed up so no one might eavesdrop. Everything about this modern marine radio seemed so complex, yet so simple in performance. The veterans on board reminisced and compared the old with the new; they recalled the Titanic and how radio and ships had changed. Marconi

³ June 15th, 1936.

naturally came into the conversation, and a pioneer, associated with him since the inception of the Marconi Company, was asked to what forces he attributed Marconi's success.

"Chiefly to his instinctive intuition as to what was wanted and how to arrive at the solution," he replied.

"Also to the fact that he had a company with plenty of capital behind him, and that the success or otherwise of the company depended upon the rapid development of wireless in the early days. With this money behind him he had the courage to launch out on great experiments such as the development of transatlantic wireless in the early part of the century.

"The fact that the organisation was named the Marconi Company added enormously to his prestige and has always kept his name prominently before the world. The most interesting period in the life of the company passed, in my opinion, when cables obtained control of wireless in England and the Marconi Company became practically a manufacturing organisation.

"Marconi deserved all the praise he received in the early days, but since the World War he has contributed very little himself to wireless development, either in invention, design or construction. . . . Marconi is a curious man."

The famous "instinctive intuition," however, was very much alive.

Did he expect television? Yes! Did he see any limitations to wireless? No! Impossible solutions of wireless mysteries, climatic, atmospheric or otherwise? No!

Wireless to him was no riddle. Time was the all-important element in the solution. To him there was one great problem, the most persistent ever placed before the thought of man. That was life itself!

Life to Marconi was an impenetrable secret. He declared life "would be truly frightening were it not for faith." Never in all his research had he glimpsed the slightest clue to explain the mystery of humanity's origin and the future.

"If we consider what science already has enabled men to know—the immensity of space, the fantastic philosophy of the stars, the infinite smallness of the composition of atoms, the macrocosm and microcosm whereby we succeed only in creating outlines and translating a measure into numbers without our minds being able to form any concrete idea of it—we remain astounded by the enormous machinery of the universe," said Marconi.⁴

"If, then, we pass towards the consideration of the phenomena of life, this sentiment is accentuated. The complexity of the different organs, which all work out in co-ordinated and determinate functions, the constant preoccupation for the conservation of the species, man's marvellous adaptation of his constitution to surroundings, the transmission of instincts, the mechanism of thought and reasoning, and, lastly, the spectre of death, place man, who wishes to explain the tormenting mystery, before a book closed with seven seals."

Marconi had reached an age where he was beginning to philosophise—to look back.

Youth dreams of the future—the road ahead. Age dreams of the past—the long

⁴ Lecture before the International Congress of Electro-Radio Biology, at Venice, Italy, September 10, 1934.

road back. The one leads on to progress; the other into hazy reveries, into the land of memory.

With a tinge of sadness, like saying farewell to an old friend, Marconi saw Poldhu, the scene of the transatlantic triumph, close after twenty-two years of continuous service, having flashed its final message to Spain, curiously enough the land from which Columbus sailed westward as did Poldhu's famous three dots.

There was a time when the skies were "painted with unnumbered sparks." But no more. He saw them pass unobtrusively from the heavens. Gone is the awe-inspiring apparatus of old. There are few crashing, crackling sparks; no electric flames leaping across wide-open gaps. The long waves upon the crests of which Marconi and the pioneers wafted wireless to victory have lost much of their glory. Short waves are the thing.

The ships which first flashed wireless from their masts no longer sail the seas. Erosion and corrosion worked by Time and the restless ocean are destructive. They leave only memory, ever fading.

Wireless has changed. Softly glowing valves silently broadcast a rhapsody of words across the world without as much as a blink. Silence in a vacuum has made wireless more mysterious.

Enlivened by constant progress, refreshed by invention, wireless is ever young. New instruments are being continually hooked into the circuits often before those in use indicate any signs of electrical fatigue. Against such a background it is rather difficult to realize that age gradually wears away the human equation that first figured out the miracles.

The destiny of the men of wireless also decrees they too must drop one by one out of the "circuits." Only Branly, Lodge, Fleming, and Tesla remain as the Grand Old Men of wireless. The irony is that their science pulses with greater vigour with the years while Time turns them grey, etches wrinkles across their brows, and slows the tempo of life. Challenged by television, they suddenly realise it is not for them; they see new champions entering the arena.

It was in the winter of 1935 word flashed around the world that Marchesa Marconi declared her husband "very, very tired." He had been working too hard; his strength failed him. Under doctor's orders he went to a London nursing home for a "few weeks' complete rest."

The Marchese, himself, within a month, wirelessed friends in America he was "laid up and unwell." A two months' rest renewed his strength and he became anxious to get back beyond the Alps. He boarded the Rome Express, on which an old associate met him at the Gare du Nord, travelling as far as Gare de Lyon with him.

"He was as charming as usual, but is beginning to look a good deal aged," he remarked of Marconi as the locomotive raced on towards the Italian frontier.

Time was creeping up on him just as it had done so often on his instruments of magic, and, alas! in the summer of 1937, the great inventor set sail on that long journey from which no traveller has yet returned. But the name MARCONI will live on and the spark of his genius will leap for ever across the skies.