

SPECIAL SUMMER WIRELESS FEATURES!

Monthly

Wireless Magazine

Edited by
Bernard E. Jones

VOL. 3, NO. 18.

July, 1926

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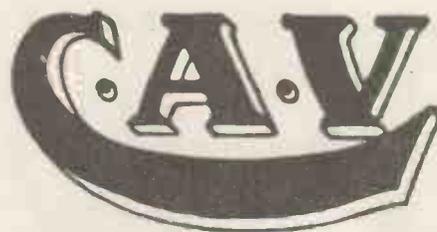
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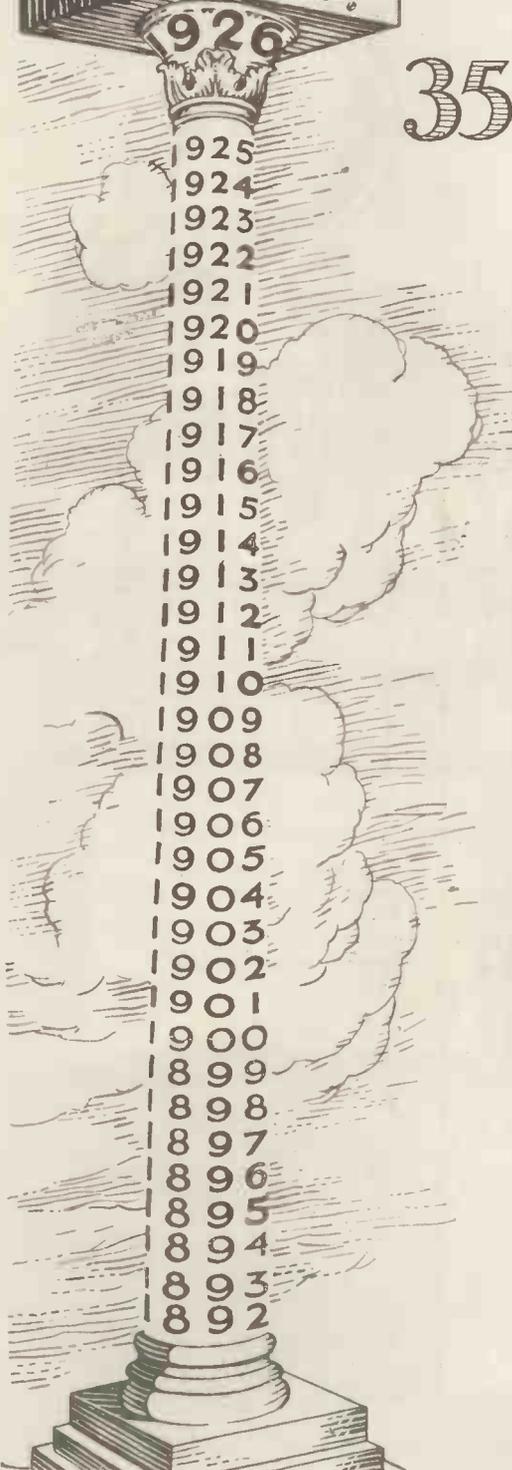
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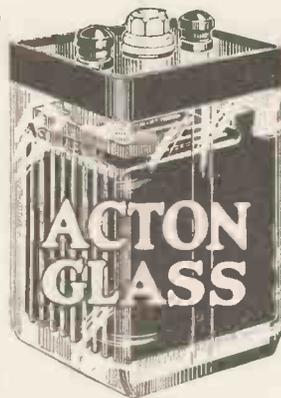
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page 538

The Town-dweller's Reflex Two

With free Structograph coloured plate

page 554

A Long-range Three-valver

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page 578

The Old Folk's Crystal Set

Receives both the local station and Daventry

page 595

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Announcements.—The WIRELESS MAGAZINE, edited by Bernard E. Jones, is published about the 25th day of the month, and bears the date of the month following. Technical Adviser: Sydney Brydon, D.Sc., M.I.E.E. One Shilling Net. Subscription rates are 15s. 6d. a year, post free; Canada, 13s. 6d. a year, post free. Contributions, accompanied by stamped and addressed envelopes, are invited. All editorial communications should be addressed to The Editor, WIRELESS MAGAZINE, La Belle Sauvage, London, E.C.A. Subscriptions should be addressed to The Publisher, WIRELESS MAGAZINE.

The Editor Reviews His Visit to the U.S.A.

My Impressions of American Radio

A Special Article by
BERNARD E. JONES
Editor of "THE WIRELESS
MAGAZINE"



A special photograph of KDKA's aerial system and station at East Pittsburgh.

LAST month my staff let you into my little secret. I was in the States. For a few weeks I had left my job in other people's hands, and had gone afield to get into touch with different men and different things; to see what there was to see in wireless and other matters in the United States and Canada; to visit well-known wireless men and manufacturers, and to make arrangements by which I am sure this magazine will, in the near future, be even more useful and entertaining than my readers assure me it is at the moment.

Getting much pleasure from my trip myself, I yet had the gratification of feeling that I was doing my readers a service also, inasmuch as I was learning lessons and coming into contact with new facts of which, in due course, I trust my readers will get the benefit.

International Set Competition

I will speak straight away of one thing accomplished. On a later page of this issue you will see particulars of a scheme I am organising for the selection of twenty-five amateur-built receiving sets to be sent over for exhibition in New York and

Chicago, where they will compete with American, and possibly French and German sets also, for an international medal or cup.

My offer to organise such a competition was in the nature of a reply to a challenge. I had an idea that England could send to the States something that was worthy to be shown side by side with the American best, and I was not afraid to make myself responsible for an arrangement by which representative British amateur-built sets will be found subjects of interest and criticism by scores of thousands of American B C L's and "amateurs."

And that leads me to remark that I discovered that an early requirement on my part was to overhaul my terms. In this country a "listener" is one who listens-in to broadcasting, and has but little interest in the electrical and mechanical construction of his set, whilst an "amateur," on the other hand, studies circuits, builds his own sets and tries out this or that idea or gadget.

In the States they give the initials B C L (broad cast listener) to both of the above groups—as far as I could learn they scarcely distinguish be-

tween them—and by the term "amateur" they mean exclusively the amateur transmitter qualified by passing the examination held by the Supervisor of Radio, who has nine offices throughout the States and who issues either first-class or second-class licences, according to the efficiency of the examinee. A first-class special licence is awarded to amateurs of considerable knowledge and ability.

An "amateur" is always assumed to have a transmitting station, which is not necessarily expensive, the initial cost for equipment being as low as £20 to £30.

Keeness and Ability

I met all classes comprising the radio interest and industry—B C L's, amateurs, technicians, scientists and manufacturers—and came away with a very marked impression of their keeness and ability.

The amateurs are a particularly bright band, prominent among them being Mr. Lloyd Jacquet, formerly Editor of *Amateur Radio* (now radio editor of the *Brooklyn Daily Eagle*), and in future to be regarded as a member of the WIRELESS MAGAZINE advisory and contributing staff.

His friend Laurence M. Cockaday, the inventor of well-known circuits and the present technical editor of *Amateur Radio*, will also be writing special articles for us.

American Broadcasting

I looked forward keenly to my first experience of listening on the spot to American broadcasting. I was prepared for anything, and because of that I was secretly—let me confess it—a little disappointed. But it was a very pleasant disappointment.

The word "chaos" repeated in the English wireless papers over and over again had become a "fixed idea" with me. I expected all sorts of interference, a veritable battle of broadcasts, and was amazed that I did not get it.

I was fortunate in listening for the first time on a very fine set (actually, a Freed-Eisemann neutrodyne) and was guided by a man (a great journalist and publicist, Mr. Eric H. Palmer) who knew his set thoroughly, and in whose wireless den in Brooklyn, eight miles or so from the Grand Central Station in New York City, we were sitting. The set had remarkable selectivity.

Of its three dials the first knob controlled the tuning condenser in the aerial circuit, and a slight movement of this knob tuned-in approximately another station, and the two other condenser knobs were then turned together to improve the tone and the volume.

The first station to come in was W M B F, the thousand-mile distant Fleetwood Hotel broadcasting station at Miami Beach, Florida, a half-

kilowatt station working on a wavelength of 384.4 metres. A slight adjustment of the controls changed us over to W S B, a newspaper station at Atlanta, Georgia (300 miles nearer), a one-kilowatt station working on 428.3 metres.

Perhaps these decimal points in the wavelengths will amuse some of my readers. Just below the last wavelength mentioned is the 422.3 metre W L W, the Crosley broadcasting station at Harrison, Ohio, with its studio in Cincinnati (I had the pleasure of visiting both), and the 428.3 metres of K P O of San Francisco (its slogan is "The City by the Golden Gate"), while just above Atlanta is N A A, 425.5 metres, of Arlington, Virginia—one of the U.S. Navy Stations working on 1 kilowatt, and situated in a spot, just outside Washington, sacred to the memory of thousands of illustrious soldiers and sailors.

After Atlanta came K D K A, at Pittsburgh, only 300 miles away—easy station to get—"The Pioneer Broadcasting Station of the World" is its slogan), and my American host was delighted because K D K A was playing the bagpipes, and he thought he was offering me congenial musical fare!

I had to tell him as politely as I could that it is only the Scotsman who really appreciates the light and shade and the delicate nuances of the most terrific of all wind instruments.

It was a great experience to sit in a New York home and to hear every minute or so some new station come in—and it came in clearly,

with no interference from the stations on near-by wavelengths, the volume being good and the tone excellent.

There are between 500 and 600 of these stations, most of them of low power, comparatively few exceeding 1 kilowatt, and they work on a wavelength band extending from 202.6 up to 545.1 metres.

Some stations have to share a wavelength, and in that case broadcast at different times, according to a time schedule ("skedule" is the American pronunciation). Until recently the number of stations was increasing regularly, but a halt has now been called, and no new station can come into existence except to take the place of an old one.

Slogans and Publicity

Station after station came in. If my memory serves me we heard K F C F at Walla Walla ("The Valley They liked so well they named it Twice"); K F P W at Carterville ("Keeping Step with Christ Means Progress"); K F W A in Utah ("Keeping Friends with All"); W A H G ("Wait and Hear Grebe"); and others with even more curious slogans.

Slogans, you will know, are the invention of the publicity or propaganda man, and publicity in the States must always be spelt with a big P—at any rate it deserves to be.

I do not think it will give an untruthful impression when I say that every broadcasting station in the United States is publicity for somebody or something; it is helping to sell something—perhaps radio instruments, household commodities, even ideas—but in every case it is



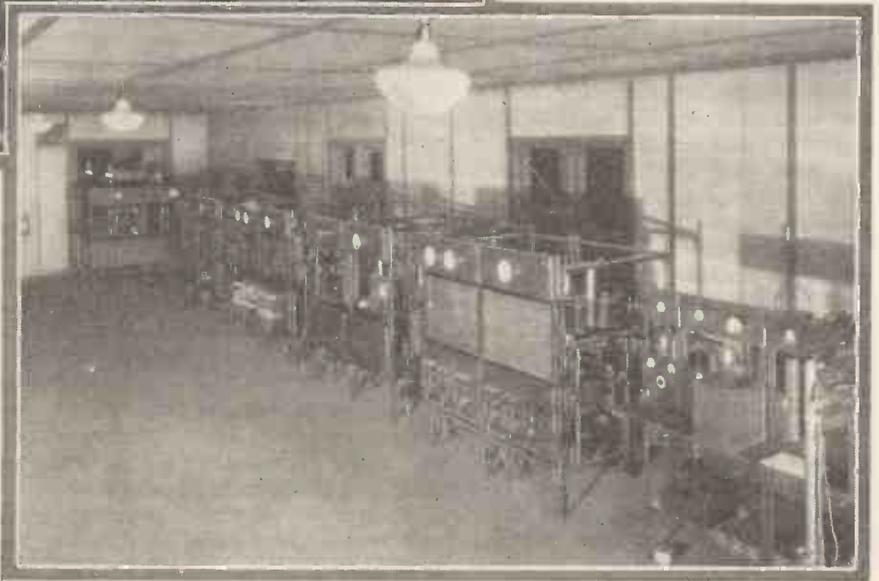
The Editor photographed in company with the staff of KDKA; he is the third in the row, and Mr. Horne, the engineer-in-charge, is the fourth

My Impressions of American Radio (Continued)



(Left).—Divided from the studio by large glass windows, the auditorium of the Crosley WLW studio is provided with loud-speakers so that the audience can hear what is going on during a broadcast. The whole station has recently been redecorated.

(Below).—A view of the transmitting gear at the Westinghouse Electric Company's East Pittsburgh station, KDKA.



maintained at the individual expense of a person or a corporation, and the listener does not directly pay a penny for the entertainment it gives him.

The 500 or more broadcasting stations cost, I suppose, ten million pounds a year to maintain. They would cost more if all the artists were paid, but as far as I could judge the majority of them give their services.

Big sums are, however, often paid to the orchestras, and there is a band of professional broadcast artists who are identified with the publicity of certain manufacturing firms, such, for example, as the "Happiness Boys" who offer a first-rate programme in which the only advertising feature is the identity of the artists' assumed names with the "Happiness" candy or confectionery stores run by the owners of the broadcasting station.

An enormous amount of such publicity is obtained in the States and the example given is quite typical.

No Obtrusive Advertisements

The advertisements over the broadcasting are never—or at any rate, seldom—obtrusive; publicity is an art on the other side, and no mistake like that would be made. There is just the announcement and possibly the slogan of the station and perhaps, as I have said, some relation between the professional name of the performer and that of some well-known commercial product—and that is all.

A comparatively small commercial house often spends £20,000 to £30,000 a year in maintaining a station, confident that the indirect return more than repays the trouble and expense.

The whole of my trip, be it said, was not given up to wireless; for example, in Chicago I had to do what every

visitor does, that is, to visit the stockyards. I went over the Swift packing house, and I tell my readers this because of one curious connection with wireless which my guide "put over."

He was talking of the great economy practised in the packing house and saying that every by-product, however small, had its uses, but that until broadcasting came in they had been quite unable to market the squeal made by the poor hog when he found himself shackled to the wheel of death.

Now, he quite gravely informed me, they were selling these squeals to the "bloopers."

The "blooper"—or, as we call him here, the oscillator—gives a lot of trouble. He appears to be an inexperienced listener who finds that by using a regenerative set he can easily locate any given station, inasmuch as, on the turning of the condenser, the set finds its way, as it were, into the station with a squeal, very gratifying for the man who is "fishing," but exasperating to everybody else.

Most Popular Set

And this leads me to the oft-repeated question: What is the most popular set in the United States? I will not be too definite in my reply. Undoubtedly, tuned

A Special Article by the Editor

H.F. (always called by the Americans tuned radio frequency) occupies a place of honour.

A typical set will have two or three H.F. valves, transformer-tuned, a detector and two L.F. valves either transformer- or capacity-coupled. There is a separate rheostat for each group of valves, that is, three rheostats in all.

Americans tend to the use of a large number of valves compared with the British practice, six or eight "tubes," as they call them, being common. It seemed to me that a three- or four-tube set was a rarity.

With their extra valves they get distance and allow of selective circuits, but as far as I can judge they do not get more volume or better tone than we in Britain get with three or four valves in a straight circuit.

Their sets, though, are the product of special circumstances, and the average British set would make a poor showing if it had to work under their conditions.

Some Stations Visited

Actually the first broadcasting station visited by me was W R N Y on the roof of the Roosevelt Hotel, one of the newest show hotels of New York. This station is maintained by our contemporary, *Radio News*, whose editor, Mr. Hugo Gernsback, very kindly entertained me for an evening.

Mr. Gernsback himself gave the "talk" that evening, and at the conclusion was interrogated by the station director, Dr. Charles D. Isaacson, in front of the microphone on some of the points mentioned. To my mind this made the feature much more interesting, and I commend the idea for occasional adoption by the B.B.C.

Of course, I had to go to K D K A. No wireless tour to the U.S.A. would be complete without a visit to that famous station. K D K A is in Pittsburgh, one of the very busy cities of the States, a city of great factories and businesses, unprepossessing at first, but possessing most delightful suburbs which

officials of the Westinghouse Company showed me with quite reasonable pride.

There are two or three studios in Pittsburgh, all used on occasion, and all emptying themselves into the broadcasting station built on a hill some miles out of the city on the road to East Pittsburgh, where the great works of the Westinghouse Company are situated.

I spent a very pleasant day with the officials of K D K A. I had a long talk (and a good lunch!) with Mr. G. Dare Fleck, the programme director, who showed me that there was a more human side to broadcasting than I had imagined, and who so fascinated me with his stories that I at once asked him to set them down in the form of an article for the *WIRELESS MAGAZINE*.

I spoke "on the air," as they call it in the States, from K D K A the next evening, and I am wondering whether by the merest chance any reader was listening to K D K A at 11.15 p.m. (Greenwich time) on Thursday, April 15?

I was able to tell my hearers that England generally hears K D K A without particular difficulty, but that



(Above).— Mr. Eric Palmer—one of the Editor's hosts—tuning-in a typical American receiver.



(Left).— A transmission in progress at the Crosley W L W studio, Cincinnati.

My Impressions of American Radio (Continued)

the American listener had great trouble in hearing England. Here is a phenomenon which, has yet to be explained. A leading amateur of great experience told me that there is a similar difficulty in the East of hearing the stations in the West, whereas the Western amateurs hear the Eastern stations much more easily.

I was surprised that our own high-power Daventry was so little heard in the States, and American amateurs generally seem to be disappointed that Daventry comes in so badly.

What I Saw at KDKA

KDKA's broadcasting station is many miles from the centre of Pittsburgh. I went out there in a car and spent a happy couple of hours, but I will not weary my readers with a long description of the equipment. I may say that the station is self-contained, except for the studio, which is in Pittsburgh city.

It has both short-wave and long-wave transmitting apparatus, the former being of 20 kilowatts and the latter up to 50 kilowatts. The aerial for the long-wave-length transmission is an elaborate affair, our heading photograph giving some idea of it, but failing to suggest the presence of an almost equally elaborate counterpoise, suspended about 10 feet above the ground.

Below the actual broadcasting room are the motor-generators taking their power from the main supply, and giving a current of 800 amperes for supplying the filaments of the water-cooled valves, each of which takes from 50 to 55 amperes. There may be as many as 16 valves working at one time.

My guide was Mr. Horne, the engineer-in-charge, the fourth person in the photograph at the foot of page 527; I am on his right.

Some of the manufacturers' studios are very charmingly designed and decorated. I was much struck with two of them. The Crossley studio, WLW, outside Cincinnati, Ohio, has already been described in these pages, and I am publishing this month one or two fresh photographs of it.

It is in two parts, with plate-glass divisions between them, and with the control room for the station director in full view of both studios, and communicating with them. It is a simple matter for the director to indicate his wishes electrically to artists in either studio.

In the larger studio is a fine organ, the pipes of which are built into the wall and covered by the hangings, while in full view of the artists, but separated from them by a glazed screen, is the auditorium which can seat possibly 200 people or more.

After a happy time in this studio I was rushed out in a Ford car thirty miles to Harrison, Ohio, where the actual WLW broadcasting station is situated. This is a relatively powerful plant, being of 5 kilowatts, and working on a wavelength of 422.3 metres.

The Zenith studio in Chicago looks like a garden lounge with its rustic brickwork and pergola and its growing plants. Cunning lighting effects are obtainable, and there is an auditorium for the accommodation of an audience, which is always found to encourage the broadcasting artists.

Largest Studio in America?

Another studio I visited, will, when completed, be most convenient and enjoyable, and perhaps the largest in America. This is WSAI, at Cincinnati, Ohio, which is the property of the U.S. Playing Card Co., who are housing in it a wonderful collection of playing cards going back hundreds of years and representing considerable monetary value.

By the way, I received a very kindly invitation from the General Electric Company's station WGY at Schenectady, New York State, to broadcast a "talk," and an appointment was made for 5.30 p.m. Eastern standard time (10.30 p.m. in England) on Tuesday, May 4, but owing to the general strike in this country I was obliged to cut my trip short by one week, and actually sailed on that evening.

However, WGY was good enough to read the MS. of my "talk" for me, the transmission being on 32 metres, and I am wondering whether any readers heard any portions of it.

Unfortunately, this country was suffering the anxiety and excitement of the strike, and readers were more intent that evening on listening to strike news from ZLO and Daventry than to the casual remarks of an English editor in the States. But I should like to hear from any readers who listened to the "talk" that was read for me.

Obviously, I cannot tell you of all the wireless things I saw and wireless men I met, but I can say that everywhere I received wonderful hospitality. They have a way in the States of showing you everything and telling you everything in their power—there are no "trade" secrets—and they certainly did all in their power to make my trip a success, not only in my interests, Reader, but in yours!

Sometimes an editor is welcomed for his own sake, but, take it from me, the depth and breadth of his welcome depend very much upon the readers whom he has the honour of representing.

On Unknown Wavelengths!

MANY famous artists are said to have shrunk from the microphone. So our "Lux" out as well as theirs.

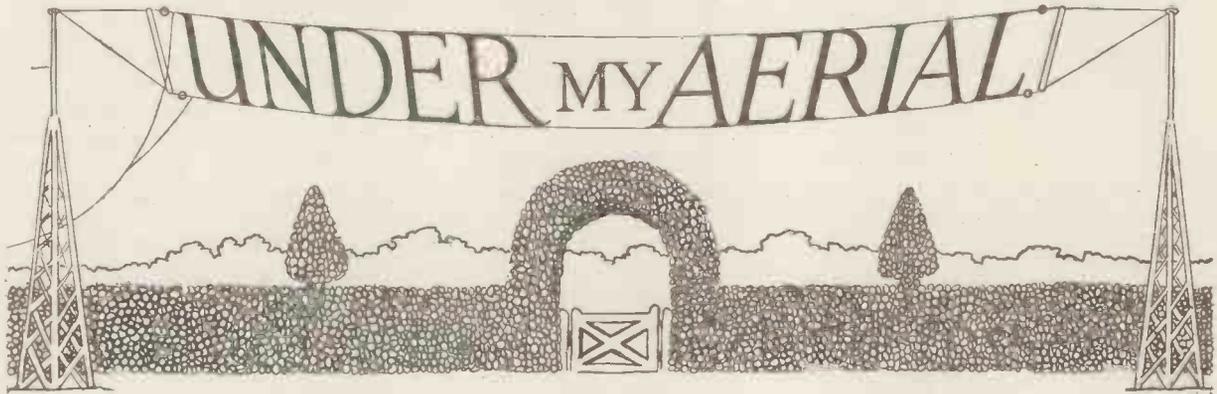
Paterfamilias, proudly exhibiting latest purchase: "My dear, here's a little present for you—a French loud-speaker; isn't it a beauty?"

Mrs. Newlyrich: "Whatever made you go and buy that thing, James, when you know perfectly well I can't understand a word of French!"

What is going to happen about the future of broadcasting? asks a correspondent. If he listens to the weather forecasts in each night's programme, he may find out which way the wind is blowing.

A Surrey man claims to have picked up more than forty stations on a single-valve set. He ought to be just the man for the presidency of our Angling Society.

Halyard's Chat on the Month's Topics



Wireless and the Strike

IT would be a most interesting thing if we could compare notes of our impressions of the early days of the great industrial stoppage. I dare say we should find that of all the impressions we retain the most vivid are those relating to the second day of the strike, the day on which we were deprived of our newspapers.

Whatever should we have done without our broadcasting service on that strangely silent Wednesday?



Took my loud-speaker with me.

There must be many millions of our people who, during the early days of the strike, realised for the first time the tremendous potentialities of our broadcasting system on occasions of national emergency.

I remember with some amusement how, during the strike, I broke off several outdoor conversations with:

"Would you mind excusing me, please? I really must hurry along home to be in time to hear the next wireless news bulletin."

When I saw how dependent I was going to be on my wireless set for news, I connected my loud-speaker to the set by means of a length of twin flex some twenty-five yards long. I was thus able to take my loud-speaker about the house with me to the room in which I happened to be working or eating at the time the news bulletin was due.

My three-valve set was tuned-in on Daventry for days on end, and I left the batteries connected up to the set for twelve hours most days, a

thing I never do under normal circumstances.



Mis-announcements

During the strike, the burden upon the 2 LO announcers became so great that help had to be sought from the highest officials of the B.B.C. staff at Savoy Hill.

The managing director, the controller and the chief engineer all took turns at reading the news bulletins before the microphone.

How well these and other volunteer announcers performed their unaccustomed task is shown by the very few slips which they and the regular announcers made when working under such heavy pressure and responsibility.

Although I listened most carefully to nearly all the news bulletins during the strike I only heard the three following *lapsus lingue*:

- train London to New York.
- Rate of exchange four point eighty five.
- railway company announce that the train service to-morrow will be on the same lines as the train service of to-day.



A Dramatic Triumph

On the day on which the general strike was called off, I sat down to my midday meal about ten minutes past one. My loud-speaker, connected by the long piece of twin flex to my receiving set in my "chief reception room," stood on the side-board.

I listened more or less casually to the news bulletin. On the plate in front of me were two tempting

rissoles, low-loss type, eatable to the last crisp crumb.

Suddenly the momentous request to stand by for "news of a more definite nature" came through. Then, after a few minutes of tense silence, came the great news that the general strike had been called off.

Could anything have been more dramatic?

Within a few minutes of the calling off of the general strike, the news reached thousands of listeners via a loud-speaker as they sat at their



Never look at a rissole again.

own or somebody else's dining table.

Do you not consider this broadcasting of the news of the termination of the general strike one of the greatest triumphs of wireless?

I am certain that I shall never look at a rissole again without hearing that momentous "Stand by, please, for news of a more definite nature."



Ohm's Law

I had a very interesting little experience of the working of Ohm's Law recently. You know the law I mean. It states that—

$$\text{Current in amperes equals battery voltage divided by resistance in ohms.}$$

This is how it came about. I happened to look in a wireless shop where there was a bargain counter on which were displayed shop-soiled goods offered at temptingly low prices.

Under My Aerial (Continued)

Amongst these cheap "lines" I noticed a bundle of phone leads. Now I had no need for such things, for my phone leads have always lived as long as the phones to which they have been attached. It struck me, though, that a pair of those cheap phone leads would be very suitable



Cheap Lines.

for connecting my accumulator, which always stands on the floor, to the L.T. terminals on my set.

Accordingly, I purchased a set of the cheap phone leads. When I arrived home with my bargain, I took out the short wire which, in the ordinary way, connects the two earpieces in series. I was then left with the two long wires.

I connected my accumulator to my set with the two long wires and I switched on. The volume of sound my loud-speaker gave was about half what I was used to. I was puzzled for a while, but eventually I examined my phone-lead battery connector.

As soon as I scraped off the insulation covering from the end of one of those wires and saw what was there, Ohm's Law came to mind. Those phone leads were made from stranded steel wire of considerable resistance.

This resistance was great enough to prevent my two-volt valves getting the current they required from the accumulator. As soon as I replaced my new battery leads with a couple of lengths of No. 22-gauge copper wire, I obtained my normal signal strength.



Heavy Hands

Have you ever noticed what a great difference there is in the manner in which different wireless enthusiasts handle the controls of their receiving sets?

Some enthusiasts are extraordinarily rough and heavy handed with their sets while others have as light a touch as a skilful pianist.

Where the operator of a wireless set is heavy handed, the parts which suffer the most are the variable con-

densers and the filament rheostats. Rotating spindles will not stand an unlimited amount of rough treatment.

I have had an interesting example of this kind of thing during the last week. Two of my wireless friends have valve sets of the same type, the filament rheostats in the two sets being of the well-known carbon pressure variety.

One of these two friends, the heavy-handed one, is continually having trouble with his filament rheostats. Sometimes the trouble is caused by the wearing away of the thread on the little lock-nut. Sometimes it is the tuning knob which works loose, and occasionally the whole rheostat is twisted round until the wires attached to it behind the panel snap off.

My second friend, the one with the light touch, has had his set in use for over a year, and has never had the slightest trouble with his filament rheostats.



Ideal wireless operator.

It is interesting to note that my heavy-handed friend drives a car, whereas my friend with the light touch is a pianist of no mean ability.

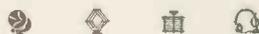
I have had the privilege of discussing this matter with George.

"If I were engaging a wireless operator, George," I said, "I should most certainly choose one who was a pianist. He would have the light touch which is so necessary with a good set."

"I agree that a musician would be a likely man as a wireless operator," said George to me in his usual thoughtful way, "but I should not pick a pianist."

"What kind of a musician would you choose, George?" I asked.

"A saxophonist, my boy. He would be the fellow to blow the dust off the condenser plates for you."



Swallows

Why is it that swallows perch on aerial wires when other birds do not?

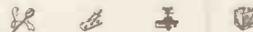
I should like someone wise in the ways of birds to answer this question. For weeks my aerial wire has never had a bird on it. Sparrows, starlings, blackbirds, tits, thrushes and robins have spurned my single wire, yet the first swallow I saw this year was one which perched on my aerial.

There were many earlier arrivals of this welcome summer migrant in the neighbourhood, I dare say, but the one which caused me to make a mental note that the swallows had arrived was the one which sat contentedly on my aerial wire for a good ten minutes the other morning.

One swallow does not make a summer. Maybe not, in the ordinary run of things, but one swallow on my aerial wire causes me to get out my portable wireless set and to have a look at last year's straw hat to see if it will stand another season's wear.

A schoolboy friend of mine has provided me with an answer to the above question. He tells me that the swallow's feet are specially suitable for gripping thin wire such as an aerial wire or a telegraph wire.

Seems a good answer to me. Have you a better one?



Aurora

It is most interesting to note that American wireless experts seem more than ever inclined to attribute the failure of the 1926 international tests to the exceptional interference which accompanied unusually brilliant displays of the Northern Lights.

Wishing to find out something authentic about this new "interferer" I approached my meteorological friend whose head is chock-a-block with miscellaneous facts and figures about atmospheric phenomena.



Northern Lights seen in London.

"What are the Northern Lights of which one hears so much in connection with the failure of the international wireless tests?" I asked.

"Aurora borealis, northern edition of aurora, the southern edition being referred to as aurora australis," was the reply.

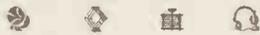
Halyard's Chat on the Month's Topics

"Thank you so much. Would you mind enlightening me then as to what aurora is?"

"Certainly. Aurora is a luminous phenomenon seen in the sky at night. It takes a great many shapes and forms. In addition to arcs, bands, rays and isolated patches of light, an auroral display may take the form of a quivering curtain of light."

"How very interesting. We never see aurora in England, do we?"

"Not in the south perhaps, but aurora is frequently seen in the Orkneys and Shetlands. It is most common there in the late evenings about the time of the equinoxes. In the north of Norway and Greenland it occurs most often in the middle of winter."



—Borealis

"How can this aurora have any effect on wireless?" I asked my meteorological adviser.

"I am afraid I cannot tell you; but aurora is undoubtedly an electrical discharge which takes place at a great height in the atmosphere," he replied.

"Have you any idea of the height?"

"Yes, fifty to a hundred miles."

"Not very high, is it?"

"It is high enough for the air to be as rarefied as it is in the bulb of one of your wireless valves."

"Oh, I see. If ever you happen to see aurora this summer, would you ring me up and give me a chance of seeing it too?"

"There is scarcely any need to do that, I think. Aurora in England is always accompanied by a magnetic storm. If you hear a succession of curious swishing noises in your



Further outlook unsettled.

phones, go outside and look towards the north for aurora. You won't see much aurora though, if there happens to be a moon. It is very faint, you know."

"Thank you ever so much. I will remember what you have told me."

"By the way, do you know that Farmer Giles calls that old, broken-winded carthorse of his Borealis?"

"No, does he really? Why ever does he call it that?"

"Because it is such aurora."

An old joke, grey whiskers on it. I heard it twenty years ago, but what can you expect from a man who makes up the weather forecasts, and whose further outlook is always unsettled?



A Corking Idea

George mystified me very considerably last night by coming round to my house to borrow all the corks I could lay my hands on.

"What do you want the corks for, George?" I asked.

"To stick them on the wire, you know," was his reply.

"I see, to give the birds a chance."

"To give my trousers a chance."

"To give your trousers— What—"



Glad it wasn't trousers.

ever are you talking about? You want the corks for your aerial wire, don't you?"

"Of course not. I want those corks for a barbed-wire fence, to protect my trousers from the projecting points thereof."

"George—"

"Yes, sir. The aerial of a certain wireless neighbour of ours has got to come down again. Since the last time I cut the pulley rope of the aerial mast the dear man has had a barbed-wire fence placed round the periphery of his garden."

I have always known George to be a most determined person when it comes to dealing with our local oscillators, and I was very thankful indeed that he came to borrow corks and not trousers last night.

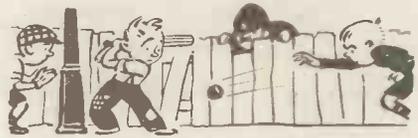


Toroidal Coils

The toroidal coil which is now quite popular on the other side of the Atlantic, and which may possibly

become popular on this side, is by no means a new type of coil.

I have in my possession a book written by an eminent American authority and published as long ago as 1920, in which are given a full description of the toroidal coil and mathematical formulae



Having no external field.

for the calculation of its inductance.

A toroidal coil is wound on a closed ring and it possesses the advantage of having no external field. Thus two toroidal coils when placed close together have no effect one upon the other. The only way in which coupling can be effected to a toroidal coil, or torus, as it is sometimes called, is by a second winding over the first winding on the closed ring.

Some years ago I tried the toroidal coil in connection with experiments with the well-known Reinartz circuit. I still have one or two of those old toroidal coils on my junk heap.

One of my Reinartz toroidal coils was wound on a large curtain ring. So large was this ring that I could pass a reel of No. 22-gauge wire through its centre. Another of my toroidal coils was wound on a wooden wheel about five inches in diameter. I dare say you are familiar with the kind of wooden wheel I refer to. The small boy buys such wheels for his wooden engine.

I remember how I had to cut about an inch out of the centre of this wooden wheel. I also remember that I made a saw-cut along a radius of the wheel and wound the wire on through that saw-cut.



A Low-loss Torus

My best toroidal coil, however, was a real low-loss coil, although I did not recognise it as such, for it was made long before the low-loss era.

I am a little bit hazy now as to some of the details, but I think the following will give you an idea as to how I made this particular coil:

The wire was wound on an ordinary cylindrical former of some

Under My Aerial (Continued)

three or four inches diameter. Before the winding was started a piece of string was placed along the length of the former, the first turn of the



A bit hazy as to details.

winding passing through a knot on the string.

All the turns of the winding were wound over the string, and the last turn was secured to the string in similar fashion to the first turn. The whole winding was slipped off the former and was then bent round into the form of a closed ring, the first turn of the winding being brought close up to the last turn. The piece of string was then more or less in the form of a circle, and it served to keep the toroidal coil in something like correct shape.

This rough-and-ready toroidal coil gave excellent results, and I remember the surprise I had when I found I could tune-in by altering the relative positions of the loops of the torus.

In case you feel inclined to carry out experiments with toroidal coils, I will give you one tip. The circular cross-section of the closed ring should be as large as possible to get the best results. In other words, the outer diameter of the ring should be as large as possible, and the inner diameter as small as possible.



Making a Catwhisker

Have you ever made a catwhisker for your crystal detector? DO PLEASE go on reading. I assure you that what is to follow has no connection with the old joke about pinching a whisker from the moustaches of an unsuspecting he moggy.

Last night I suddenly decided to make a simple crystal set. I found that I had everything I required with the exception of a catwhisker.

It was too late to go out and buy one of those small transparent cases which have inside them a strange assortment of catwhiskers. You know the kind of case I mean. Sometimes you find three catwhiskers in the case. Occasionally you find four, and if you are very lucky you

may find as many as six catwhiskers in the tube, in which case the extra ones, the fifth and the sixth, are of gold and platinum respectively. Yes, I think so!

Well, I saw that there was nothing for it but to make a catwhisker. Accordingly, I searched in the junk box in which I keep my odds and ends of wire, and there I found a likely-looking piece of No. 32-gauge, or thereabouts, wire.

From this piece of double-cotton-covered wire I cut off three short lengths each about two inches long. I removed the insulation from these short pieces of fine wire, twisted the bare wire round a two-inch nail in



An unsuspecting moggy.

each case, and so made three excellent catwhiskers.



Removing the Cotton Cover

When it comes to removing the cotton covering from a length of d.c.c. wire, I wonder what method you adopt. I know of three good methods, and I used all three in making my home-constructor's catwhiskers.

I removed the cotton covering from my first piece of catwhisker wire by scraping the wire with the blade of a pocket knife. The result, however, did not satisfy me, for I seemed to scrape the wire itself rather badly.

Then I had the bright idea of burning the cotton covering from off my second piece of catwhisker wire. Have you ever removed the cotton covering from a length of d.c.c. wire in this way?

In these notes Halyard has something to say about toroidal coils. A special receiver incorporating them is described on page 578.

It is a pretty little method. You hold the wire in your pliers and you put a lighted match to one end of the wire. The cotton covering takes

fire immediately and a dear little flame travels slowly along the wire right to the other end. There is a smell exactly like that of a Lan-



Like a Lancashire cotton town.

cashire cotton town, only on a much smaller scale of course. The charred remains of the cotton covering come off with a touch.

I am not quite sure that this burning method is a good one to use when making catwhiskers. There is a possibility that the wire might be affected by the heat of the little flame.

In making my third catwhisker I actually unwound the cotton covering. Have you ever done such a thing? It is worth doing if only to see how the cotton covering is wound on d.c.c. wire.



From Cambridge

I hope that the Sunday afternoon service of King's College Chapel, Cambridge, will be broadcast on many future occasions.

Just as you can tell from John Henry's accent that he is an Oxford man so, I am sure, you can tell from the way I turn some of my sentences that I am a Cambridge man.

At any rate, I know King's College Chapel, Cambridge, most intimately, having attended the Sunday afternoon service there many times. I believe the singing in this chapel is as beautiful as ever it was, and that is saying a great deal.

If ever you have the opportunity of seeing King's College Chapel, do take it, for it is a magnificent building.

The interior of the building is two hundred and eighty nine feet long, forty feet wide and eighty feet high. The organ-screen is situated across the interior about half-way down. I wonder where the B.B.C. engineers fixed the microphone in this somewhat unusually-shaped chapel. They must have had to contend with some very peculiar echo effects.

HALYARD.

A Word to the Skilled Experimenter

The Use of Brains

In following
Practical
Instructions

I AM a Bolshevik. I am protesting against the present law and order of things. No! I'm not going to complain about the B.B.C. Personally, I'm in sympathy with them; I do think we could find a better system than we have to-day, at least, under present conditions.

My complaint is against the present generation generally. We are losing our initiative and individuality. Our modern amateur, or it would be better to call him the home constructor, is led entirely by a select few who, having obtained a popular name or appearing to be in authority, design his wireless sets for him, think for him, tell him where to drill his 2 B.A. holes and which components he should use.

I think it a great mistake, educationally and physically, to leave the thinking or active work in our hobbies and amusements to other people.

Tens of thousands of able men pay money to go and watch a paid team play against the paid team of another district at football, when it would do the majority of them more good to run after the ball for half an hour themselves. The same applies to boxing, but in this instance it may not be to their physical benefit to take active part in a fight with Dempsey.

Community Movement

Mark you, I'm not blaming the wireless amateur for this state of things. The whole community is moving in this direction. The public make a great fuss of Tom Mix and yet there are dozens of just as good horsemen in the British Army, but we don't take our hats off to them. It would no doubt be better if we did.

In wireless, there are probably far better technical advisers at your wireless society, but a lot of constructors would rather follow their

favourite author's instructions, word for word, than piece together good information and think the matter out for themselves.

Why is it, that just because the author of an article writes from

following the whims and ideas of Mr. Blank. And, mark you, Mr. Blank is but human, he is not infallible, so each little mistake is repeated a thousandfold. To quote one great wireless man: "It is all wrong."

I plead earnestly for a little more individuality amongst us so-called experimenters.

Let us just think of the ladies (God bless 'em!). What would you say if all your acquaintances trimmed their hats stitch for stitch and feather for feather like Mary Pickford? Or whole communities dressed themselves exactly like Gladys Cooper? It's not done!

When we read a book on gardening we are not told that we must measure down 8 in. from the left-hand corner, then in 4 in. bore a hole 3 in. deep and drop in a geranium. How uninteresting the country would be if every garden were laid out to a printed plan; it is bad enough to have one street filled with the same pattern houses.

Perhaps you will now realise how uninteresting it is for me to visit my friends and see exactly the same design of wireless sets everywhere, which only change, en masse, with the fashion.

My chief complaint is for the technical side rather than for my own personal objection to repetition. I have no complaint at all about the beginner building his first set from some standardised designs, it would be more economical and minimise errors. But when it comes to improved instruments or experimental circuits, I think the individuality of the experimenter should be encouraged.

Standardisation Bad?

Standardisation, when it destroys the incentive to think and act for oneself, is Teutonic and should be discouraged. By all means fill our wireless magazines with other people's designs and ideas, it helps us to build up composite designs, utilising

A MUSIC CABINET FIVE-VALVE RECEIVER



A neat "combination" cabinet set made by a reader at Catrine.

America or is supposed to have once invented something, that he is to be taken as infallible?

It is astounding the number of amateurs I meet who have constructed what is called the Blank circuit and believe it to be the acme of perfection, because Blank says so. I do not blame Mr. Blank, it is the lack of initiative on the part of the constructor in not deviating the slightest, even for his own benefit, from Blank's printed instructions. This, I think, is detrimental to progress.

Where we should have a hundred thousand experimenters striving after perfection and possibly attaining something, we get a multitude

the good points of some and overcoming the defects in others. But please don't take anything as the last word in that particular scheme just because the author thinks so.

Mr. Blank's Failings!

Those of my readers who have technical knowledge will realise the human failings of our Mr. Blank. Just look at the poor designs offered to-day. Crystal detectors tucked away behind some other controls or ugly coil holders stuck out at grotesque angles round the cabinet, and the use of long breakable leads and semi-loose connections.

How often we see a badly balanced ratio of condenser capacities, designs in which, with the advocated inductance, the aerial coil would

have to be changed before the anode condenser was half-way round the scale. It is just as bad as a motor engineer designing a motor car with a four-speed gear, but the fourth gear being unusable because the brake lever prevents that movement.

We are often told to use a 5:1 transformer for first stage and 3:1 for second when we know that the reverse would be more correct. Or to use four .06 valves in this set when the last valve should be of the low-impedance type for anything like good quality reception.

What about these super-selective designs in which the sensitivity is lowered to help lose that interfering signal? Or the neurodyne circuit with reaction on

the aerial? And dual circuits which cannot autodyne a C.W. station?

Nothing Perfect

There are hundreds of these instances in which the designs are interesting but do not warrant mass production or reflect credit on the designer. The true experimenter admits nothing as perfect and should always strive for improvement, either in efficiency or structural design; if our constructor, before building Mr. Blank's latest, would consult his fellows and spend an hour or so on re-designing, to suit his own conditions, he would undoubtedly benefit himself and his work.

I expect by now I have made a good many enemies, but if I have converted any reader to independent research, I am satisfied. E. J. P.

Listening for Faults in Your Set

EVERY experimenter and constructor has experienced the mysterious fault which defies all attempts at detection until the whole set is dismantled and examined piecemeal. Often this proves to have been a waste of time, the fault being remediable *in situ* if only detected at first.

Making a Diagnosis

It is, of course, often possible to make a correct diagnosis from the symptoms evinced when on test; but there are times when two or more possibilities present themselves as the cause of the trouble, and again when after all remedies fail some component or joint still proves faulty.

The professional is often confronted with the same problem, and if the solution is not evident he turns to his stethoscope. It is well known that the combination of the telephone and ear is one of the most sensitive electrical detectors, and he therefore makes use of it in much the same way as the doctor employs his physical detector.

Instead of asking the patient to say "ninety-nine," the engineer takes a single dry cell and solders leads to its two poles. He connects one lead to one tag of a pair of telephones, which he dons, and with

the free tag and the remaining lead he tests each part of the circuit.

Thus, suppose he suspects a transformer winding. He touches the terminals with the free poles of his tester and if there is no click he knows that the winding is broken. If the click is very dull and small compared

prove to be well insulated by a layer of flux (generally resin) under the generous blob of solder are not unknown. These are practically undiscoverable by observation, and dismantling immediately makes detection impossible, though the set will probably work when reassembled, adding to the mystery. The stethoscope lays bare the solution at once.

Condenser Faults

Condensers often give trouble, and here again any fault in the insulation is easily detected by the slight rustling click obtained on testing across the poles. A large condenser will always give a dull click the first time it is touched, owing to the charging current. It should, therefore, be tested several times by rapid successive touches, when no click will be heard, if it is sound, after the first.

A variable condenser may be tested by fixing the poles of the tester to its terminals and then varying its capacity. If there is a short circuit at any point it will be heard.

With a knowledge of the circuit and a little practice it is possible to identify almost any fault exactly, before removing a single screw. The saving in time and temper is incalculable. F. Y.

ARE YOU BINDING YOUR "WIRELESS MAGS"?

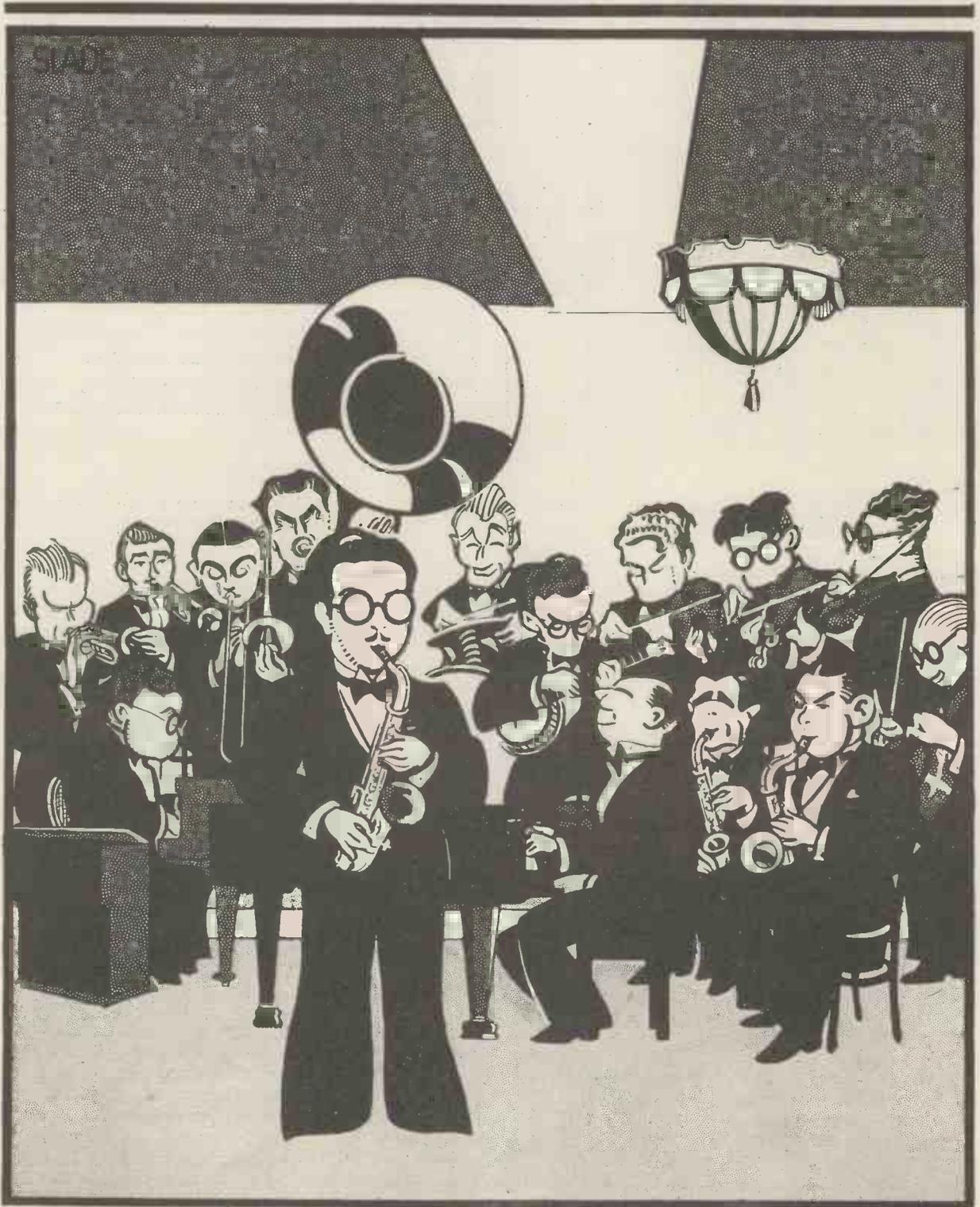
Suitable cases, in cloth and of an attractive colour and design, are now available (in response to hundreds of inquiries) for Vols. 1 (Nos. 1-6) and 2 (Nos. 7-12) of the WIRELESS MAGAZINE.

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with that given by another similar winding, there may be a partial break only, causing intermittent failure—a puzzling trouble. In the same way faults in tuning coils, chokes and joints may be traced.

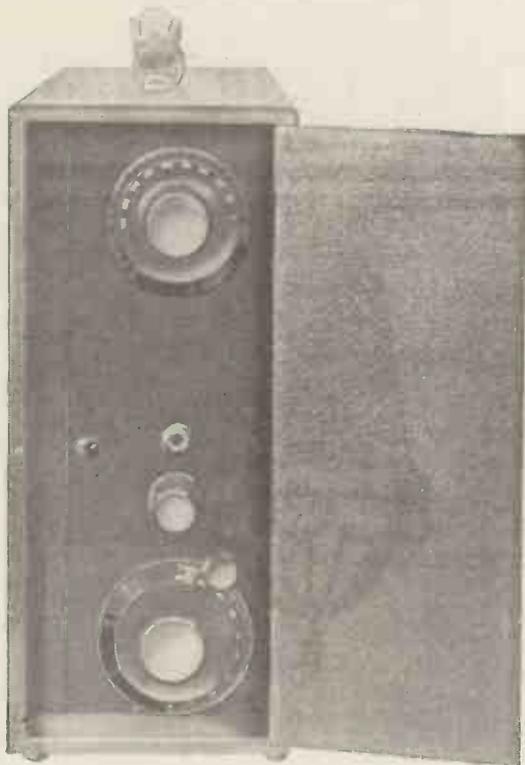
Cases where seemingly sound joints

An Impression of the Kit Kat Club Band



This popular organisation of Jack Hylton's has been relayed from the Piccadilly Hotel and the Kit Kat Club. Its "style" is particularly suited to broadcasting. Al. Stanita directs the orchestra.

A Holiday Four-valver



Self-contained except for a loud-speaker, this Holiday Four-valver can be used equally as well indoors during the winter months as it can out of doors during the summer months.

It has been specially designed, built and tested by the WIRELESS MAGAZINE Technical Staff, and will be found to be an ideal dual-purpose receiver.

THERE are two purposes a portable valve set can serve. It can be used throughout the autumn and winter months in a house or flat where an outdoor aerial and earth are either inconvenient or prohibited, while, when the summer months arrive, it can be easily transported into the country with no more difficulty than the average week-end case.

Special Features

A dual-purpose set of this description must possess certain features which are not found in the ordinary family receiver in which the actual receiver—in itself a fair bulk—is surrounded by large dry batteries and a heavy accumulator—not to mention the loud-speaker and aerial and earth leads.

In order that the set should be really portable all these external accessories must be included in the cabinet containing the set, which

means that a specially designed cabinet is required.

A point arises here, however, over which there has been, and still will be, some controversy. By packing the batteries in the same cabinet together with the set, no decrease

this reason some form of horn other than the swan-neck type must be used.

In almost every case a built-in loud-speaker gives a quality of reproduction that is decidedly inferior to that obtained from a standard model and it was therefore decided, in the particular set which is to be described, to leave the loud-speaker out of the design altogether.

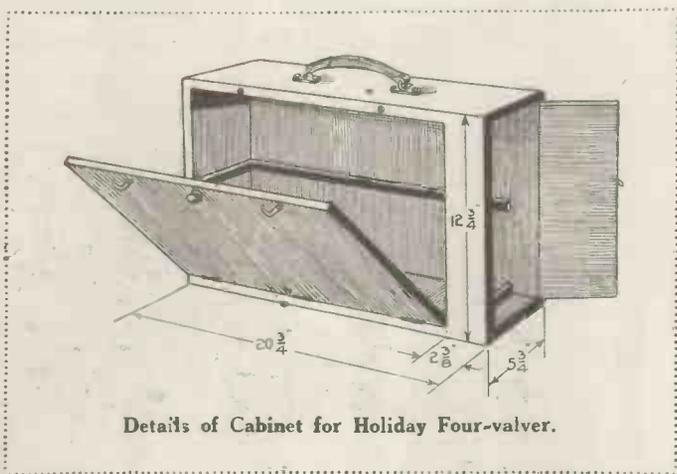
There are one or two excellent portable loud-speakers on the market which are scientifically designed.

When the set is used indoors there is not, of course, any difficulty to be overcome.

Light Weight

Other features which a portable set must possess are simplicity in

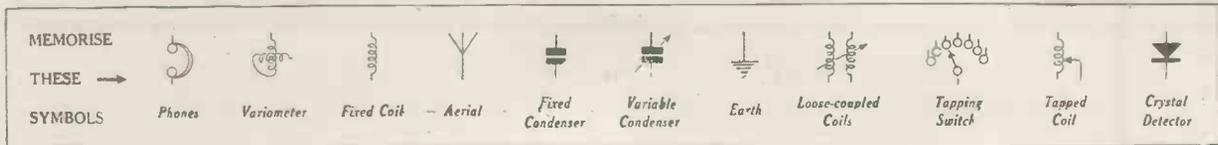
tuning, as light a weight as batteries and components will permit, a high degree of sensitivity and small current consumption, obtained by the use of dull-emitter valves run

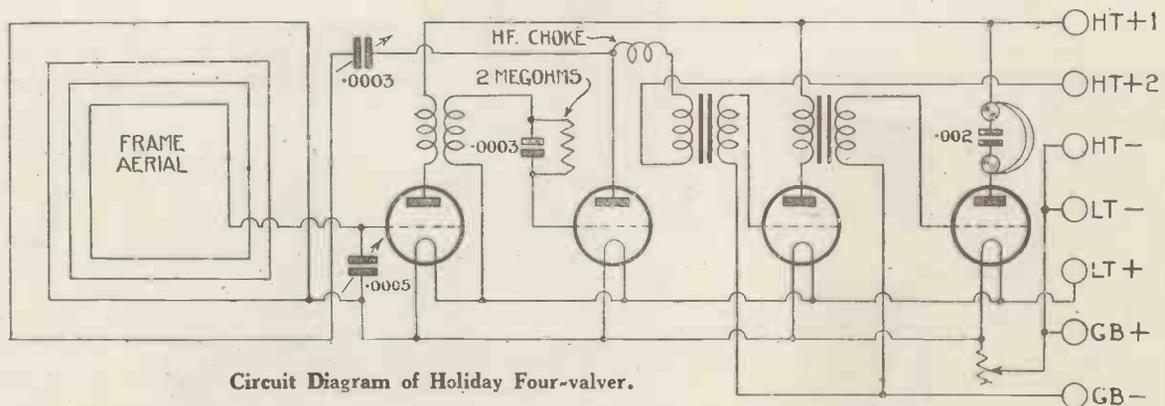


Details of Cabinet for Holiday Four-valver.

in efficiency is experienced, but this is not true with the loud-speaker.

The average loud-speaker takes up far too much space to be incorporated in a portable set, and for





off a 2- or 4-volt accumulator of small capacity.

Circuit

A glance at the circuit diagram shows that a frame aerial is employed with a tapping connected through a variable condenser to the plate of the detector valve. In this manner reaction is obtained by a combination of static and magnetic coupling, the former being varied by the variable condenser, whilst the latter is fixed and is obtained by the few turns of wire between one end of the frame aerial and the tapping.

With a little experimenting the most suitable position of the tapping

to give a very smooth control of reaction is easily found.

The H.F. choke connected between the plate of the detector valve and the primary of the low-frequency transformer confines the H.F. currents to the frame aerial and prevents them from passing through the primary of the transformer.

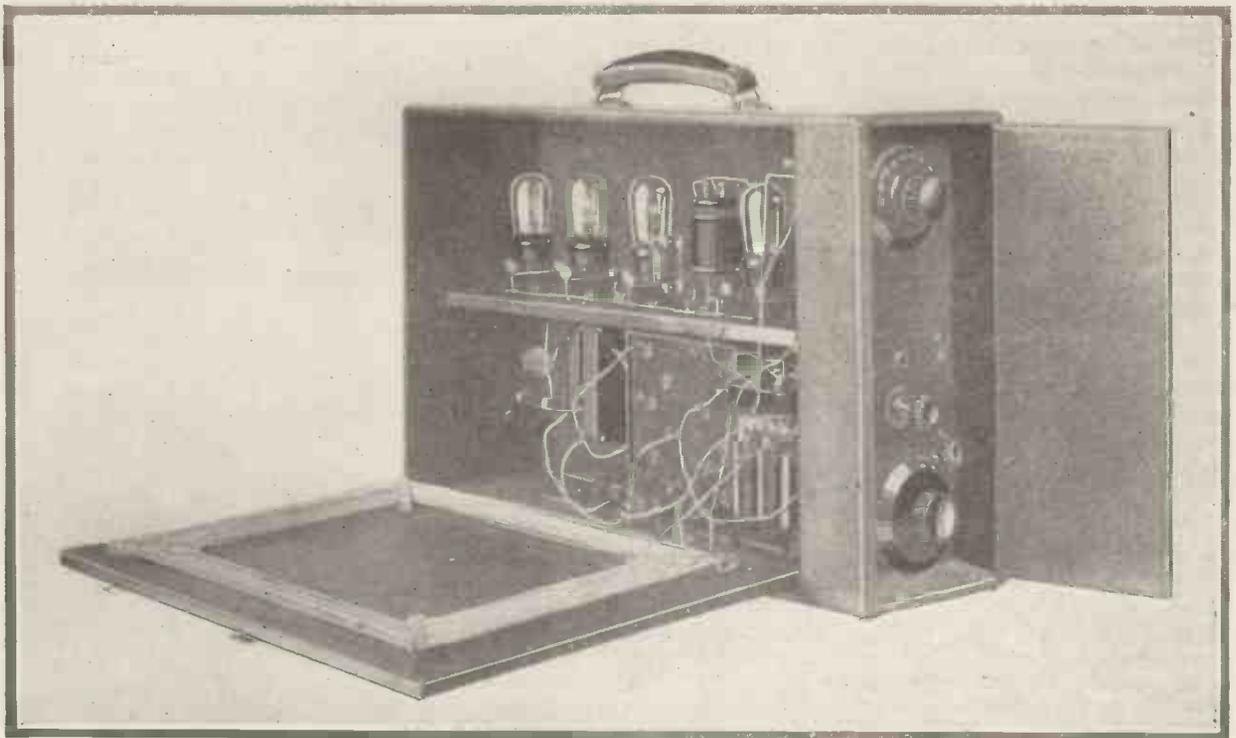
In order to obtain an increase in sensitivity without increasing the number of tuning controls, a high-frequency amplifying valve is connected to the frame aerial. In the plate circuit of this valve a high-frequency transformer is inserted having a very flat resonance curve on a wide band of wavelengths.

Although the H.F. amplification from such a transformer is not so great as that obtained with a tuned transformer of low H.F. resistance, yet a fair amount of amplification is given with no extra control, reducing the number of tuning controls to two, including the reaction control.

Constant Amplification

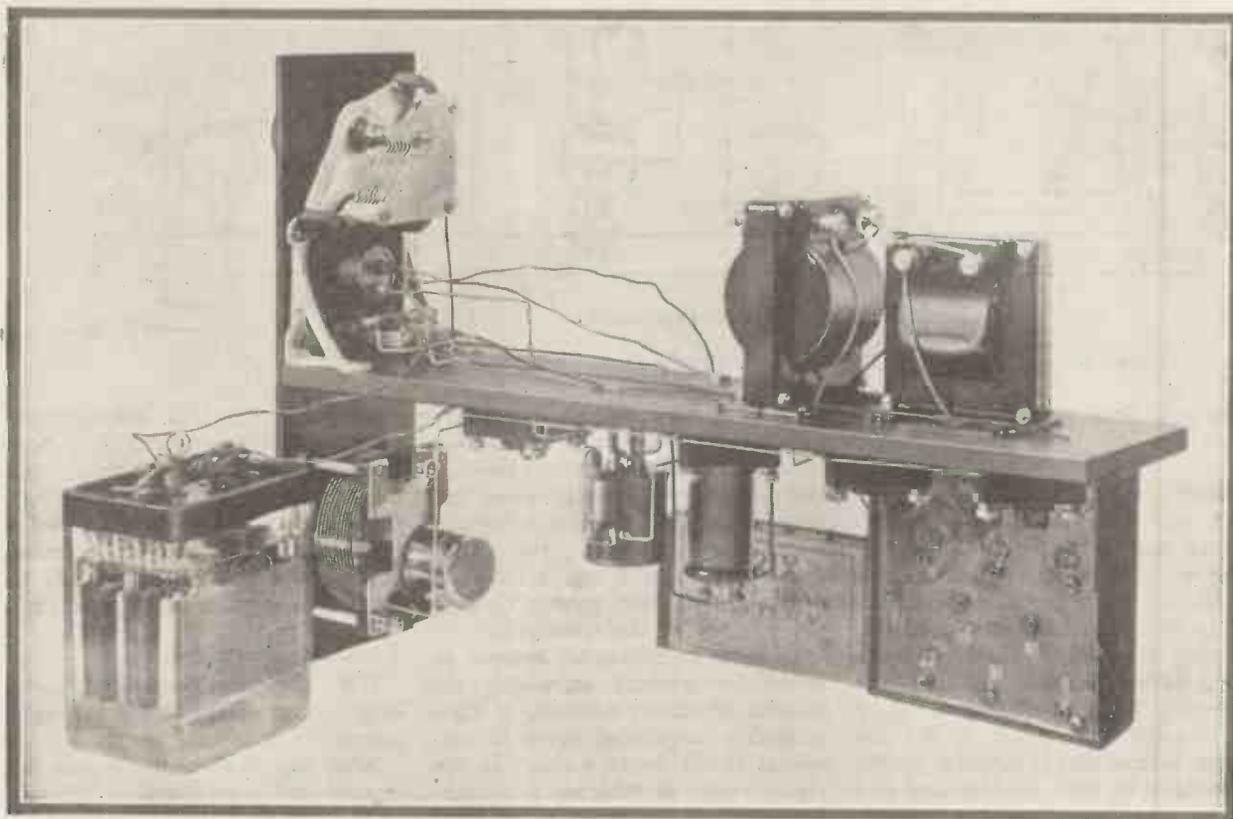
H.F. amplification over a wavelength range of 250 to 800 metres is practically constant.

After the H.F. valve comes the detector valve, as already indicated, after which the signals are magnified by two stages of transformer-coupled low-frequency amplification. In the



Photograph showing Complete Holiday Four-valver ready for use.

A Holiday Four-valver (Continued)



Photograph showing Disposition of Components of Holiday Four-valver.

plate circuit of the last valve is connected a jack into which the loud-speaker or phones are plugged.

All four valve filaments are controlled by one rheostat, and in order that this does not overheat, it is again emphasised that valves of low filament-current consumption must be used.

H.T. Voltages

Of the four valves the detector requires less plate potential than the H.F. or L.F. amplifiers. A common H.T., therefore, is applied to the latter valves and a separate H.T. to the detector. Both L.F. valves are given the same negative grid bias so that, for distortionless amplification, it is essential that both these valves have similar characteristics.

Components required for the construction of this set are given in the following list:—

Ebonite panel, 12 in. by 4 in. (Radion or British Ebonite, Clayton, Trelleborgs).

·0005-microfarad variable condenser (Ormond or G.E.C., Jackson Bros.).

·0003-microfarad variable condenser (Utility or G.E.C.).

Filament rheostat (Wates or Lissen).

Phone plug and jack (Igranico-Pacent).

2 panel brackets (Burne-Jones).

2 L.F. transformers, 1st and 2nd stages (Ferranti AF3 and AF4 or G.E.C., B.T.H., Lissen, Igranico, M.L.).

4 anti-microphonic valve holders (Benjamin or Lotus, Etherplus).

Ordinary valve holder (Burne-Jones).

Aperiodic H.F. plug-in transformer (Burne-Jones or Peter Curtiss).

H.F. choke (Marconiphone or Lissen).

·0003- and ·002-microfarad fixed condensers (Metro-Vick or Dubilier, Mullard, T.C.C.).

2-megohm grid leak (Dubilier or Mullard).

Baseboard, 18 in. by 4 in. by ½ in.

Cabinet (Carrington Manufacturing Co.).

NOTE.—The particular components used in the photographs and allowed for in the dimensioned layout are in each case mentioned first.

An idea of the general design of the set can be obtained from the photographs, from which it will be seen that the panel on which the controls are mounted is fixed to one of the ends of the baseboard, the panel and baseboard forming a large T.

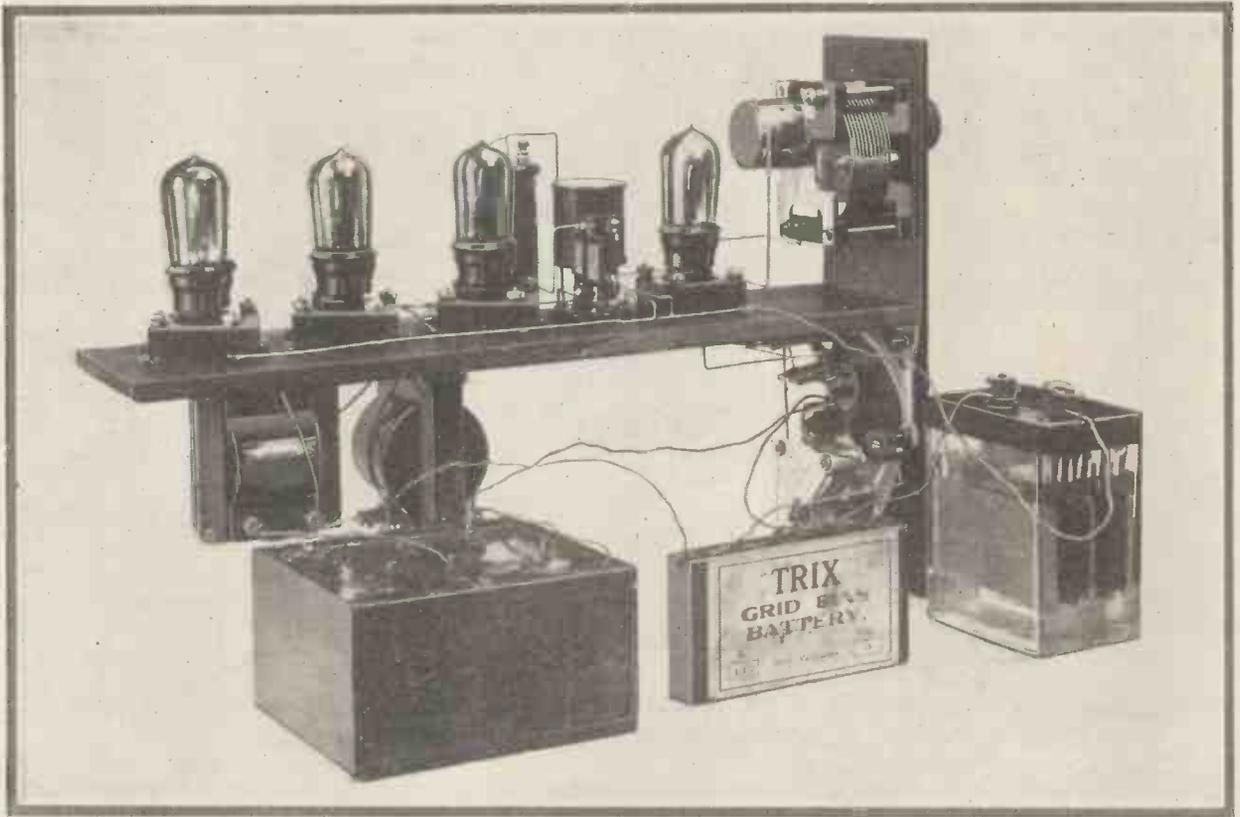
The baseboard is attached to the panel so that the distance between the bottom edge of the former and the bottom of the panel is 6 in. Two small aluminium brackets are used to fix the panel and baseboard together, but before this is done the panel should be drilled according to the panel-drilling diagram, in which the positions and sizes of all the holes are indicated.

Mounting the Components

On the top of the panel the frame-tuning condenser is mounted, whilst to the bottom half the filament rheostat, phone jack and reaction condenser are attached in the positions shown.

When these components have been mounted on the panel, the remainder of the apparatus should be screwed to the baseboard. The four valve holders and the H.F.-transformer socket, together with the H.F. choke, grid leak and condenser, are mounted on top of the baseboard, whilst the two low-frequency transformers and the ·002-microfarad fixed condenser are screwed to the underside of the baseboard.

A Special "Wireless Magazine" Design



Another photograph showing Disposition of Components of Holiday Four-valver.

The positions of these components can best be seen from the wiring diagram, which shows the wiring side of the panel and *both* sides of the baseboard.

Constructors should not be confused into thinking that there are two baseboards as the wiring diagram seems to indicate. This is the only convenient method of showing the wiring of both sides of the baseboard.

Having fixed the baseboard to the panel in the manner previously described, wiring may be begun, and this should be accomplished in conjunction with the wiring diagram, which not only shows how the components are wired together but indicates in what order they are connected.

Connecting Up

All those terminals marked *a*, for example, are to be connected together with one wire or as few wires as possible, after which all the terminals marked *b* are wired up in a similar fashion. Next, those marked *c* are similarly treated, and so on until the wiring is completed.

All wires leading from the under side of the baseboard to the top of the latter are taken through holes conveniently drilled through the baseboard. All such wires should be protected by insulating sleeving or, better still, by some special wire such as Glazite.

After the wiring has been carefully checked, the panel and baseboard may be mounted in the cabinet and screwed in position.

The frame aerial is wound on the inside of the hinged side of the cabinet. Four slotted wood or ebonite strips are required, 3 in. in length by $\frac{3}{8}$ in. square, slotted at intervals of $\frac{1}{8}$ in., leaving a space of about $\frac{1}{4}$ in. at each end for screwing the strips to the side of the cabinet.

Altogether approximately 22 turns are required, including 2 turns for reaction, so that 22 slots are to be cut in each strip.

The slots should be deep enough to take No. 22-gauge d.c.c. wire. The four strips are screwed to the sides of the cabinet in a diagonal fashion, so that the rectangle formed by the outside turn measures 15 in. by 10 in.

One end of the frame aerial and the tapping are connected to the two terminals of the frame-tuning condenser and the other end of the aerial is connected to one side of the reaction condenser. It should be noted that these connections should be made so that the tapping is nearer to the filament end of the frame aerial than to the grid end.

Flexible Leads

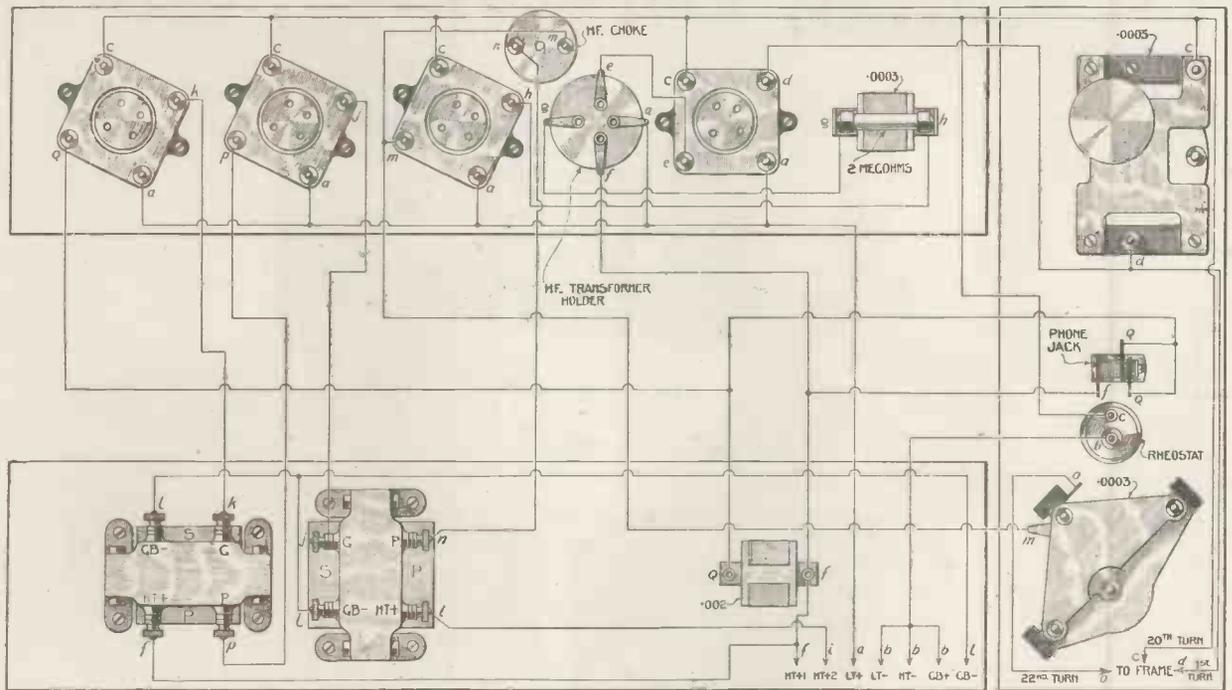
Other connections to the H.T., L.T., and grid-bias batteries, which are placed in the cabinet underneath the baseboard, are made by pieces of flex.

The sizes of these batteries are important, for if they are too large they cannot be accommodated in the cabinet. Suitable batteries are the following: Hart Enduro 2-volt accumulator, Hellesen 60-volt H.T. battery, and a Trix 9-volt grid-bias battery.

In conjunction with these batteries we recommend Osram DE₂'s, H.F. and L.F. valves, or Ediswan ARDE's, H.F. and L.F.

As previously indicated, tuning is rendered simple by the use of only

A Holiday Four-valver (Continued)



Combined Layout and Wiring Diagram of Holiday Four-valver.

two dials. The top dial on the panel tunes the frame aerial, the plane of which should point towards the station it is desired to receive.

Oscillating Point

The set should be brought to a point just short of oscillation by adjusting the reaction condenser at the bottom of the panel.

Keeping the set in this condition, the frame-tuning condenser should be slowly rotated until signals are heard. Once the signal strength has

been adjusted by the two variable condensers, the set should be picked up bodily and slowly rotated on a vertical axis until the plane of the frame aerial is lying in the right direction.

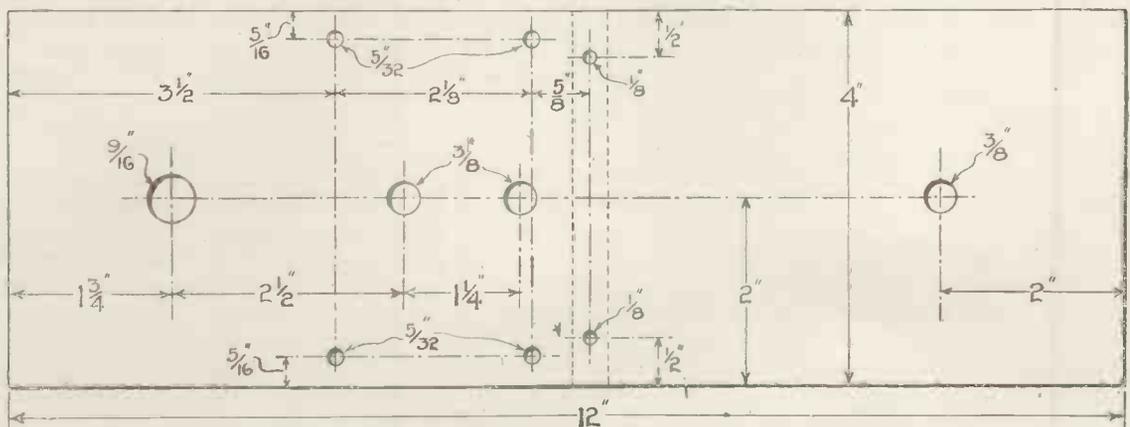
Further adjustments include those of the H.T. and grid-bias batteries, the tapplings of which should be experimented with until the volume and quality of reproduction are at their best.

We would point out here that the set is not suitable for the reception of

long-wavelength stations such as Daventry. To render the set suitable for the reception of this station considerable alteration would be required, including the winding of another frame aerial and the insertion of another H.F. transformer.

Results

Results with this set were exceptionally good, London and Birmingham being received at good loud-speaker strength in the heart of London.



Layout of Panel of Holiday Four-valver.

Amateur Direction-finding

IT seems amazing that more attention has not been paid by the amateur to direction-finding since, at its simplest, the only apparatus required is a frame aerial, a map, and a compass.

Since this article is not intended for the expert, perhaps some consideration of the principles used may not be out of place.

Only one point can be at the junction of two straight lines. Given a base and the two angles on it, we can construct a triangle. This is the method used in direction-finding, whether it be locating a sniper in a tree or an unauthorised transmitter in wireless.

Setting "A Line"

Two receiving sets are located at some distance from each other, the line between them representing the base of a triangle and the mystery transmitter the apex. If the two receivers can get "a line" upon the transmitting station from their respective positions then the problem is solved, for the point where the two lines, produced, intersect will give the location needed with absolute accuracy.

Anyone who chooses to work this out on a piece of paper will have no difficulty in following the theory.

When it was a question of locating snipers during the war the method used was simple. Two turnips were placed on the top of the trench at some distance away from each other in the hopes that the Bosch would mistake them for someone's head. As soon as a bullet was sent through them a stick was placed through the holes, thereby establishing the direction of the hidden sniper from two different points upon a given base—the line between the two turnips. These two direction lines produced gave at their point of intersection the location of the sniper.

In wireless we needed to find some method of finding upon what line a transmitter lay. Once we discovered that a frame aerial was directional, the problem was solved. By rotating our aerial until the signals were loudest we were able to say that the station lay somewhere on a line

produced through the plane which contained our aerial.

There are many gadgets, of course, connected with wireless direction-finding, but they need not concern the amateur. A simple apparatus for this work may be constructed with ease and economy. Having been constructed, oscillators may be located, and stations which persistently refuse to give their call signs logged with the help of one friend using a similar apparatus at another place.

Best Method

The method I have found best is to get a small table, preferably a round-topped one, and glue a map of the district on to it, so that the position of my own house comes at the centre. (It does not really matter whether one's own location is in the centre or not so long as it is represented upon the portion of map used, but it simplifies matters.)

When this has been done the table is secured to the floor so that it cannot be moved, and an accurate compass dial is drawn upon the map, the table having been anchored so that the north point on the map coincides with the actual north—not the magnetic north. The degrees and points can be marked on the margin of the map.

In the exact centre of the table compass is placed the supporting rod of a frame aerial, so that the frame is free to revolve upon it. To the rod of the aerial is fixed a long metal pointer in such a way that when the aerial is revolved the pointer covers the degrees marked on the edge of the map. By this means several things may be read off at one time.

Exact Reading

The pointer gives us first the exact compass reading when the frame is lying in a given plane. An imaginary line drawn from the centre of the map—our own position—to the degree indicated by the pointer will show us the exact line of actual country somewhere upon which the mystery transmitter is located.

Assuming that we have rotated our aerial until signals are coming in

with the maximum volume, and found that our pointer, lying in the same plane as the aerial, covers the north point on the marked compass, then we have established the fact that the station we want lies either due north or due south of our own location. Half the job is done.

On our map there is a small red blob, representing the location of our collaborator. With this as a centre a circle is described in red ink. On this circle are marked the degrees of the compass.

Point of Intersection

We now go to our telephone and are given a certain reading. Returning to our own map we find that reading on the red circle. Taking a line from the red blob through this reading, we produce it until it crosses the line we have established ourselves. At that point of intersection lies the wanted station. By reference to the map we find that it is a house; number 42, for instance, in a road given as Flower Avenue.

If stations located at greater distances are required, then the procedure is a little different. In this case a much larger map is required and the two direction-finders must be located a considerable distance apart. The map will be kept separate from the aerial table, which will have only the compass markings. On the map the positions of both stations will be shown and a line drawn connecting them.

When the readings are established for each station, they will be plotted, so as to obtain the angles to the base line.

By producing the lines thus found the same result as before will be obtained.

This short article, of course, by no means covers the subject of direction-finding, but it does show in a simple way how local experiments may be carried out without any great expenditure of either money or effort. Since oscillatory interference is usually operative only within an area representing some twenty-five miles radius of the oscillator, an apparatus such as the one described here should be of great assistance to listeners troubled in this way. E. C. D.



BROADCAST MUSIC THAT CHEERS

By JACK HYLTON

(The Famous Conductor)

CCHEERFULNESS is the keynote of modern music. I want to send to every listener a message of good cheer, to play songs of gladness and innocent frivolity, to be a disciple of Comus the Merry-Maker. Is there not enough sadness already in the world?

My Ambition

It is a dreadful thought that, by radio's magic wings, music can be broadcast that might make people sad, that might add to the sufferings of the lonely and the sick. My ambition is to make every face a little brighter, if only for the time that my music lasts. That is my creed.

But to radiate cheerfulness a modern conductor must be very serious in his quiet moments. Our modern symphonic syncopated music, which undoubtedly conveys an optimistic and cheerful note, is constantly decried and condemned.

Judged by the standards of yesterday it certainly is heretical. Yet in spite of their fulminations against it none of my well-intentioned critics denies that symphonic syncopation is increasing in popularity.

Even Mr. J. H. Squire, who has banned this type of music from his performances, wrote in a recent issue of the WIRELESS MAGAZINE that many bands which set out with firm resolutions to avoid "jazz" gradually weakened under stress of public

opinion and eventually acceded to the demand and supplied "jazz." In other words, even the enemies of syncopation agree that the public want it.

The law of supply and demand rules. And that is why syncopated music lives and will always live. But what is the inner secret of

its extraordinary success?

Few people have a clear idea as to what syncopation actually is. It would be humorous were it not serious to find well-known musicians, such as Mr. Squire, making a confused use of the terms "jazz" and "syncopation," because the two words have entirely different meanings.

When listeners object to syncopation they frequently are thinking of "jazz" and I believe that most of the uninformed opposition to our modern music would disappear if it could be dissociated from this unfortunate word "jazz" which, to the majority of folk, represents something noisy, unmusical and torturing to the nerves.

It cannot be denied that the modern style of music originated in "jazz." But the two things are no more alike than a beautiful orchid resembles the ugly brown seed from which it sprang.

"Jazz" was a war-time product. It was the logical application to music of the topsy-turvy spirit then prevailing.

Popular Thought

In literature, the most successful works are those which reflect popular thought at the time of their publication. It is for this reason, in my judgment, that "If Winter Comes" is a best-seller, for every normal man sees himself mirrored in Hutchinson's principal character.

So it is in music.

Rhythm was the element that predominated in the old-time "jazz." True, it was the same savage rhythm that the tom-toms gave out way back in the world's early history. But it was none the worse for that. Human nature has not changed. Everything moves with a rhythm, in cycles, large or small. It is a fundamental factor in the universe, not excepting human nature.

We Britishers, as a whole, are extremely fond of harmony. Could I not combine with it, I pondered, that haunting rhythm of "jazz"? If this could be done, I figured, we should then have a true People's Music, something that would appeal to the majority.

Crude Rhythm

In its beginning all music was crude rhythm. The change wrought by the march of time was to embellish it with harmony; but this tendency was overdone, and in the most intellectualised form of music, represented by the great classics, harmony predominates unduly whilst a continuous and satisfying rhythm is conspicuously absent.

Even to-day these two contrary elements are ever at war. Some listeners have an ear for harmony, but cannot appreciate rhythm. These are the people who play hymn tunes and songs very well, but cannot "get the knack" of dance music. On the other hand, many musicians do not readily appreciate the subtleties of harmony yet they "pick up" a syncopated dance tune immediately. Sense of rhythm dominates their musical make-up.

When I formed my first band my proven theory was, and is to-day, that no music which emphasises rhythm only, such as the old "jazz," or which gives exclusive prominence to har-

mony, as does much of the so-called classical music, can possibly appeal to the bulk of listeners.

What was wanted was a new music consisting of a successful combination of those two hitherto elusive elements, rhythm and harmony. Such a combination only would satisfy all the musical needs of the average man or woman. That is precisely what symphonic syncopation does. It expresses the ideas of the average listener, which is the secret of its success.

Mechanical Part

The mechanical part of syncopation consists of an alteration of accent, which produces a soothing and satisfying throb. By prolonging a note from a normally weak place in a bar over a normally strong one a peculiar and characteristic cross accentuation results which has an admittedly stimulating effect upon a listener.

This device, however, is by no means modern, and many examples of its successful use can be found in the works of Liszt, Beethoven and other masters.

A prominent lady, writing recently to the newspapers, lamented the passing of the old dances. Now, syncopated music is specially suited to dancing, owing to the insistence upon definite rhythm, and I venture to express the opinion that the simpler dances of to-day which have followed in the train of syncopation are a distinct advance over the dances of a few years back.

There was something spectacular and picturesque about the polka, the lancers and the quadrille; but how many people enjoyed those dances compared with the millions nowadays who fox-trot o' nights?

Syncopated music has made dancing simpler. It has made dancing a pleasure within the reach of everyone, instead of a puzzle.

I do not assert that symphonic syncopation, because it interprets public taste at the moment, is the best and last word in music. There can be no finality in the matter of musical expression. Our music, like everything else, is evolving, changing progressively into new forms. But the essential favour of syncopation, despite probable changes in the outward form, will remain, I feel convinced, for many generations to come.

Wireless has been invaluable in teaching me what the public prefer. After one of my recent broadcasts I received literally mountains of messages which confirmed my view that symphonic syncopation makes a larger popular appeal than any other type of music. It is the music of the normal human being.

The notion prevails in some quarters that the chief function of this wonderful discovery, wireless, is to act as an educational medium. This may be largely true; but I believe that radio programmes, in common with our newspapers, will rapidly become less informative in the pedagogic sense, and more lightly amusing.

After a weary day's work people do not want to be "educated." They want to be cheered. That is what wireless has taught me, and, owing to its atmosphere of cheer, I am certain that, in the near future, symphonic syncopation will find a larger and larger place in wireless fare.

Tired of Dull Music

People are tired of dull music. Cloying, sloppy sentiment is no longer wanted either. The war did away

"JAMMED"

A WIRELESS amateur came to me,
And begged that I would go and see
His two-valve set, stamped B.B.C.,
Of type approved by P.M.C.
'T would hardly work at all, said he;
Would I do what I was able.

I went, it was a lovely sight,
With knobs and fittings polished bright.
His aerial seemed a decent height.
I said, "Are you sure your earth's all right?"
"Oh, yes," he said, "that's out of sight,
"In a jam jar under the table."

GUY H. LEARNED.

with it, as it did with long hair and dust-gathering skirts. The universal demand to-day is for something bright, for toe-tickling tunes that make listeners feel, if only for a moment, the real joy of living.

And if, perchance, one amongst them has a heartache, well, symphonic syncopation may help her to forget.

I feel supremely happy in the thought that my music has, in a small measure, answered this persistent cry for cheerfulness which all the world awaits.

A Nutshell Novel

AT 7 P.M.

THE Policeman sauntered casually along.

Life was easy and was treating him kindly. There was an appointment with the maid of No. 17 to-night. Surely life was indeed very pleasant. . . . So he mused, as he leisurely took his stroll of duty round the houses.

P.C. 39's wandering attention was recalled from blue eyes to duty with a jerk—a crowd was gathering in the main road several yards farther along. His saunter developed into a quick run.

The crowd increased, and raised voices reached him apparently proceeding from the centre of the quickly increasing throng.

Windows began to open, and excited householders asked vain questions of one another. One said a woman had fainted, another that there was a fight.

As P.C. 39 pushed his way energetically through the crowd and approached the centre with heroic struggles, a loud voice boomed in his ear—"That concludes the news bulletin for to-night," it said.

The door of the wireless shop opened and a man quietly removed the loud-speaker.

R. W. T.

IN including so many lectures on musical appreciation in the programmes, surely the B.B.C. is flattering itself?

It is claimed for a new loud-speaker that it makes distortion impossible. Then that puts the lid on the prospect of using wireless for political purposes.

THERE are said to be half a million pirate listeners in this country. And sometimes an equal number of irate ones, too.

PARIS now gives drawing lessons by wireless. If corks are amongst the objects drawn, the B.B.C. might consider the possibility of relaying the item to Aberdeen.

A Simple Competition for which Every Reader Can Enter!

Can You Identify These Componigraths?

Six Guineas' Worth of Prizes

ON the opposite page are illustrated—some of them from unusual viewpoints—ten pieces of wireless apparatus. For identifying these Componigraths—not a difficult task if you are a regular reader of the WIRELESS MAGAZINE—you may win a prize.

All that you have to do is to state what the component is and *by whom it is manufactured*, giving any special trade name if thought necessary to establish the identity beyond doubt.

Almost every piece of apparatus has been illustrated or described in the advertisement or editorial pages of the WIRELESS MAGAZINE.

To make quite sure that every reader understands what is required of him (or her) in this simple competition we give an example here.

If this Componigrath were amongst those illustrated for competition on the opposite page, it would be "identified" as follows:

Lissenola loud-speaker unit—Lissen, Ltd., of 500-520, Friars Lane, Richmond, Surrey.

To say what the Componigrath represents, without giving the manufacturer's name, is not sufficient.

Entries, which must be accom-



If this Componigrath were amongst those on the opposite page it would be correct to identify it as: Lissenola loud-speaker unit; Lissen, Ltd., of 500-520, Friars Lane, Richmond, Surrey.

panied by the coupon on page iii of the cover, will be kept by us unopened until Wednesday morning, July 21.

On this day, all the entries received will be thoroughly "mixed up," and prizes of a guinea's worth each of components chosen from the catalogues of firms advertising in the

WIRELESS MAGAZINE will be given to the senders of the first six correct lists found as the letters are opened.

Address your effort to "Componigraths," WIRELESS MAGAZINE, La Belle Sauvage, E.C.4, so that it will reach this office not later than first post on Wednesday, July 21, not forgetting to enclose the coupon on page iii of the cover.

When making out your list, put the number of the Componigrath alongside your identification. Write legibly on one side of the paper only, and do not send anything except the list, coupon, and your name and address.

This is our second Componigrath competition. For the first competition an extraordinarily large number of entries was received. Start making out your list now.

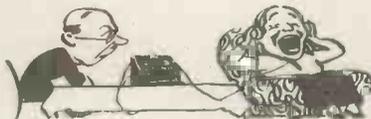
Remember that you stand an equally good chance of winning a prize whether you send your entry as soon as this issue is published or not until July 20!

THE OTHER FELLOW'S AERIAL!

WHENEVER I take my walks abroad I always keep an eye up to see what the other fellow is using in the way of an aerial and, in consequence, it has become an almost unconscious habit with me to sum up the capabilities of an aerial at a glance.

The other day I took a walk in a direction new to me and I saw an aerial of somewhat unusual appearance. The aerial was of the single-wire type and it was slung over a field. One end of the aerial was attached to a house and the other end was secured to the top of a high tree.

I was astounded at the apparent length of this aerial. It seemed to me a good eighty yards long. However, on getting closer to the aerial,



Take the lion's share.

I saw that there was a small insulator about a third of the way along the whole stretch of wire from house to tree.

By going close to the tree, I satis-

fied myself that there were not two aerials joined to a common insulator.

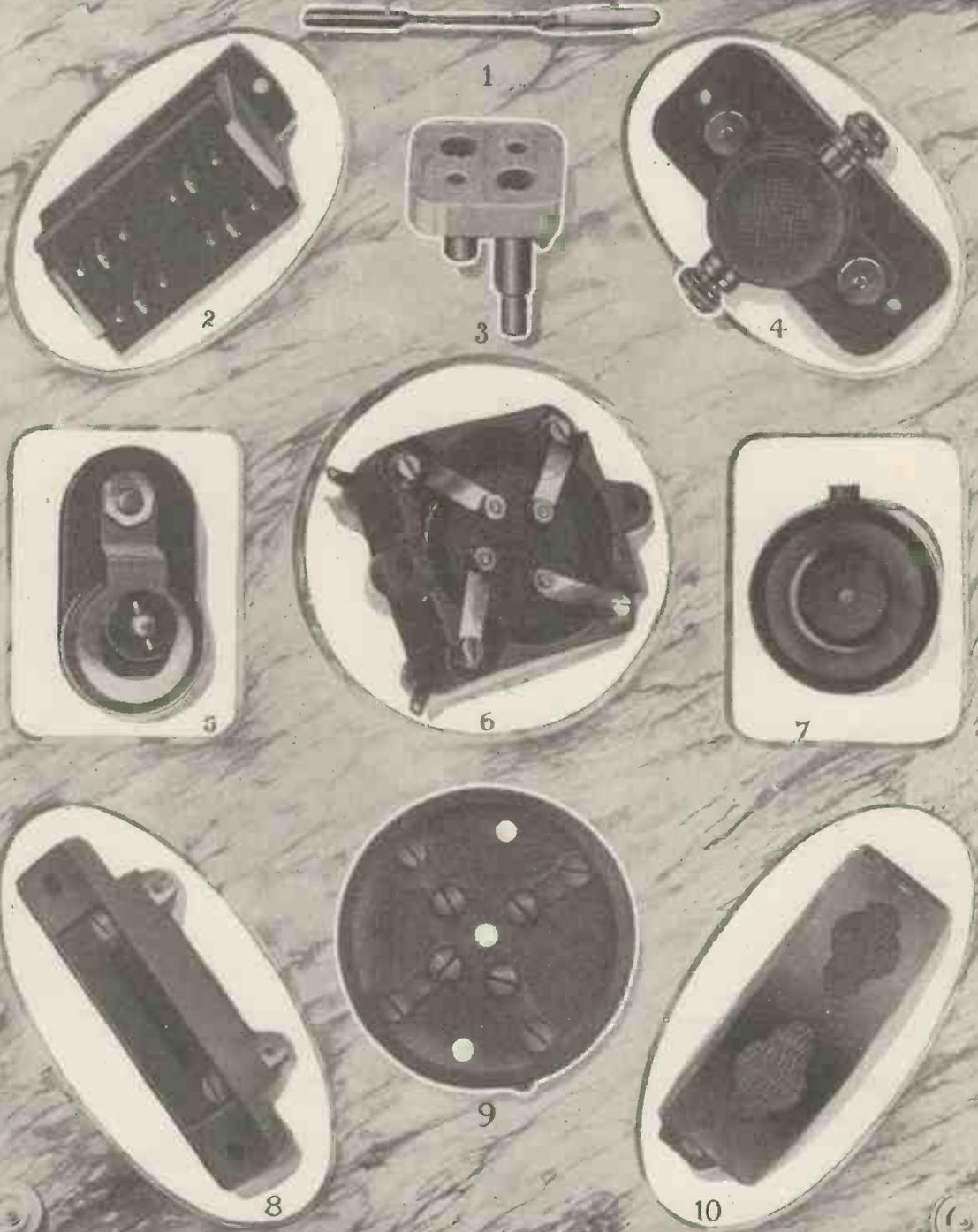
Just imagine it. The horizontal portion of the aerial proper was about eighty feet long and the wire holding up the open end of the aerial was at least twice that length.

Of course, it may have been a very satisfactory aerial, but it went against my instinct in such matters. I should never put up such an aerial, for I should be superstitious enough to imagine that the long sustaining wire would take the lion's share of what was going that way and leave very little for the aerial proper.

AERIAL.

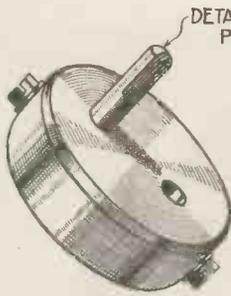
Prizes for Identifying These COMPONIGRAPHS

For full particulars see opposite page.



Novelties and New Apparatus

Tested and Approved by Our Technical Staff

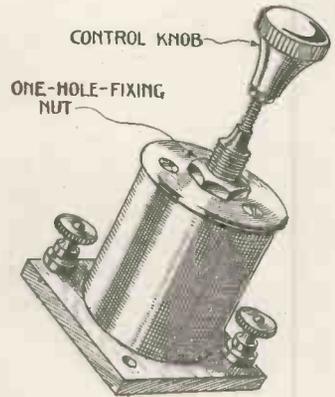


DETACHABLE PLUG

Suitable for baseboard mounting, the Bretwood fixed coil holder possesses some unusual features. The base consists of a circular moulding in which two accurately spaced holes are drilled.

A detachable plug is supplied which can be withdrawn and inserted in either one of the two holes. Contact between the plug and the terminals situated at opposite sides of the base is effected by a small dome-shaped spring buffer projecting from the side of each hole.

The manufacturers are Bretwood, Ltd., of 12 to 18, London Mews, Maple St., W.



CONTROL KNOB

ONE-HOLE-FIXING NUT

The Magnum neutralising condenser is mounted on a small square ebonite base which can be screwed to a baseboard behind the panel.

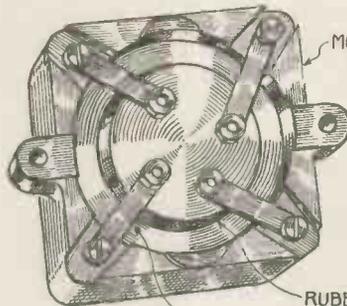
Internal connections are brought out to two terminals. The screwed spindle gives a very fine adjustment of capacity.

The makers are Burne-Jones and Co., Ltd., of Magnum House, 296, Borough High St., S.E.1.

The Etherplus anti-vibratory valve holder possesses just the right amount of shock-absorbing qualities. It has low-capacity air-spaced valve legs mounted on a special non-deteriorating rubber disc, flexible connecting strips being used between the valve legs and the outer rigid moulded base.

These flexible strips also impart a floating support to the rubber disc.

The manufacturers are M. and A. Wolff, of 9 to 15, Whitecross St., E.C.1.



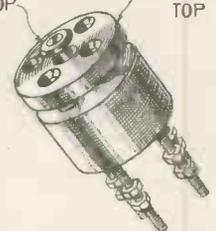
MOULDED BASE

RUBBER DISC HOLDING SOCKETS

FLEXIBLE CONNECTING STRIPS

STOP

SPRUNG TOP



This well-made anti-microphonic valve holder has a floating platform into which the valve is inserted, the valve pins making contact with brass bushes moulded in the platform.

The floating platform is held in position by four springs, down the centre of each of which the valve pins pass.

The valve holder is made by Metro-Vick Supplies, Ltd., of Metro-Vick House, 145, Charing Cross Rd., W.C.2.



SPRUNG SOCKET

SPRING

LEG TO FIT EXISTING VALVE HOLDER

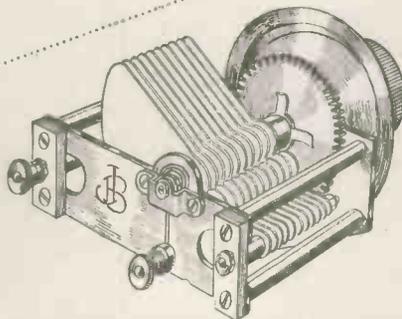
A very ingenious method of converting a rigid valve holder into a very efficient anti-microphonic type is to be seen in the "Wobbly" adaptor legs.

These consist of valve sockets mounted on small springs and attached to

"banana" pins which are plugged in the sockets of the rigid valve holder.

They are supplied in cartons of four—three black sockets and one red.

"Wobblers" are made by A. H. Hunt, Ltd., of Croydon, Surrey.

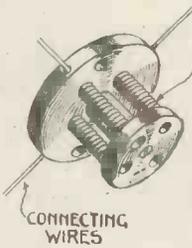


It is not often that we have examined a variable condenser having a slow- and quick-motion device employing gear wheels that is devoid of backlash, but the J.B. condenser illustrated here has the slow-motion mechanism so mounted that backlash is practically negligible.

Low-loss principles have been adhered to in the design.

The large dial gives a quick motion, whilst the smaller knob situated underneath the main dial gives fine tuning.

Jackson Bros. of 8, Poland St., W.1 are the makers.



Shown in the accompanying sketch is a novel type of anti-microphonic valve holder. It consists of two circular pieces of ebonite (each of which is drilled to receive valve legs) joined together by means of a small tubular piece of ebonite about an inch long.

Between each set of drilled holes are fixed wire springs which act as valve sockets. It will be seen that a valve can be inserted at either end of the component.

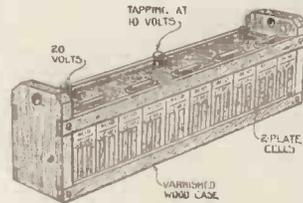
Although the holder itself is perfectly rigid, any valve inserted in it has a reasonable amount of play—enough, as tests prove, to eliminate all microphonic noises from the set. The manufacturers are A. H. Hunt, Ltd., of Tunstall Road, Croydon.

A convenient form of accumulator high-tension battery may be made up from several of the Exide 20-volt units, one of which is illustrated. It is contained in a varnished wooden crate 14 in. long and about 2½ in. in width.

The individual cells, which are made of strong glass, are readily accessible, an advantage which is not fully appreciated until one has used such batteries for some time—and had occasion to inspect them closely.

Although only 20 volts are obtainable from each unit, several of them coupled in series can be used to supply a multi-valve set.

The Chloride Electrical Storage Co., Ltd., of Clifton Junction, nr. Manchester, are the manufacturers.



Of interest to all constructors of sets which require vertical panels are the panel-supporting brackets made by Burne-Jones & Co., Ltd., of Magnum House, 296, Borough High Street, S.E.1, an example of which is seen in the illustration.

Although extremely light in weight—being made of aluminium—they are capable of supporting all but the largest of panels, and for the latter purpose there is a larger size made.

TO TAKE FULL ADVANTAGE OF THESE PAGES

it is advisable to supplement the brief particulars that we are able to give in the limited space at our disposal by writing to the manufacturers concerned for fuller details.

For instance, makers of valves and transformers are, in most cases, only too glad to send interested enthusiasts sample characteristic curves of their products.

In this respect we give our readers as much help as possible by putting the manufacturer's name and postal address alongside each piece of apparatus described. A post card mentioning the WIRELESS MAGAZINE will result in the firm concerned giving you all the special information that you may require.

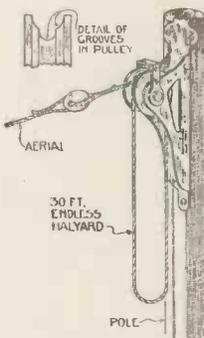
By following out this suggestion, the home constructor will keep himself informed of all the best developments that take place month by month, and that without waste of time.

An aerial-mast pulley which is so designed that should the aerial break it may be repaired or renewed and hoisted back into position again in a few minutes without the necessity of lowering the mast will come as a boon to those who have suffered in this respect.

The Collett self-hoisting pulley is provided with 30 ft. of endless halyard running in a small separate groove in the sheave, enabling the aerial to be fastened to the halyard and hauled into position..

The details of this useful device, which is made of aluminium, are shown by the diagram.

The makers are the S. H. Collett Manufacturing Co., of 52-54, Hampstead Rd., London, N.W.1.

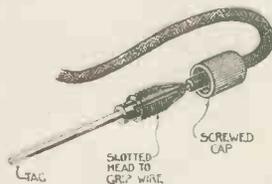


A very neat method of fixing a pin terminal to the end of a piece of wire is shown in the accompanying sketch.

The screwed cap is slipped over the end of the wire, and the latter is inserted between the jaws of the slotted head of the pin.

When the cap is screwed over the head of the pin the jaws are compressed together in the same fashion as the chuck of a hand-drill grips the drill when the chuck is screwed up tight.

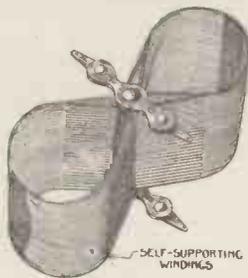
The complete attachment presents a neat and clean appearance free from frayed ends of wire.



Every amateur will find it convenient to keep a few of these gadgets in his "spare parts" drawer—they will come in handy for all kinds of purposes.

J. J. Eastick and Sons, of Elex House, 118, Bunhill Row, E.C., are the manufacturers.

The Bodine twin-eight binocular transformer is a special type of H.F. coupler, the primary and secondary windings of which are wound in an unusual manner, the finished component resembling, as its name implies, a pair of binoculars.



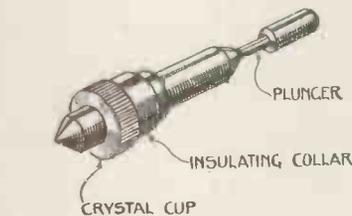
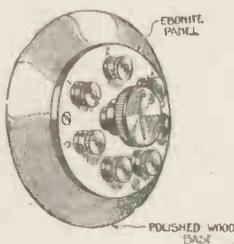
It is claimed that the field of the windings is confined to the coil itself and will not, when incorporated in a set, affect other apparatus. Our tests confirm this claim.

These coils can be supplied individually or in matched sets of three by the Rothermel Radio Corporation of Great Britain, Ltd., of 24 and 26, Maddox Street, W.1.

A very useful component is the Trix phone distribution board. It consists of a rotary switch which passes over studs connected to the terminals.

Any number of phones up to four can be used at will.

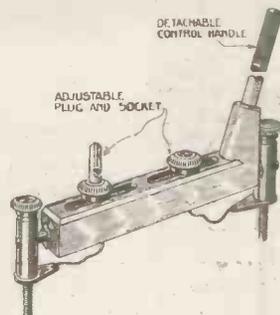
The maker is Eric J. Lever, of 33, Clerkenwell Green, E.C.1.



For those who need a really efficient semi-permanent crystal detector the Perma-rector can be confidently recommended. Rectification is obtained by two crystals—giltvium and tellurium.

Adjustment of the contact is obtained by pulling up the spring plunger to which the pointed crystal is attached and releasing the plunger again, at the same time giving the latter a slight turn.

The Brownie Wireless Co. of Great Britain, Ltd., of London, N.W.1, are the manufacturers.



A component which will appeal to the experimenter is the Igranic Universal coil holder, which possesses many unique points. The spacing between the contact pin and socket may be varied, rendering the coil holder suitable for accommodating standard or low-loss coils.

This coil holder is especially suitable for the Igranic Xilos coil, the pin and socket of which are adjustable and may be given a wide spacing, thereby reducing the self-capacity. A long detachable control handle is provided which effectually reduces hand-capacity effects.

Three of these holders mounted side by side will make an excellent three-coil holder. Connections from the pin and socket of the coil holder are brought out to the two mounting terminals by short pieces of flex. By screwing down the heads of the terminals the coils may be locked in any desired position.

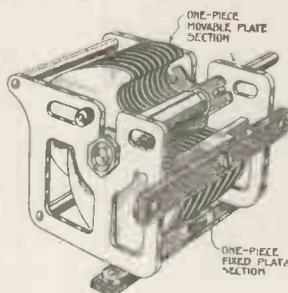
The finish of the units is of a very high standard and the metal parts are heavily nickel-plated.

These coil holders are made by Igranic Electric Co., Ltd., of 149, Queen Victoria Street, E.C.4.

By means of an adjustable bearing the metal-to-metal gears of the Penton two-way coil holder can be so adjusted that backlash is entirely eliminated. Any wear in the gears can be taken up immediately.

Another point worthy of note is the locking screw attached to the moving socket which adjusts the friction of the latter and thereby prevents heavy coils from falling.

The coil holder is made by Penton Engineering Co., of 15, Cromer Street, W.C.1.



Both sets of vanes of the Cleartron Dikast variable condenser are die-cast out of aluminium, thereby eliminating the H.F. resistance due to contact connection between each vane and the spacing washers.

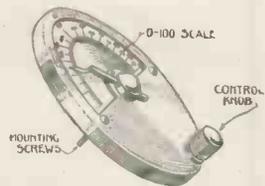
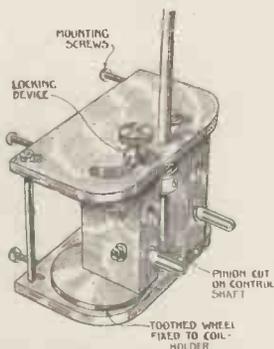
The fixed vanes are insulated from the metal frame and moving vanes by two strips of ebonite, whilst a flexible pigtail ensures perfect contact between frame and moving vanes.

The manufacturers are Cleartron Radio Ltd., of 1, Charing Cross, S.W.

The Cleartron slow-motion dial is well made, has no backlash, gives a clear scale reading and presents a very handsome appearance.

The dial is operated by the small control knob, the moving vanes of the condenser being attached to the pointer.

Cleartron Radio, Ltd., of 1, Charing Cross, London, are the makers.





Wireless Femininities

to folk who, like myself, live in the heart of a city on a road thronged with heavy traffic. Warm weather means the wholesale opening of windows and consequently the wholesale admittance of the incessant grind of trams, thudding of lorries, and cries of street hawkers.

When wireless is heard by phones neither vocalists nor speakers are able to compete with the continual noise outside. All last summer I had either to close my windows and swelter during the programme or have fresh air and about one word out of three.

Of course, a loud-speaker largely overcomes the difficulty, but is seldom convenient either for a solitary listener or in a room used for different purposes by several members of a family. Double windows, common in my street, are no solution either.

If both are closed, partial suffocation results; if one is open, there is neither fresh air nor quiet; if both stand wide, good-bye to a satisfactory programme.

Voices Last—though Not Least

With modern life tending to become more noisy every day, it's difficult to see a solution of this particular difficulty. The only alleviation I can suggest is that during the hot months of the year the B.B.C. might find it possible to broadcast orchestral and other items which stand noise comparatively well early in the evening, keeping speakers and singers until last in the programme. On most busy roads traffic lessens considerably after about 9 p.m.

I should be interested to hear the experience of other city dwellers on this point.

Desert Island Up to Date

I've recently had occasion to re-read those two desert-island classics—"The Swiss Family Robinson" and "Treasure Island." In the papers about the same time was the information that the first ship had called at that loneliest of islands, Tristan da Cunha, for two years.

This dose of remote islands set me rather childishly off on a new amusement—mentally re-writing the two classics above mentioned as they would be written in this year of grace 1926. And immediately it occurred to me that a wireless set either in the Swiss family's ingenious home among the tree tops, or in the log-hut manned by Jim Hawkins and his comrades, would completely revolutionise the story.

Imagine, too, Man Friday and Crusoe sitting in their cave each evening with phones on!

Classics Plus Radio

What a golden opportunity for some novelist of imagination to write an up-to-date castaway story introducing wireless. To be within listening reach of the world—of course, the wreck would have destroyed any transmitting set on board, to avoid rescuing the hero too soon—without being able to communicate with it, would make a fine ironic situation. It ought to provide thrilling new incidents different from any already used in stories of this type.

As a matter of fact, apart from the short stories which appear every month in the WIRELESS MAGAZINE, it is rather curious how little writers seem so far to have recognised the fiction value of wireless.

Spring Cleaning—and Your Set

It's late now to talk of the annual house turning out, I admit. But this time of year, when plenty of dust prevails, is the best of all seasons for overhauling your crystal set from the cleanliness standpoint.

Housewives who would thoroughly clean up a lamp or an iron which refused to work properly seldom apply this same simple treatment to the wireless set. It is "machinery" and mustn't be defiled by a duster!

If the set consistently gives poorer reception than it used, try cleaning it in all its crevices. And to give the crystal itself a new lease of usefulness, scrape it gently with a penknife to provide it with a new dust-free surface. The result will probably surprise you.

A. M. M.

"FEED the brute!" has always been the golden maxim handed down to wives as to the management of their husbands. But the general strike, just ended as I write, seems to have refuted this lamentably low view of mankind. "Let them get the news, at any cost to meals," ought to be the new slogan.

News Before Food

Plenty of housewives have discovered, half amused, half rueful, that with their husbands and sons news comes before nourishment—a long way before. The admirable B.B.C. strike news bulletins were broadcast just at meal times—no doubt a wise provision for catching most listeners at leisure.

But it did rather play havoc with the feeding of households where broadcasts are heard by headphones

Item the Men Like

"Five half-hours of news a day and during each one the cat mustn't even walk across the room for fear my hubby misses a word," complained to me an old lady who lives in one room in a tenement house.

"Such a nuisance! There's only one pair of phones and I have to sit with my hands folded, hearing and doing nothing. All meals have to be put back half an hour, of course."

Can you imagine anything so drastic being required for a mere symphony or wireless play? It's my firm belief that's all the men ever listen for—news, news, news!

The coming of summer has brought back one problem rather bothering

Solving the Programme Problem

Just where the fault lies in broadcast programmes and how all listeners could be provided with entertainments exactly to their tastes is explained in this article by C. Whitaker-Wilson.

IT is so easy to be critical—especially in a destructive sense—that in beginning an article in which, to some degree at least, I am bound to find fault before I can offer anything constructive in character, I feel rather like the Communists whose outlook on life seems to be epitomised in the motto, "Let us have a grievance."

Grievances

As a matter of fact, the grievance in this case is not my own to any large extent, because I have very little time for listening; but I have read from time to time of the grievances of others. Evidently people have had a great deal to say upon the subject of the programmes as broadcast from almost every station, and in adding my own observations I can draw upon nothing very tangible in the way of personal experience so far as actual listening goes.

So instead of relying upon my ear, I base my deductions upon what I have read in the Press. And I am bound to confess that every time I have looked at the published programmes I have confirmed my view that the whole system of programme-making, as it is at present, is psychologically wrong.

That is a sweeping thing to say, and yet I hope to lay a case for the defence of my opinion. And it is certainly with the profoundest respect for those whose duty it is to devise 365 programmes each year that I begin to criticise at all.

Of course, it is always possible to criticise to that vanishing-point at which statement becomes hopelessly commingled with conjecture, and opinion becomes commuted to pedantry. But I hope to avoid extremes of any kind, and reasonably to view the question as I find it presented to me.

Programme-making is such a blending of colours and toning of the faintest shades that it is not always a simple matter to determine exactly where the faults are. To begin with, people are getting used to wireless

transmission: it is by no means the thing of wonder it was even a year ago. Moreover, the average person, who could probably write down all he really knows about music on a half-sheet of note-paper, has (by virtue of continued listening) absorbed so much music that he is rapidly becoming more and more receptive. And this is a factor in the situation.

But the statement of it is no prelude to any argument on my part that, as the average listener by dint of nightly practice is able to receive broadcast music with greater facility and understanding, there is now a golden opportunity to stiffen up the programmes, avoiding the lighter side altogether, and substituting the so-called "high-brow stuff."

Indeed that argument is no argument at all—however much the musicians might like to advance it—because there is no case against light music as such. There cannot be, considering nearly every great musician has written light music at some time or other in his career. So that such a suggestion would be negated immediately. And quite rightly so, too: that point of view is scarcely worth committing to paper, because it is perfectly obvious that the public must be considered first.

Appealing to All

It is not—it never has been—a question of a surfeit of one or the other, of having too much high-brow or too much low-brow (if that is the antithesis of rather a stupid term); it is solely and entirely one of trying to appeal to all shades of opinion in one programme.

To put it on the lowest and simplest basis, it naturally follows that such a procedure results in all types of listener being bored *somewhere*. The man who feels that his artistic soul craves for the latest fox-trot will scarcely give thanks for a Brandenburg Concerto, whether it be offered instead or in addition thereto. And, conversely, a Bach-lover can hardly be expected to endure the fox-trot.

And, to pursue the argument still further, it is not a question of a programme for half-an-hour, or an hour-and-a-half; it is a question of a *whole evening's entertainment*. Then it follows that the programme must be regarded in that light. It is the customary switching-off, so to speak, from light to serious and back again which has been the chief reason of the recent dissatisfaction.

Bad Mixture

For example, in a programme which I have just examined I find someone playing a series of "pieces by Bach," immediately followed by John Henry. Bach is, of course, excellent, and John Henry admirable; but I cannot be persuaded that one must follow the other, or indeed be heard in the same evening. There is no possible consecution of thought in such a programme.

Neither am I satisfied if I am told that one must please Whitechapel as well as Mayfair. My reply is most certainly to agree; one *must* please Whitechapel and Mayfair, but one cannot do so in the same programme. It is a psychological impossibility. No single programme could be devised which would really be enjoyable to both areas.

This is not necessarily to say that John Henry is not appreciated in both districts, or Bach either. I have no doubt that it is not the case at all; but the listener who wants to laugh at one John is going to be irritated at having to listen to the other John first.

And even if he is not, the whole idea is wrong musically, psychologically, and from any other point of view. And *still* the public has to be considered. What is the remedy?

I maintain that the only satisfactory solution of the problem is to broadcast simultaneously every evening from three stations only—London and two higher-power stations, running three distinct programmes on three widely differing powers, relaying the weaker ones, where necessary, to the provincial stations,

which could be kept open for that purpose alone.

Three Programmes

Thus the programmes would be brought within the reach of the most modest crystal set. And it would come about that three stations, broadcasting three distinct programmes at one and the same time, giving a choice of three different talks, and having the news and weather common, could take the place of the present system. And that should be enough for any country.

There is, I admit, an argument against the closing of the provincial stations. Their existence means more work for the musical profession. It is a strong argument—undeniably so—especially in these times when things are none too good for musicians. It means a bigger staff in London (effected, one supposes, by the translation of the provincial officials), but, even so, the weight must be on the side of the listeners, who, after all, pay the piper, and therefore ought to have some voice in calling the tune.

The broadcasting service is a public affair: it does not exist primarily for the artists. In any case the upkeep of the provincial stations must be an enormous expense, and it is inconceivable that it is a sound policy to send artists touring round the country merely to provide programmes when, by means of a switch, the local station can be cut off and the London programme presented. I have just counted nine of them which, while providing their own music up to seven o'clock, revert to London for the rest of the evening's entertainment.

Now as to these three programmes. Let them be A, B and C.

A. Light music only, conveniently ending each night with dance music from one of the usual sources.

B. A *classified* programme. A programme with a single thought. A light opera; a relay from some theatrical performance; a broadcast play direct from the studio; a choral work; an oratorio; or even the music of some one composer. No matter what, let it be single in design.

C. A first-rate concert containing only the best music. The orchestral works to be played by a symphony orchestra, not by an ill-balanced affair such as has, perforce, to exist at the stations now out of consideration for expense. There should be double wood-wind, four horns, three trumpets (not cornets), four trombones, percussion, and at least thirty first violins with the under strings in proportion. There should be something under a hundred players in all.

It is ridiculous to argue that an orchestra of twenty when broadcast sounds like a hundred-and-twenty; it does nothing of the sort—to trained ears, at all events. The B.B.C. orchestra, in my judgment, should be one of the finest in the whole world. Why ever not? It would be an expense; but I imagine that the closing of the provincial stations would make it financially possible to concentrate in one place.

And here I am bound to state that I have little patience to listen to

music; (2) Gilbert and Sullivan; (3) a relay of a play from the West End.

C. Tschaikovski: Symphony No. 5 or 6 (properly played upon the instruments for which he wrote it—not faked as at present); a Chopin recital.

All Classes Catered for

Such a scheme would certainly mean that all classes of listeners would be catered for separately, not together. And I am perfectly certain that it would result in an increased list of subscribers. The closing of the provincial stations would probably mean the squeezing-out of the less competent performer, but even with every sympathy for those who are not great artists, I am convinced that it is the only step to take.

It is perfectly amazing how good it all has been, considering the difficulties and the amount of music that has been heard already. The B.B.C. has shown the greatest ingenuity and originality in a great many of its projects. But the fact remains that there is this one driving fact to face: no single programme can suffice for all shades of thinkers.

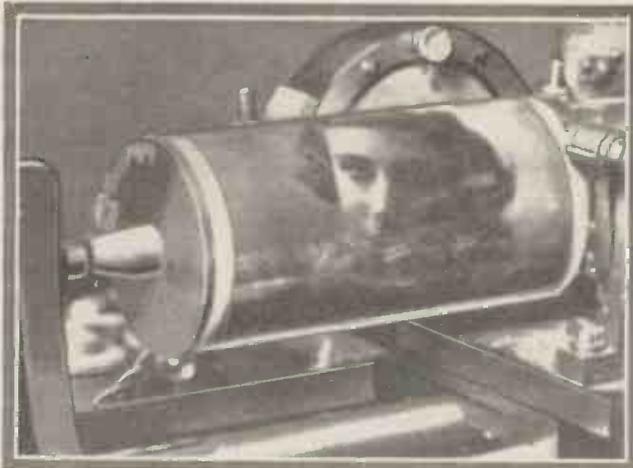
But the scheme which I have laid before my readers would reach everyone, and programme C would have the advantage of adding the musicians and the real music-lovers to the list of subscribers. I imagine that very few practising musicians listen at the present time.

The ideal of broadcasting seems to me to be so very high. It is such a noble thing—with such far-reaching and wondrous possibilities!

Music is an influence—and if it is to be possible for every living soul in this England of ours to have its uplifting message reverberating within the walls of every house and home, it is possible that every living soul shall also have his own artistic requirements met, his own desires satisfied. The sending-out of the best of the world's music is a solemn thing.

Have you never heard those stirring words: *London calling the British Isles*? What a thought!

PICTURES BY WIRELESS!



The picture on the cylinder is the first transmitted by wireless in Austria.

six violins trying to hold their own against a quartet of wood-wind and a couple of harsh cornets. There is no possible balance about it.

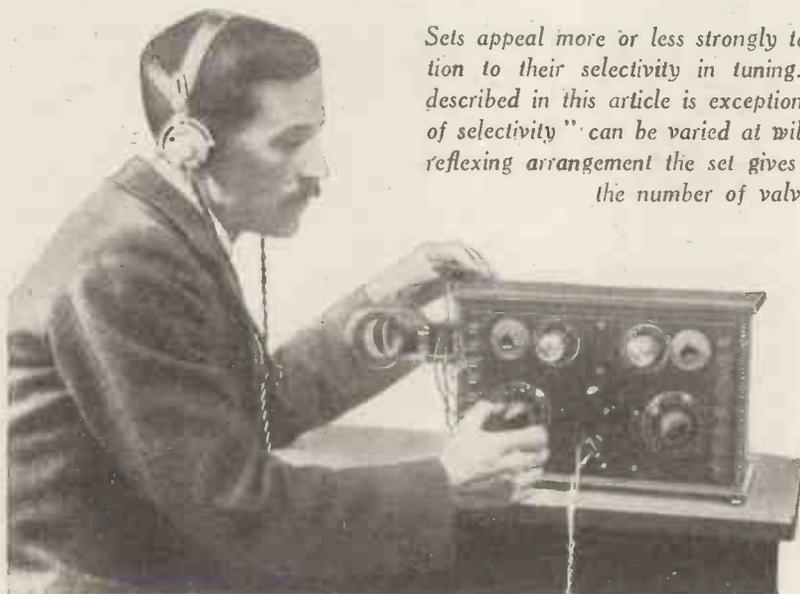
Thus it might be the happy lot of the listener to have a choice, some evening, of three programmes such as these:

A. A selection of the latest light ballads; some well-known pianoforte music of the lighter type; dance music; a comedian.

B. An evening of (1) chamber

Structograph Coloured Plate of This Set Free with This Issue

The Town-dweller's Reflex Two



Sets appeal more or less strongly to the town dweller in proportion to their selectivity in tuning. For a two-valver the set described in this article is exceptionally selective—and its "degree of selectivity" can be varied at will. Moreover, by virtue of its reflexing arrangement the set gives the maximum of volume for the number of valves it employs.

Designed, built and tested by the WIRELESS MAGAZINE Technical Staff, this simple two-valver is one of the most efficient reflex sets yet made available to the home constructor.

OF a type that is very popular in America because of its simplicity and the excellent results that can be obtained by the use of only two valves, this set is one that will also appeal to the British amateur.

The average American receiver is a five- or six-valver that is very selective and gives good volume. It is significant, therefore, that this type of two-valve set more than holds its own among so many larger and more elaborate receivers.

Indeed, the volume obtained from one or two of the nearer stations with this valve-crystal reflex receiver is comparable with that from a three- or four-valve set. Because of the variable coupling between the H.F. transformer windings (the primary is coupled to the aerial coil, giving a reaction effect) the selectivity can be adjusted as circumstances demand.

Thus, if the receiver is situated near a broadcasting station inter-

ference from the latter will, in the ordinary way, be considerable when it is desired to receive other and more distant stations. By loosening the coupling between the two transformer coils the selectivity is greatly increased and the local station will

The second valve is a low-frequency amplifier only.

A crystal detector of the permanently-adjusted type is employed to rectify the oscillations present in the H.F. primary coil (the plate coil of the first valve) and, after rectification, the impulses are fed back to the grid of the first valve through a low-frequency transformer and are amplified by the second valve.

Perhaps one of the commonest causes of a reflex-receiver refusing to function properly is to be found in the use of a reflexing transformer having an unsuitable ratio. Although almost any transformer will work more or less efficiently in an ordinary low-frequency amplifier this cannot be said of

Let us Help when You Are in Difficulty— Our Service is Free of Charge!

Even the most experienced amateur at one time or another comes up against some little difficulty—some little problem of which the solution momentarily escapes him. Have you any such problem? No matter how trifling or how important the point is we are always ready to help you out of your trouble—we keep a special staff just for that purpose.

Moreover, we make no charge whatever—we are glad to do it! Just write your query on one side of a sheet of paper (this small point greatly facilitates the handling of your question) and enclose it, together with the coupon on page iii of the cover and a stamped enveloped addressed to yourself for return, in an envelope addressed to The Editor, WIRELESS MAGAZINE, La Belle Sauvage, E.C.4. You will get a reply within a few posts!

only be audible over a very small arc of the tuning dial.

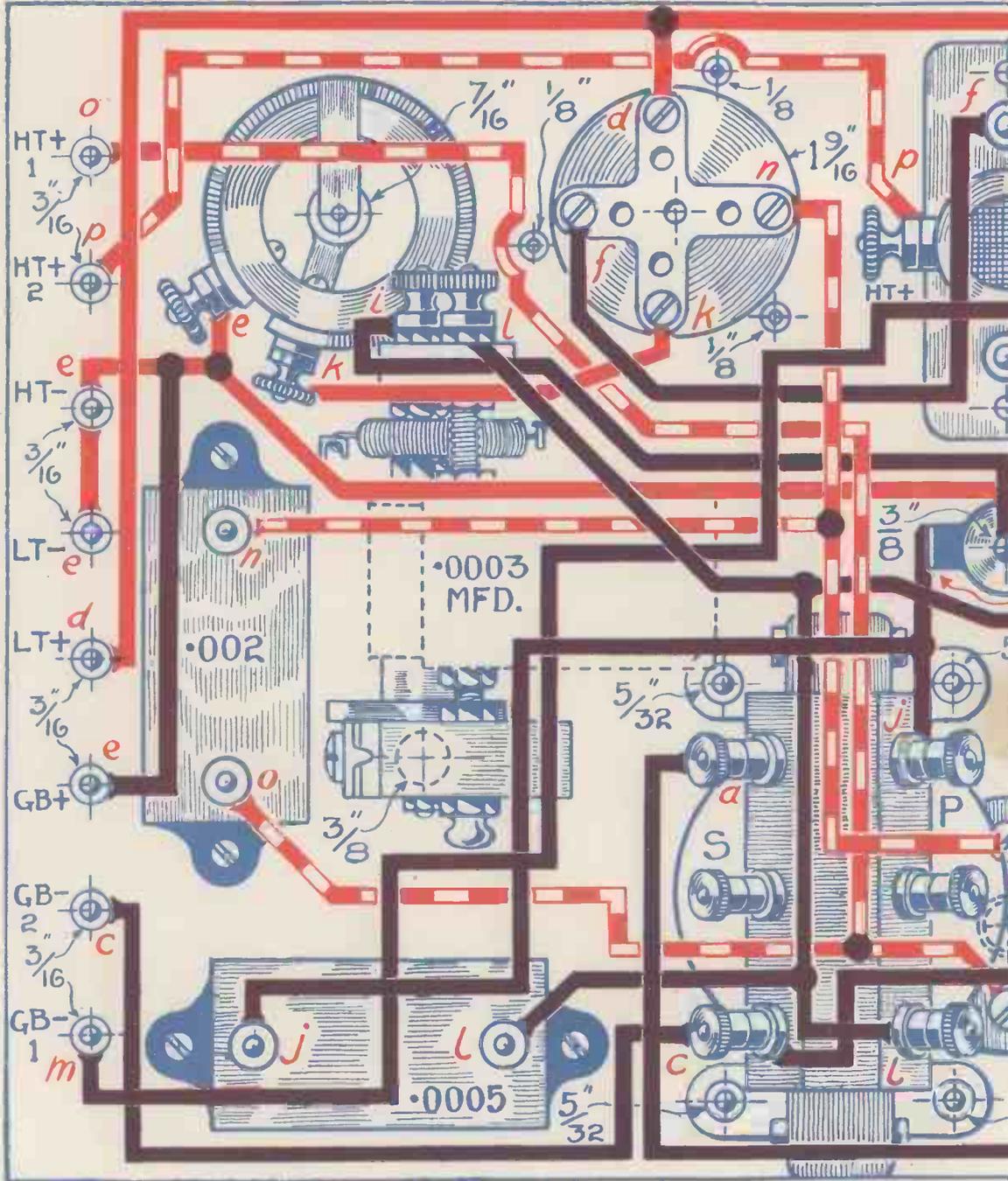
As is usual with reflex receivers, the first valve performs the dual function of simultaneously amplifying at high and low frequencies.

the reflexing transformer, and a considerable amount of experimenting is needed in this direction before a suitable instrument can be found for a particular reflex circuit.

THE TOWN-DWELL

Structograph Combined Full-size Layout,

For full particulars, see article in the

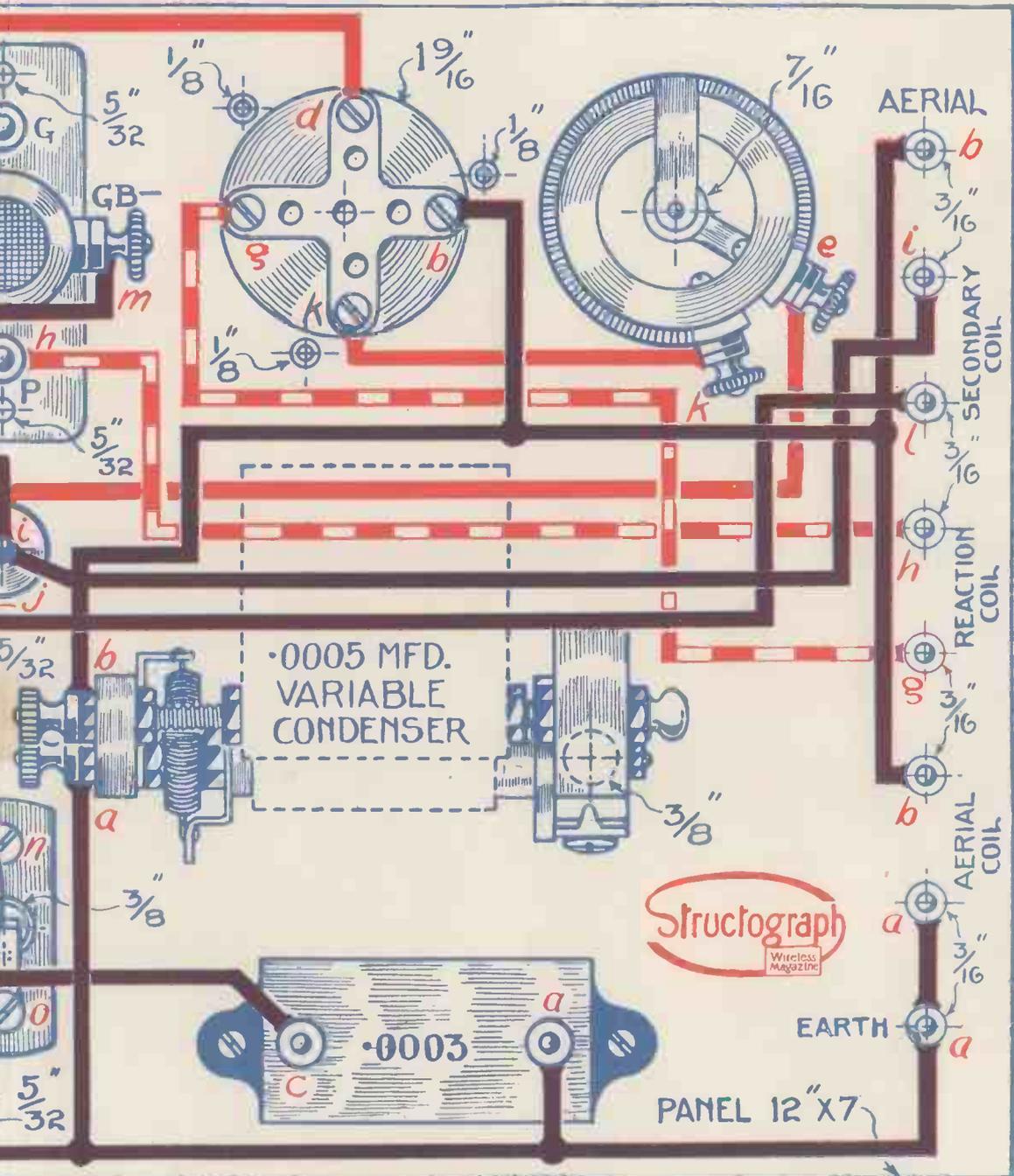


There is a choice of three ways of using the Structograph for wiring:—(1) Follow the wiring lines, *red* lines, indicating the filament lighting circuits; *red-and-white* lines, the H.T. or plate circuits; and *black* lines, the grid circuits. A *black circle* at the intersection of two wires indicates that the two are soldered together. At all other intersections there is no connection between the two wires. (2) You can ignore the lines of the wiring, if

ER'S REFLEX TWO

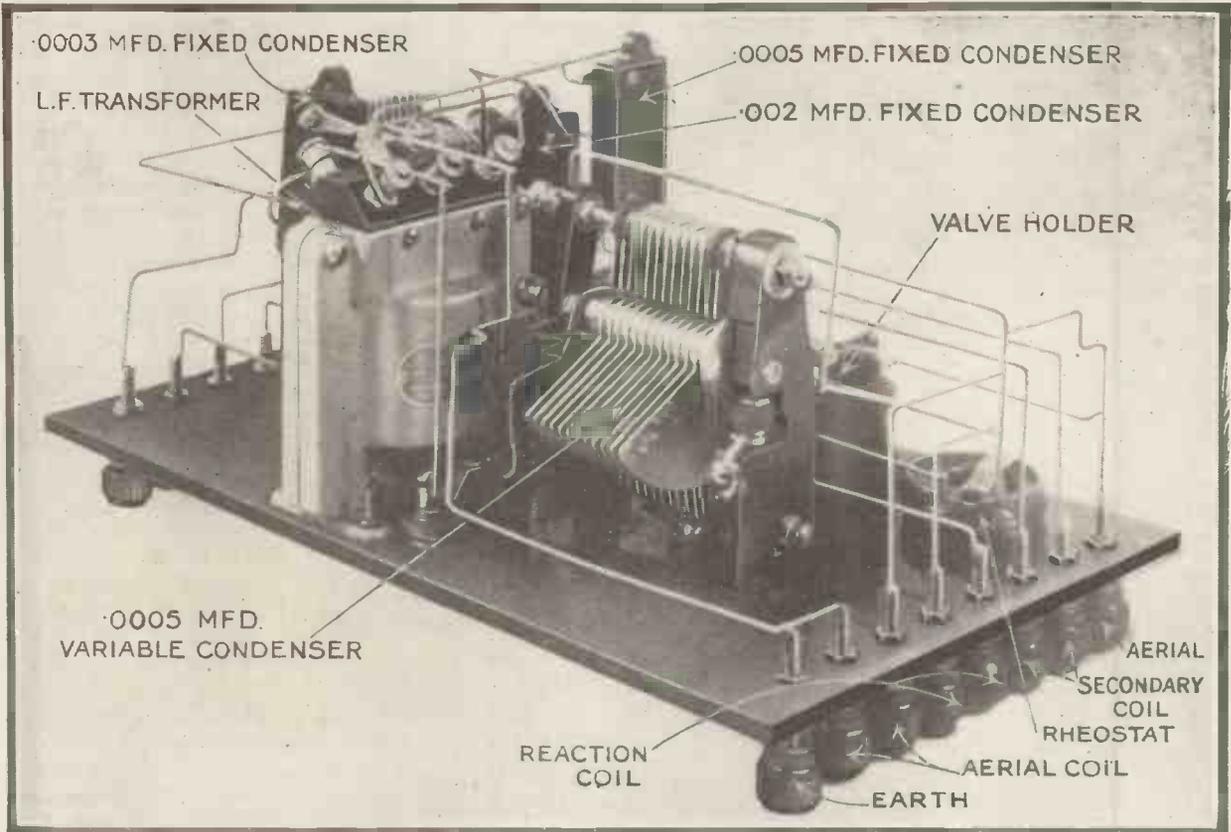
Wiring Diagram and Drilling Template.

the "Wireless Magazine" for July, 1926.



you like, and work entirely by means of the red letters shown at the various terminals. You just connect all like letters together with one wire or with as few wires as possible, thus all the a's together, all the b's together and so on, and you should do so in alphabetical order, the a's first. (3) The ideal method is to combine (1) and (2).

The Town-dweller's Reflex Two (Continued)



Photograph showing the Disposition of the Components of the Town-dweller's Reflex Two.

The positions of the components can be seen from the photographs and more especially from the Structograph, which also shows the positions and the sizes of the holes to be drilled.

Wiring Up

As soon as all the components have been assembled the wiring may be begun, and for this purpose the Structograph should be repeatedly consulted.

The wiring shown on the Structograph is carried out in three colours. Thus, the filament-lighting circuit is shown coloured red, the grid circuits black, and the plate circuits red-and-white.

In this manner the three circuits may be checked independently.

Furthermore, in order to assist the constructor in wiring up the receiver in the easiest fashion each terminal (including the terminals on the components) is marked with a small letter of the alphabet.

Some, for instance, are marked *a*, and all these so marked should be joined up *first* with one wire or as few wires as possible. Next, all those marked *b* are joined up in a similar fashion, then those marked *c*, and so on.

In order that the connections may be easily made to the coil holder the connections from the latter are brought to the centre six terminals mounted on the left-hand edge of the panel (looking at the front).

Internal connections from these terminals to the components on the panel can thus be made with the

thick wire used for connecting up (No. 16- or 18-gauge).

Aerial and Earth Terminals

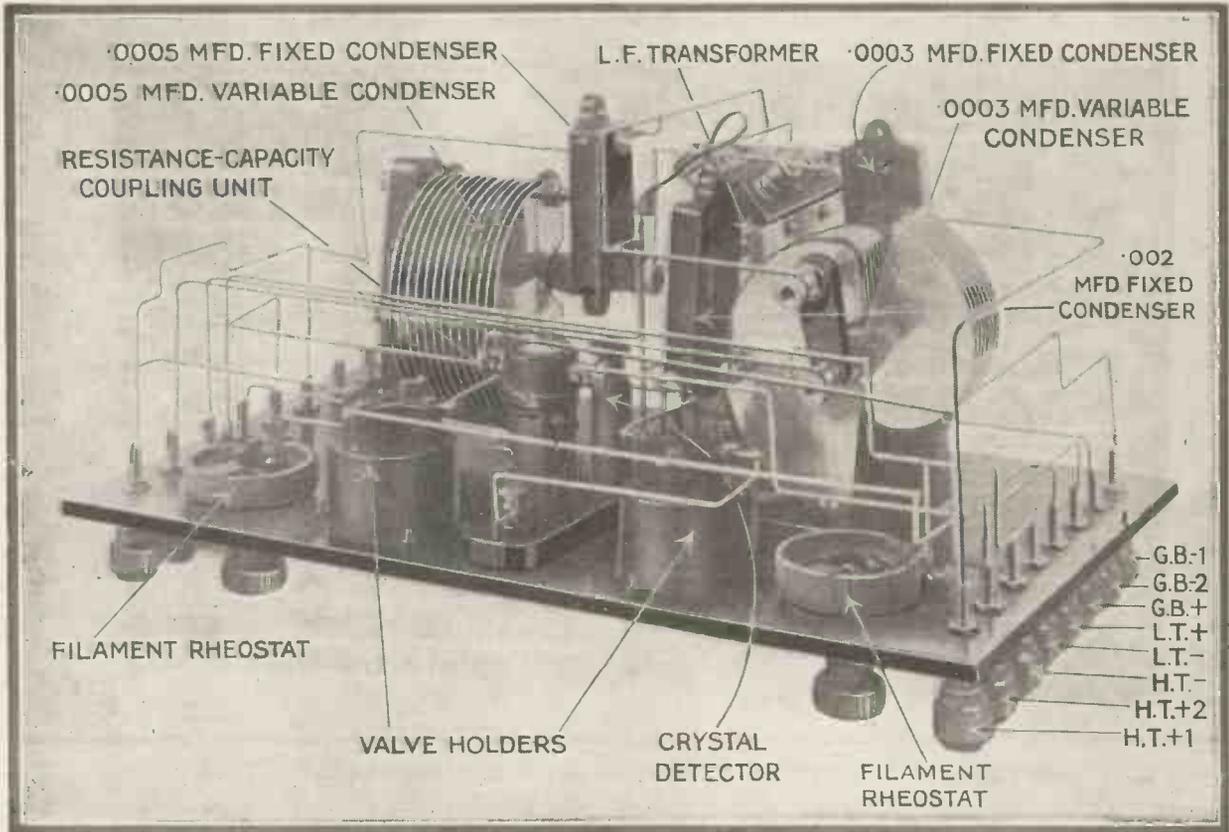
Of this row of terminals the top is connected to the aerial and the bottom to earth. The connections from the remaining six terminals to the three-coil holder are clearly marked on the Structograph.

On the right-hand edge of the panel are the remaining eight terminals, and these are connected to the H.T., L.T., and grid-bias batteries. In this respect it should be noted that there are two H.T. positive terminals and two grid-bias negative terminals supplying separate H.T. and grid bias to each of the two valves.

Now it only remains to place the set in the cabinet, a dimensioned



An Exceptionally Selective Two-valver



Another Photograph showing the Components of the Town-dweller's Reflex Two.

sketch of which is given for those who intend making the cabinet themselves (page 558).

Coil-holder Position

To the left-hand side of the cabinet the three-way coil holder is screwed and short pieces of flex connected to each of the three coil holders and to the respective terminals on the panel. The central socket of the three-coil holder is to receive the primary coil of the H.F. transformer, whilst into the two outside sockets the aerial and transformer secondary coils are inserted respectively.

The terminals of the centre socket are connected to the fourth and fifth terminals on the left-hand edge of the panel, counting from the top. The terminals of the secondary-coil socket

are connected to the second and third terminals, and the terminals of the aerial-coil socket are connected to the sixth and seventh terminals.

Valves recommended are an Osram DE5B followed by a DE5, two Ediswan PV8DE's, Mullard PM2's or Cossor W3's. Suitable sizes of coils for ordinary broadcast wavelengths are:—Aerial, No. 40; reaction (centre coil), No. 50 or 100; transformer secondary, No. 75.

The voltages of the H.T. and L.T. batteries required are, of course, dependent on the choice of valves. In the second valve socket a power valve should be inserted and a fairly high voltage applied to the plate, together with suitable grid bias. This will give plenty of volume.

For the first valve the H.T. and grid-bias voltages should be care-

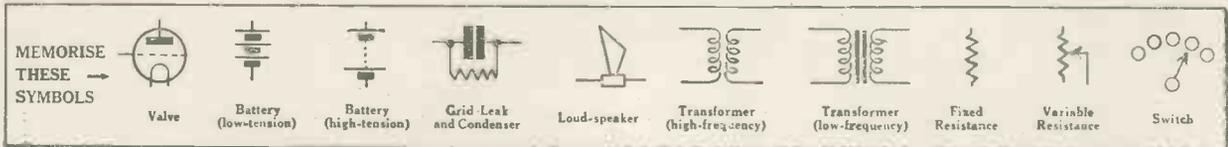
fully adjusted, the operator at the same time experimenting with the connections to the reflexing transformer.

Interference

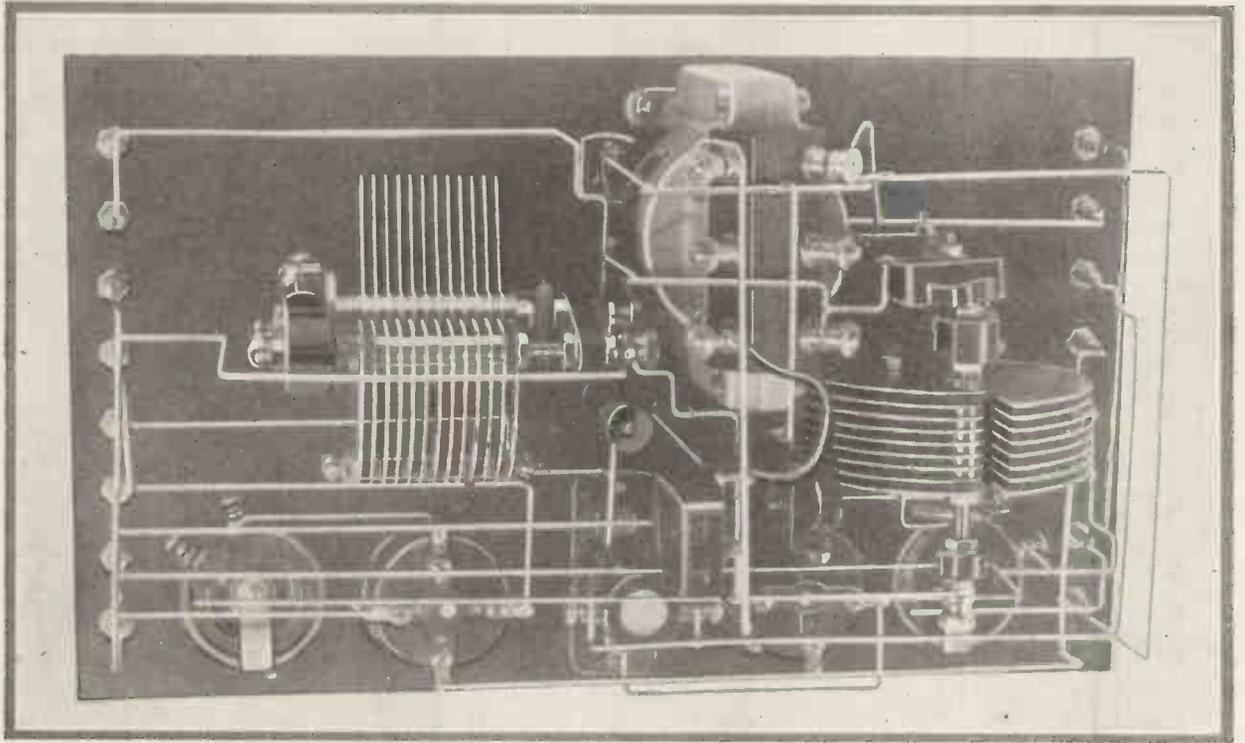
If interference from the local station is experienced, the coupling between the reaction and secondary coils should be loosened until the necessary degree of selectivity is obtained. When this coupling is altered the tuning of the set will need a slight readjustment and, of course, will be more critical.

The leads to the reaction coil should be so made that by increasing the coupling between the reaction and aerial coils the set starts to oscillate.

As already mentioned at the beginning of this article the volume



The Town-dweller's Reflex Two (Continued)

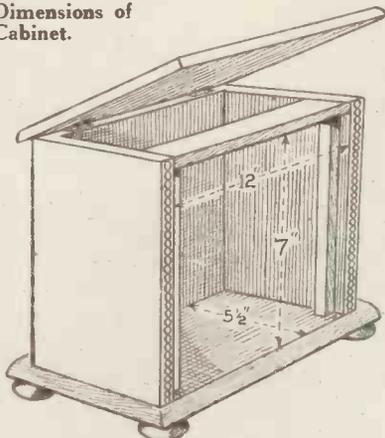


Photograph of the Town-dweller's Reflex Two showing Components on Back of Panel.

obtained from this receiver is exceptionally good for two valves and the quality is all that can be desired.

While testing the set we received London, Birmingham, Daventry, Radio-Paris and Bournemouth at

Dimensions of Cabinet.



good loud-speaker strength and, by reason of the variable coupling between reaction and secondary coils, Bournemouth could be easily separated from London at a distance of six miles from the latter station.

ON THE SHORT WAVES

LISTENERS who have any inclination to explore the ether below the 100-metre mark will find the present time an excellent opportunity for testing the capabilities of their sets in this direction. Apart from the numerous amateurs who are constantly "on the ether" on wavelengths ranging from 20 to 100 metres, there are several high-power commercial stations which work from time to time within the same limits.

In this country the Chelmsford station transmits both on 15 and 17 metres, using the call sign 2 BR, whilst Poldhu works on 25, 32, 60 and 94 metres under the call sign 2 YT. There is not much chance, however, of picking up short-wave directional transmissions unless one is situated somewhere within the area of the "beam."

Farther afield the German station at Nauen transmits on 13.5, 17, and

20 metres under the call sign P O F, on 25 metres under P O Y, and also on 28, 70 and 100 metres. Similarly the giant French station at Sainte Assize frequently intersperses its long-wave European and Transatlantic messages with short-wave transmissions on 25 and 42 metres under the call sign F W. B. A. R.

A CONTRIVANCE known as the "oyster coil" has been invented. Just the thing for bi-valve sets.

WHAT are weak signals? asks a correspondent. Those that a Scotsman usually gives when it is his turn to pay.

A PARSON says that wireless keeps men away from the drink. But judging from the number of pubs where wireless has been installed it does not keep them more than arm's length away.

The International Set Competition

We Give the British Set Builder a Great Chance!

ON page 431 of last month's issue of the WIRELESS MAGAZINE we announced that we should hold an Elimination Competition for the purpose of selecting twenty-five British amateur-built sets which will be sent across the Atlantic to compete with American and, possibly also European, home-built sets.

We now invite all intending competitors to send us a letter or post card, asking for an application form and a copy of the rules, which we shall forward to them in duplicate, one to be completed and returned to us and the other to be retained for reference.

Little Time to Spare

As, unfortunately, we are late in publishing this issue (due to the aftermath of the General Strike), there is very little time to spare, and we urge every reader who intends submitting a set to send to us immediately for an application form and copy of the rules.

It is impossible for anybody to compete unless he has first of all filled in the application form and returned it to us, as not until we have received the completed form shall we forward the necessary labels.

At the moment of writing we are not in a position to say definitely the last date for receiving application forms, but it is not likely to be later than July 14, and readers must be in readiness to send their sets to us immediately we send them the labels.

Closing Date

The closing date will be announced when we send the application form.

We cannot send labels with the application form as we cannot say definitely where the sets are to be sent until we have some idea of the number of sets we shall have to judge.

There is only one step at the moment to be taken by would-be competitors; just this—write to us immediately for an entrance form and copy of the rules.

Open for Public Inspection

One or two points we wish to emphasise. We hope to arrange for all the sets judged by us to be open for public inspection for a day or two, at the conclusion of which exhibition the twenty-five selected sets will be packed and sent (fully insured) to the United States. The other sets will be returned to their owners.

The WIRELESS MAGAZINE and its companion publication "Amateur Wireless" are responsible for the Elimination Competition only; the Radio Manufacturers' Show Association of New York is responsible for the organisation and judging of the International Competition in the United States of America.

No wireless manufacturer or salesman, no employée of any wireless manufacturer or salesman, and no other member of the wireless industry may compete; neither may any employée of the proprietors of the WIRELESS MAGAZINE and "Amateur Wireless."

Official Labels to Be Used

In sending sets to us use only the labels we provide. As we have said, these labels will be issued by us after we receive the completed entry form.

All sets must be sent carriage paid. The rules and instructions to be issued by us will give explicit information on packing and the best way to send the sets to London.

By the way, no crystal set is eligible. Why? Well, in America the crystal set is not much in use, and the valve set is the only one with which the American home-constructor would wish to compete.

Prizes You May Win

Every competitor whose set is selected to go to the U.S.A. will be awarded

A BRONZE MEDAL

by the WIRELESS MAGAZINE and "Amateur Wireless," in addition to any certificate presented by the R.M.S.A. of New York.

The WIRELESS MAGAZINE and "Amateur Wireless" will present

A SPECIALLY STRUCK GOLD MEDAL

to the winner of the International Prize, provided that his set went through our elimination competition and was forwarded by us to the States.

The International Prize will take the form of

A MEDAL or CUP

This competition is an event of very great importance. Never before, to the best of our belief, have British sets been sent to America to compete with amateur-built sets of that country. Awards will be valued very highly by those fortunate enough to win them. The British competitors will share among them three prizes awarded by the American organisers.

We hope there will be a great response to our invitation, and that readers who have made fine examples of the sets described and illustrated in the pages of the WIRELESS MAGAZINE will take a delight in entering them for this exhibition.

But let us make one point very clear: ANY set constructed by a British amateur is eligible, whether he found the design in our pages or anybody else's pages, or whether he conceived it himself. We want the best that the British amateur has built, and we invite him to send it to us.

So send us now a request for a copy of the rules and entry form.

Can Games Be Taught by Wireless?



F. Gordon Lowe
in play.

In these pages four players, eminent for their prowess in their respective games, answer the question for "Wireless Magazine" readers, and suggest the lines on which broadcast games lessons could be given.

instructed where a book or article will only reach comparatively few.

The greatest attraction is that the vast audience is able, through wireless, to get in intimate touch with some well-known player or authority on the game. People will be far more likely to pay attention to his spoken word than if his views were merely expressed in cold print.

Such talks must be delivered attractively, clearly and with humour, otherwise they will not sink in. There could be no better way of popularising the game than by wireless, and many a youngster—the type of recruit to be encouraged in England just now—may be won over by some clever speaker.

Already we have heard the great Suzanne herself, but she has only given us a few short remarks. The words of Mlle. Lenglen would be of untold value to all lawn-tennis players if only she could be induced to tell the story of her rise to fame, and to explain the use of her many strokes and clever tactics.

Other famous players of the fair sex who have lectured by wireless are Mrs. Godfree, formerly Miss McKane, and youthful Miss Betty Nuthall, who told us all about her training and the interest which our L. T. A. had shown in her prowess.

Roper Barratt, always a humorist, gave us a prophecy about future events just before the last Wimbledon; the views of this famous veteran, noted for his courtcraft, must always be interesting and instructive.

There should be several intimate talks before the event about the great players who are taking part at Wimbledon. These would act as an introductory guide for the general public, especially to those who do not play lawn tennis but turn up year after year in their numbers to watch. It would be of real assistance to many to know a little more

about the players themselves and their achievements. Information such as this would help the spectators to enjoy the actual matches more and to understand the methods of the players better.

Useful Tips

Beamish, the well known professional, who teaches lawn tennis by post as well as on the court, has spoken at Savoy Hill on several occasions. No one has made such a scientific study of teaching lawn tennis as this International or is better able to pass on his knowledge to others. Those who hear him should be able to pick up many useful tips likely to be of future value to them.

Directly the lecturer has finished the listeners-in should at once make notes about any points which have most impressed them. The following day they must put these into practice on the court. A series of instructional lectures, given throughout the season on each particular stroke, should be an excellent way of teaching lawn tennis to all beginners.

Each of these talks should be given by a man who is a specialist in the particular stroke in question. In addition the audience would like to know how and when he finds it most useful during his matches.

Players Who Could Help

I am sure everyone would want to hear what Miss Joan Fry, Turnbull, Wheatley, Kingsley, and last, but not least, Austin, have to say on the subject. Then again some of the older players, such as Ritchie, Dixon, Gore and Commander Hillyard, with years of experience behind them, could tell the public many useful things about the game.

There is a novel way in which tennis could be taught by wireless, and I feel sure it would prove successful. Every listener-in could have

.....
CAN TENNIS
BE TAUGHT BY
WIRELESS?
.....

By
F. GORDON LOWE

THERE is little doubt that lawn tennis can, to a certain extent, be taught by wireless. Primarily the best place to learn is on the court or by watching first-class players; after that, however, there can be no better medium than wireless.

Beginners and others should be able to learn much by an intelligent study of books and articles on the game, provided they are written by men who know their subject thoroughly. Similarly a wireless talk should prove of even greater benefit to countless lawn-tennis players.

Illustrations

In such talks there can be no photographs (as there are in magazine articles) or such demonstration of strokes as the lawn-tennis lecturer can give on the platform, but against this every player in England can be

without proper advice it is not to be expected that one can make them with the requisite accuracy.

With bowling it is just the same. The different methods of holding the ball, the desirability of maintaining a good length and what length means, the value of variation in pace, how to impart spin to the ball, these and all the other essentials of the art of bowling could be discussed with distinct advantage.

Yes, wireless, I am convinced, could be a very potent factor in the education of the cricketer, and in the improvement of play generally.

**CAN GOLF
BE TAUGHT BY
WIRELESS?**

By
A. C. CROOME

WHEN the Editor asked me to discuss the question "Can Golf be Taught by Wireless?" my first impulse was to tell him that the answer is in the negative, and leave it at that.

But reflection led me to the conclusion that there are one or two things which may profitably be said in this place.

First and foremost I set the obvious truth that golf is not a science but a practical art. Knowledge is power in the arts as it is in the sciences. But the knowledge which enables the artist to produce results is mainly self-acquired; the modicum which he derives from an outside source he gets from example, not by precept.

Consequently the limits within which one man may teach another to hit golf-balls, paint pictures, or play fiddles, are strictly defined.

My second postulate is this: The object of education is to teach the student how to learn. The number of books which have been written about golf is legion. In reading them one sometimes comes across a phrase which seems to flood the mind with new illumination or to rekindle an ancient light.

What was Wrong

As the reader sits in his arm-chair he feels a most gratifying conviction that he has discovered "what he has been doing wrong," a phrase familiar

to all golfers, but especially to professionals and caddies.

It may be that when on the morrow's morn he goes out to play his game on the links the effect of the information digested overnight is not immediately apparent. But if he possesses the virtue of perseverance it may also be that his handicap will gradually, but surely, be reduced in consequence of a leading given to his mind by printed words.

Manifestly that leading will be no more and no less valuable if it be imparted by ear-phones and not through eye-glasses. Therefore the golfer anxious to improve his play may just as well listen to a talk on golf over the wireless as read a didactic book or article on the subject.

I write these lines a few days before the tournament for the amateur championship is due to begin. And for the next month or

so there will be opportunities to watch the world's most famous players in action.

Quite a large number of people attend championships and other important competitions with a view to learning something which will reduce the number of their own fozzles and increase the power and accuracy of their good strokes.

Not one in a hundred of these well-intentioned persons sets about his business in the proper way. A lecture by a competent authority, if broadcast, would surely lessen the waste of well-meaning effort, and incidentally might make easier the task of the stewards deputed to shepherd the prominent players round the course.

The average spectator tries to get as near as possible to the man whom he has elected to follow, and almost invariably watches the ball instead of the man. At the finish of the round his mind retains no clear impressions calculated to enable him

to go and do likewise within the limits of his physical capacity.

If you want to see how Mr. R. T. Jones hits, and why he is, as many good judges hold, the best golfer in the world to-day, stand fifty or a hundred yards away from him, watch the poise of his body and the sweep of his club.

Never mind about the ball. You will be able to pick it up later if you leisurely turn your eyes in the direction of the hole.

I imagine myself to be broadcasting a message to the great army of slicers. I should ask them to perform an act of self-examination, and determine each for himself how often in the course of a round he finds himself, after he has struck a full shot, insecurely poised on his right leg, with the left waving frantically in the air.

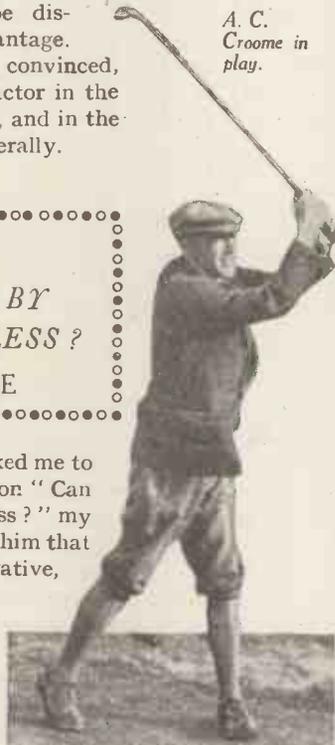
I should then bid him watch Bobby Jones, and note how his left leg and hip are braced against the descending club and how his right knee comes forward with it during and after the impact of the head upon the ball.

Right Intention

By drawing their attention to this and other points of method, all of which Mr. Jones exemplifies as well as any other, I should expect to implant in their minds the sentiment of the right intention, which is for the golfer as for everyone else the basis of right action.

The building of the superstructure on the proper basis is the business of the pupil, not of the teacher.

In conclusion I remark that not all the owners of wireless sets are interested in golf. There is a distinct possibility that such inveterate



A. C. Croome in play.

OUR CONTRIBUTORS

F. GORDON LOWE last year represented England against Poland and won the Beaulieu, Carlton, and Menton tournaments.

ANDREW SANDHAM, the All-England and Surrey cricketer, has many times partnered Jack Hobbs in long and valuable first-wicket stands.

A. C. CROOME is well-known as the golfing correspondent of the "Morning Post."

G. T. BURROWS, bowls correspondent of the "Daily Telegraph," has won many championships.

cricketers as Mr. A. J. Webbe and Mr. P. F. Warner would regard as sheer waste of time and energy the broadcasting of a discourse, however illuminating, about this infernal Scotch croquet!

An Hour with the Roosters

Our Special Commissioner Interviews a Well-known Wireless Concert Party

I MADE the acquaintance of each one of them in turn; it was my luck to catch them together in the artists' waiting-room at Savoy Hill before their number was called.

We exchanged the inevitable "gaspers."

"I," said Arthur Mackness, "do not smoke; I sing."

Somebody made an audible observation to the effect that the general public had not yet noticed it and he heard the remark. A mock fight ensued, but with tact the combatants were separated and peace for the rest of the evening was assured.

Secret of Success

Here you have the secret of the Roosters' success; they pull together; they believe in team work. Possessed of a keen sense of humour, no amount of chaff, leg-pulling or good-natured banter upsets their equilibrium. Should one of the troupe in the course of a public performance—broadcast or otherwise—take a rise out of a colleague, the victim of the joke enjoys the hit. He does not complain to his union; neither does he strike.

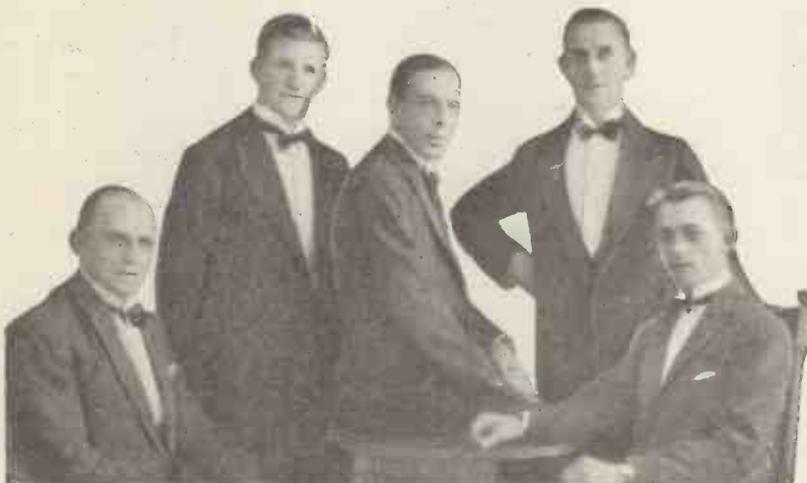
The Roosters is one of the only concert parties composed solely of the male element; the risk of petty jealousies is reduced by the simple precaution of admitting no hens to the chicken coop. But they are not misogynists!

Percy Merriman is the elocutionist of the party; as a rule he portrays old men, but can be considered the *deus ex machina* of the little band.

To him, therefore, I turned for information.

"When, how and where were the Roosters born?" I inquired.

"On March 30, 1917, at Summerhill Camp, Salonica. A Captain



Roose was the camp commandant; hence the title—Roosters.

"Our name," added a voice, "does not allude to members of the feathered tribe." But the chief quelled him with a look.

"From the banks of the Jordan to those of the Thames is a far cry," he began. "When we first appeared at the London studio we were still fresh from our experiences as an army concert party in Mesopotamia and Egypt."

"You started," I interrupted, "at Salonica?"

"Yes. The Commandant, in order to break the soulless monotony of life in a rest camp, looked around for the elements of a concert party. He found them in every branch of the service; most of the men discovered were mere amateurs with a modicum of talent and much good will but, with a small leavening of semi-professionals, we were able to form a troupe."

Now, let me for one moment digress. Apart from Percy Merriman, there were present, on that evening, Arthur Mackness (tenor), Septimus Hunt (baritone), William Mack (who styles himself an impressionist), Charles Harrison (the funny man of the combination) and George Western (who, besides holding himself responsible for most of the melodious musical settings and interludes, when not sitting at the piano, successfully impersonates female

characters). These were all original members of the first Salonica Pierrot Party.

I observed that I had seldom met a combination which pulled so well together.

"Merely due," was the reply, "to the lengthy period during which we have worked with one another; our joint experiences—pleasant and

otherwise—are the basis of the comradeship and harmony which always prevails."

"But how did you start?"

"Under difficulties, as you may well imagine. A few derelicts in the shape of a ragged wardrobe abandoned, at some previous date, by a touring regimental party, provided us with somewhat primitive costumes for the actors depicting male parts; for the principal girls' dresses as well as for the beauty chorus, Paris creations had to be designed. The material used was mostly curtaining and dyed mosquito netting. The question of the proverbial chemical-blond tresses—remember that this was before the days of the Eton crop—was solved by the illicit docking of mules' tails. By a patent process which I shall never reveal, we worked them up into the necessary curls. Most of the difficulties having been overcome—at least to the satisfaction of a not too critical audience—the entertainments were soon in full swing, performances being given several times weekly, and visits made—by request, mark you—to outlying camps and hospitals so far distant as Kalamaria."

"Did you remain at Salonica?" I asked.

Desert Tour

"No. When the division left for Egypt the Roosters were booked for a desert tour in the wilderness of

Sinai. For this purpose, a portable stage was slung together; scenic effects were neither by Harker nor by Hawes Craven, the back-cloth and wings being painted by the aid of a common shaving-brush. Our orchestra consisted of George Western and a second-hand—very second-hand—piano, purchased at Cairo, which was smuggled up the line in the safe disguise of a case of bully beef. A few hangings, scrounged somewhere from somebody, and the very elaborate wardrobe already described constituted the Theatre Royal, Sinai."

"And your success?"

Heat!

"Prodigious, 'although I sez it as shouldn't.' Well, the month of September in that part of the globe is usually accompanied by terrific heat. We were not spared in this respect; we encountered sweltering temperatures. As lights required for evening entertainments up the line would have brought on the enemy's gun fire, most of the performances were given as matinées. Egypt, as you probably know, is noted for its large population of flies; these must have found an agreeable change in their daily diet, as our grease paint attracted them for miles around. A few thousand of every variety buzzing around one's head was all in the day's work; a score or more swallowed in the course of a performance was not a fact worth writing home about but, believe me, to linger on a top-note was to secure a mouthful!

"When the great push came along in Palestine the Roosters were temporarily disbanded and sent back to their respective units, but we were able to meet again when guarding the dumps at Shellal. During this period we were given ample opportunity to revise our programmes and rehearse new sketches. We were then called up to entertain the troops on their entry into Jerusalem.

"The Turkish Municipal Theatre was handed over to us. Apparently when in the possession of its original owners it had never been cleaned, after which it had been used, during the war, as a general garbage dump. It was cleared, fumigated, scoured, liberally disinfected, and on New Year's Eve, 1918, we opened it as The Palestine Pavilion. The end of the same month saw the production of the pantomime *Cinderella*, since revived in the 2 L O studio."

"Presumably the first pantomime ever performed in the Holy Land?"

"Without any doubt whatever. On March 11, 1918, we were again touring, this time in the neighbourhood of Oifa Waddy, situated some miles across the river in the dreaded Jordan valley. This district lies at more than 1,200 ft. below sea-level, and, with a shade temperature of well over 130 degrees, it is not surprising that considerable sickness broke out."

"How did it affect the box office?"

"We gave several performances at Jericho, but finally malaria knocked out five of our party, with the result that the show was compelled to close down. We disposed of the casualties and the remaining members of the troupe were sent to Alexandria for a well-earned rest, following which we opened the Piccadilly Theatre in September."

"How soon afterwards did you return to England?"

"When the Armistice was declared in November, 1918, our services were retained at Alexandria to beguile the troops wearily waiting for demobilisation.

"We actually left Egypt for 'Blighty' in February, 1919."

"But the Roosters were not disbanded?"

"As a matter of fact, although some of the performers were scattered over the British Isles, several of us met at regular intervals with a view to maintaining our long associations, and it was at one of these informal dinners that a decision was taken to resuscitate the troupe for the purpose of attending the reunions of ex-service men. On January 9, 1920, again as the Roosters, we made our West-End debut with a performance at the Æolian Hall, London, and from that date we filled many engagements in the United Kingdom. Most of these shows were replicas—although perhaps a trifle more refined—of the entertainments we had given to the troops in the Near East."

At this moment the Roosters were called to the studio.

Their First Broadcast

It was a happy thought on the part of the B.B.C. authorities to engage them for their first broadcast in October, 1922. Readers may remember that on that occasion they depicted *Army Reminiscences*, and brought back to the memories of many thousands of listeners camp scenes, fatigues, drills and those interminable, wearisome and mono-

tonous route marches with which all army training is associated.

In these very human sketches, Arthur Mackness has always filled the part of an officer, Septimus Hunt that of the bullying sergeant-major, and Percy Merriman the rôle of the proverbial, persistent grouser.

But I had not secured all the information I required for the WIRELESS MAGAZINE, and as soon as their turn was over I waylaid them at the door of the studio.

George Western, the accompanist—he is more than that, as I have already written—appears to have specialised as a coy maiden, and was known right up the line as Kitty, the charming flapper. When I reminded him of his successes in that direction he blushed with pride.

Beauty Chorus

"When in Egypt," he told me, "our beauty chorus attracted quite a considerable amount of attention, and one of our main difficulties was to keep the boys and *gyppies* from our canvas dressing rooms. When we left at night, after the show, in uniform, as no female members of the party appeared, much curiosity was aroused, and I believe, on more than one occasion, rumours were spread that the girls had been murdered and that their corpses had been buried in the sand."

From the Roosters' first broadcast they derived great publicity, and from that date have performed not only at most of the B.B.C. studios but also in theatres, music and concert halls. Requests for a revival of their army sketches and pantomime have been frequent. On a recent occasion their nigger-minstrel show was repeated twice in the course of ten days. On the following morning a registered parcel was addressed to Percy Merriman. It contained a few stale chestnuts with the inscription: R.I.P.!

But the army reminiscences never die; they do not even fade away, as is witnessed by the many letters they receive from their unseen audience. They still give joy to most of the little houses with the funny crooked aerials one sees in the suburbs of the great cities.

And the Roosters do not crow, but they boast of having performed before all the crowned heads of Europe—*ever heard of them!*

This, I am convinced is a statement which is not open to contradiction.

found that these loud-speakers prevent scores of enquiries that previously delayed and hindered the station officials.

In Great Britain the usefulness of wireless to the railways has been tested in a manner that many enthusiasts describe as half-hearted. Beyond an occasional experiment in communication with moving trains, little has been done until the recent introduction at St. Pancras station of a loud-speaker to announce the trains' times, as on the Paris-Orleans line.

Short Journeys

There is some little excuse, perhaps, for the absence of wireless train concerts on British railways, for our travelling is not as a rule sufficiently protracted to warrant the innovation.

In Canada and America days of continuous riding make some diversion essential. Moreover, the frequency of our tunnels rather spoils reception, whereas tunnels are rare in Canada and U.S.A.

Yet the possibilities of using wireless advantageously are greater in our own country than in any other part of the world. At no time or place are our railway trains beyond easy reach of at least one broadcasting station. The smallness and compactness of our country is all in favour of useful wireless results.

Not a day passes without thousands of circulars being sent out from railway headquarters to as many different stations and junctions. These circulars are of no permanent value, but merely distribute railway news from day to day. They are just the equivalent of a newspaper, and with the passing of a few hours their usefulness is gone for ever.

Scores of clerks are kept at work preparing, addressing and despatching these circulars. Harassed guards and porters look after them on the trains as they are carried for distribution. Yet invariably some few

amongst the thousands get lost, and so someone goes uninformed after all.

Saving Expense

If such "news" were broadcast by wireless at fixed hours and picked up by the various stations and depôts, the cost of installing railway receiving sets would be saved over and over again in a few years!

Similarly the news of special trains, of alterations in time tables, of engine breakdowns, and of accidents might often be usefully and quickly spread by wireless rather than by the telegraph needle.

One of the most useful amongst modern railway methods is that of train control, whereby an official seated in some central office orders the movements of all sorts of trains for scores of miles round. He is in charge of signalmen, enginemen, guards and stationmasters—and his presence saves many a muddle and probably many an accident, besides enabling more trains to be on the

casting instructions. Were it possible for the controller to speak simultaneously to the whole of his subordinates by means of wireless, he would find the advantage very great indeed.

Wireless may well revolutionise present methods of railway working. Should it ever become practicable to install a receiving set on the footplate of each express locomotive, the driver would receive continual information about the trains before and behind him, and about the condition of the lines ahead, and would thus become independent of the present-day semaphore signals!

S. T. J.

RIPPLES

A PARADE ground broadcast during recruits' drill has been proposed. The only drawback is that people who did not hear the announcer might mistake the sergeant-major's remarks for an Esperanto lesson and put down the ear-phones.

WIRELESS accessories on the easy payment plan are advertised in a Scottish newspaper. A sheer waste of space! As if payments could ever be easy in Scotland.

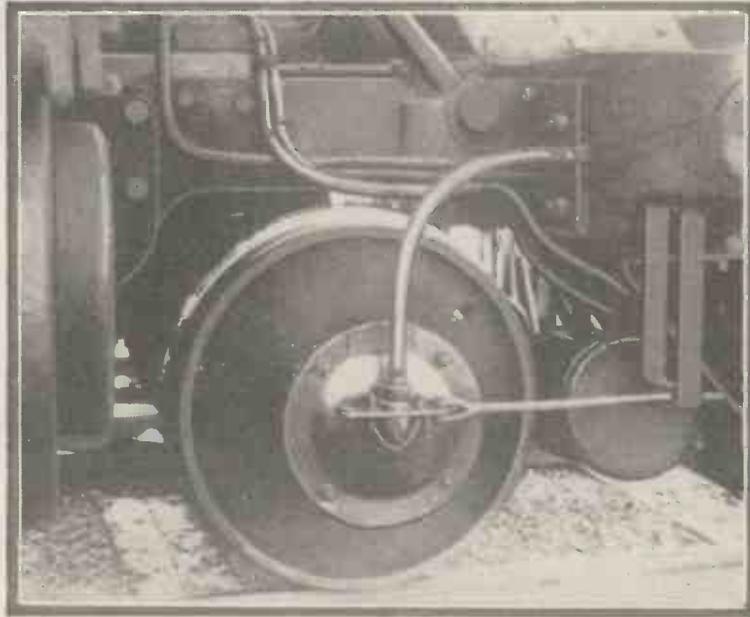
IN parts of Switzerland, by a communal-aerial system, there are three listening sets to every one aerial. That's nothing. In some parts of Scotland there are three sets to every one licence.

In a German laundry the operatives have jazz pro-

grammes by wireless while they work. Perhaps this is to help them in putting the syncopated edges on the collars.

THE proposal to broadcast novels certainly is a novel proposal, if nothing else.

It is said that the Bolsheviks are using wireless for propaganda purposes. Very improganda purposes, we consider.



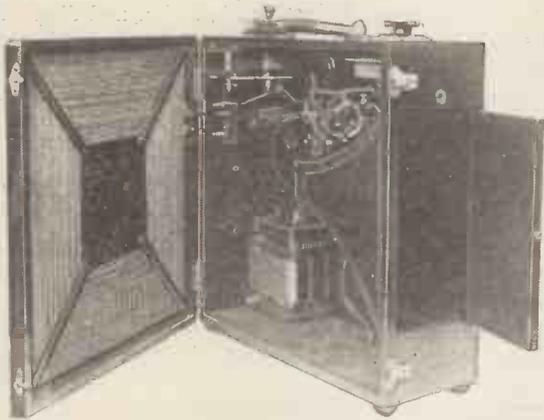
Above is shown a speed-control device on the driving wheel of a locomotive; it is operated by wireless.

lines and more speed to be made without sacrifice of safety.

At present, the train controller needs a private telephone to each station, junction or signal-box within his area. To the man in charge he gives his instructions and from each he receives reports of passing trains.

Various devices are used whereby the controller can speak to several stations or boxes at the same time, which is just a clumsy way of broad-

Some Portable Sets for Summer Use



Ingenious construction has resulted in the entirely self-contained three-valve portable set shown. The touch of a switch brings in the local station, but if distant stations are required an external aerial and earth can be used.

Sockets are also provided for phones and high-wave-length coils.

The manufacturers are Neutron, Ltd., of Sentinel House, Kingsway, W.C.



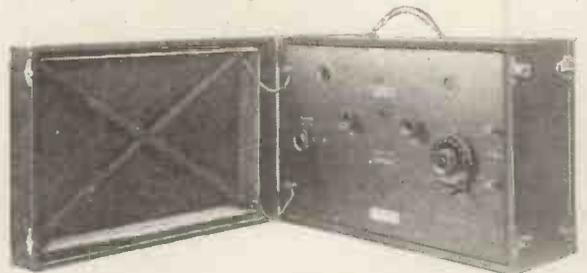
Compactness and light weight have been achieved in this two-valve portable set by using a separate case for the batteries, aerial, etc.

The manufacturer is P. Sherman, of 12, River Street, E.C.1.

Except for the loud-speaker, this portable set is self-contained; it is complete with batteries, a set of seven coils and a pair of phones. Although the circuit used is a straight one with detector and two L.F. stages, the volume obtained when used with the frame aerial will enable a large loud-speaker to be worked on the local station.

As provision is made for using an outside aerial, it is possible, with the coils supplied, to cover most of the main B.B.C. and continental stations.

The manufacturers are C. T. Colbery & Co., Ltd., of 8, St. James Walk, Clerkenwell Green, E.C.1.





This handsome hide-cased set comprises a four-valve circuit with built-in loud-speaker and all accessories. It is a truly portable set, its weight being only 21 lb.

The usual 30-mile loud-speaker range from a main B.B.C. station should be obtained, this distance being greatly exceeded in the case of Daventry.

Once tuned to any given station the set can be started or stopped by a simple control switch.

The manufacturers are Gilfillan Bros., of 63, High Holborn, W.C.

Utilising a single-valve reflex circuit, this Climax portable set has an external frame aerial which is detachable from the set and folds up to a convenient size.

There is room inside the instrument for the necessary batteries and for the phones.

Although primarily intended for phone reception, this set will work a loud-speaker at close range to a B.B.C. main station. Up to 50 miles, clear phone reception is possible from any main station.

Provision is made for the use of an external aerial and earth.

The manufacturers are Climax Radio Electric, Ltd., of Quill Works, Putney, S.W.15.



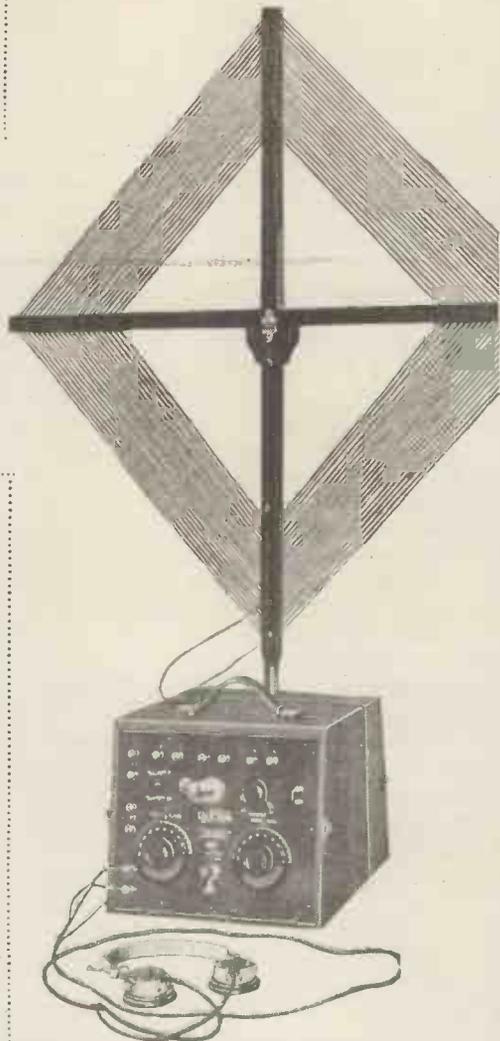
Enclosed in a handsome dark-polished oak cabinet, this four-valve portable set includes a built-in loud-speaker and all accessories. Good loud-speaker results can be obtained at 20 to 30 miles from B.B.C. main stations, and at 100 to 200 miles from Daventry.

Under suitable conditions, with an ordinary aerial and earth, all British and continental stations can be received on the loud-speaker.

The manufacturers of this set are the Halcyon Wireless Supply Company, of 110, Knightsbridge, S.W.1.

Limits of space prevent us from giving more than the bare details of these portable sets. In all cases, however, the manufacturers will be only too glad to provide readers with particulars of any sets in which they are especially interested.

For this purpose the manufacturer's name and address is given in each case. Enquiries mentioning the WIRELESS MAGAZINE will receive prompt replies from the manufacturers concerned.



Sandy McNab's Wireless Picnic!

Another Story by RICHARD CAROL

THE announcer chiel was maist emphatic about it. For twa nichts he had stated that an aunty-cyclone was hoverin' roon' the British Isles an', if wet weather didna come up frae the Atlantic, we wad a' participate in vera fine weather for mebbe a week.

Sae I gaed along to Angus McCaffy an' speired him hoo his rheumatism was an' he tellt me they were jist middlin'. Sic evidence I decided was overwhelmin'ly conveincin'. Ye canna be ower carefu' when ye're arrangin' a wireless picnic on a lavish scale.

Ay, that's what I was daein'. I had asked about a dizzen folk to come to a wireless picnic under the ostriches (whatever that means) o' Sandy McNab, general proveesion merchant, post-maister an' wireless expert o' Auchterauchty, the date to be settled subsequently.

It was to be a Dutch picnic, which seegnifies that each o' those invited maun bring something to eat, which meant that business wad be guid for me on the day appinted. Wi' a generous gesture I had offerd to look aifter the wireless pairt o' the entertainment in its entirety.

Weel, the dizzen approx met at the Hielan' Laddie. The day omened benignantly an' we proceeded along the road towards Glentoddy wi' a' oor appurtenances—food assorted, drink ditto, an' me pushin' a wee barrow on which reposed ma magneeficent twa-valve set, lood-speaker, accumulators, frame-aerial, an' a'. Och the excitement.

Angus keppit speirin' if the machine wad really wark wi'oot a pole an' line, an' Kirsty McKay an' Miss McCosh keppit keekin' in each ither's pokes to see what they had brocht to eat.

Finally, I led the eager pairty to the spot I had chosen. It was in the domains o' Tammis McPherson, an' jist about fifty yards frae the fairm-hoose. It was a guid place, it bein' near the fairm whaur we cud get milk for the refreshments, alas.

Weel, the congregation had a' sat doon an' aifter a short exposition by masel on the wunners o' wireless I proceeded to arrange the set an'

mak' the necessary connections. It was noo time for the mornin' program. I started tunin' in whiles the congregation regarded me wi' a maist satisfactory interest.

I turned an' I touched. I twiddled an' I poked. Then I attached the lood-speaker. Hooever that didna mak' muckle defference.

"Are they broadcastin' the hush o' the woods?" says Mistress Andrews.

I was glad to note that there was nae trace o' sarcastic in her tones.

Jist then I stopped an' they a' cocked up their ears. A wee bittie faint it was, but there was nae doot about it bein' music.

"The Vulgar Boatmen" I remarks wi' a fine feelin' o' superiority.

"Ay, it is that," says Kirsty wi' a wise nod, an' she no' kennin' the defference atween "Low an' Grim" an' "The Deid Mairchin' Soul."

"Wunnerfu'," murmurs Miss McCosh, thochtfully suckin' an orange.

"It must shairly be an extrornar guid yin to get thae results wi' only a wee bit contraption like yon to catch the waves in, Meester McNab," says Mistress Andrews, keekin' again into Kirsty's poke o' edibles.

"Na, na," I says easily, "It's jist the usual set I mak' for ma customers. Noo haud on a meenit," I adds as the 'Vulgar Boatmen' stopped, "an' I'll see if I can dae something even better for ye. I dinna ken if I can get foreign stations under such *deeficult* conditions, but—"

I twiddled about. Ma conscience, ma conscience, I cud hardly believe ma ears—a Spanish dance.

"Jist think o' it," I cries wi' exultation, "ye're listenin' to Madrid, that's in Spain. Dae yer hear the castin' nets. Mighty me, listen, folk, listen. It's amazin'. Hear it, the bull, as clear as clear."

Och, I was that agitated at ma success. Unfortunately, hooever, the bull hissel maist thochtlessly pit his heid ower the wa'.

Miss McCosh gied ae screech an' fainted awa' an' it took hauf a bottle o' kola to revive her. But wi' characteristic composure I merely remarked on the extrornar *coincidence*.

At this point I announced that we would participate in the joys afforded by the consumption o' the eatables an' drinkables an' departed to the fairm-hoose to purchase the milk, whiles the ither busied theirsels spreadin' oot the array an' bilin' the kettle, kindly lent by Mistress McNab, wife o' Sandy McNab, general proveesion merchant, post-maister an' wireless expert o' Auchterauchty.

The meal was a great success, though I maun admit that I wad hae preferred a wee bit mair oreiginality in the choice o' proveesions: I get enough o' ma ain cheap lines at hame to appreciate them viva voce (that's in the open air).

Hooever the conteenuation o' the music an' the obvious appreciation o' the assembled multitude brichtened ma appetite. Yin or twa asked vera intelligent questions about the warkin' o' the instrument, its cost an' sic like an' I had an idea that ma unselfish action in arrangin' the picnic micht hae its ain reward.

About twa o'clock the music ceased. I turned off the wireless an' delighted the noo contented audience wi' a short recital o' the history o' wireless an' the simplicity o' its warkin'.

Mistress Andrews, wha's a widow in influent circumstances, keppit lookin' at me thochtful like a' the time an' I took the opportunity to hurl ma barrow hame alongside o' her.

As we were passin' the Hielan' Laddie, she saw the licht.

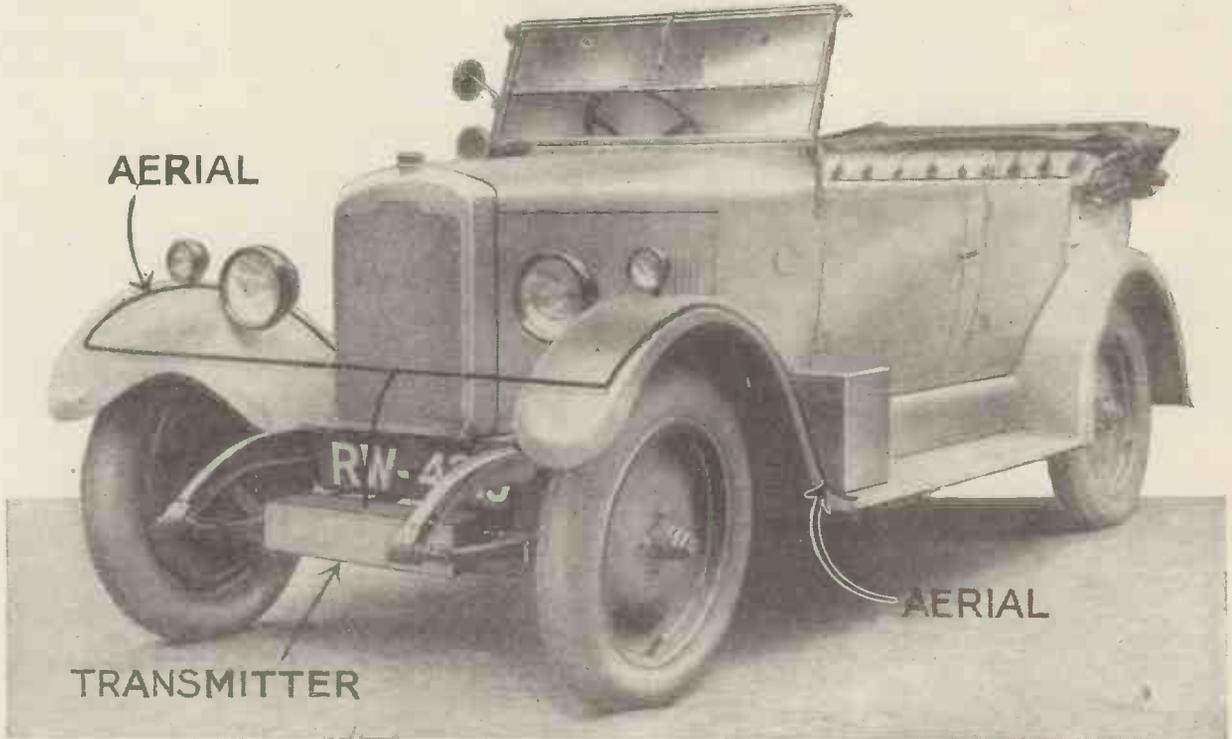
"Meester McNab," she says, "I canna get ower it a'. Wull ye mak' me a set—as reasonable as ye can manage? I've no ower muckle, ye ken, Meester McNab." And she smiled at me pathetic like.

"Dinna fash yersel about that," I says.

But I hope she winna be disappointed. It was only when I went to the fairm for the milk I discovered that the music, baith Glesga and Madrid, was emanating frae Mistress McPherson's gramophone. She was vera guid was Mistress McPherson an' maist readily agreed to provide an excellent program o' music till twa o'clock.

A Wireless Traffic Safeguard

Preventing Cross-road Collisions



This photograph of a 9-20 h.p. Rover car shows how an aerial and transmitter could be easily fitted.

AMONGST the many risks now run by motorists that arising from a collision at a cross-road or at a "blind" corner is the most dangerous. A suggestion has recently been made to minimise this particular peril by means of wireless.

Many-sidedness of Wireless

Apart from its intrinsic merit, the proposal is interesting as an illustration of what may be termed the many-sidedness of modern wireless activities.

A small insulated aerial is stretched over the mudguard of the car as shown in the photograph, and is energised by a small transmitter of the spark type so as to send out short-wave impulses of low power.

The metal frame of the car serves partly as an earth or counterpoise, and partly as a wave-reflector or screen, so that the transmitted waves tend to spread out fanwise in the direction in which the car is travelling, and not behind.

The apparatus is connected up to the usual electric horn, so that as the switch of the latter is operated, the miniature transmitter automatically sends out a stream of wireless waves.

Normally, that is, when the electric horn is not in action, the aerial is connected up to a receiving set

which indicates to the driver the receipt of signals from an oncoming car, either by lighting up an indicator lamp on the dashboard or steering wheel, or else by ringing a warning bell.

This is done automatically by means of a local relay which is closed by the action of the received waves and is held closed until reset by the driver.

In the Country

Although the wireless "warner" would probably be useless in town or amongst congested traffic, it has distinct possibilities out in the open country, more especially as a means of minimising the danger of the particular type of collision mentioned above.

B. A. R.

A PARIS doctor is giving a wireless talk to women on "How to Prevent Loss of Hair." If he thinks that they could possibly lose much more he is mistaken.

WILD WAVES.

"WHAT are the wild waves saying?"

She murmured, "as they're playing
Upon the pebbly beach;
See how they come a-dashing,
The sands with silver splashing,
Then hurry out of reach!"

"What are the wild waves saying?
What melody conveying,
With all their power and strength?
So vigorous and tireless."
He, quite obsessed by wireless,
Replied "What is their length?"

LESLIE M. OYLER.

How to Identify the Slav Stations

MANY readers will have, in the early hours of a Sunday morning, picked up a concert or operatic performance on a wavelength apparently midway between that of the high-power Königswusterhausen and Daventry transmitters. Although, in many instances, the signals are received at fairly good strength, especially in the Eastern and North-Eastern districts of the United Kingdom, some difficulty may have been experienced in identifying the language and call.

Greatly to the surprise and satisfaction of these fans, investigations prove that they have captured a broadcast from Russia. The Moscow station on 1,450 metres is now working on high power, and if the listener will only show some slight degree of patience when he has tuned-in to that wavelength, and has heard music or speech, he will, without doubt, pick up the call: "Radio Peredacha, Moskova," thus securing the confirmation that he is anxious to get.

Presumably, when time permits, the full call is given out by the announcer, in particular at the opening of the programme. It is as follows:

"Hallo, Hallo, Eto goworyt Moskovskaja Zentralnaja Radio Telephonia stantsia in eni Kominterna."

This is just the playful way in which the Central station draws your attention to its forthcoming transmission.

To denote intervals, a gong is used in very much the same way as adopted by some of the German stations, and when closing down, Moscow indicates, by so many strokes, the standard time. It must be remembered that when it is mid-day B.S.T. in the United Kingdom, it is 1 p.m. in Russia.

In the case of the Leningrad station, which on some occasions is also heard on this side, the call is "Radio Peredacha, Leningrad," but

in view of the fact that the stations are all run by a central broadcasting company their peculiarities are similar.

Although as a rule the programmes are not extended to a late hour, on

been added to the daily programme. When the station closes down at midnight (23.00 B.S.T.), listeners are switched over to the main square of the capital (Krasnaya Ploschad), which is bordered on one of its sides

by the wall of the famous Kremlin. As a microphone has now been installed in the belfry, the clock is heard to strike midnight, followed by a more or less mutilated version of the Bolshevik national anthem, pealed out by the carillon.

The Russian broadcasts have quite naturally been followed with considerable interest by listeners in Lettland, Esthonia, Poland, Finland and Jugo-Slavia, all countries in which the language is well understood, with the result that of fairly recent date stations have cropped up at Riga, Reval, Warsaw, Helsingfors and Belgrade.

At present the transmitters installed at Riga, Warsaw and Helsingfors are the only ones giving a regular daily broadcasting service to the Baltic States, but so great has been the enthusiasm for this new "sport" that we may fully expect to hear of a rapid development taking place in other neighbouring countries. The call for the Lettish station is merely "Radio Riga," and is repeated frequently.

Reval, in Esthonia, possesses a small 1½-kw. station run by the Raadio Ringhaaling, but the transmissions are of a spasmodic nature; it is only on special occasions that speeches and concerts are broadcast as the authorities have no definite income by which the programme company can be supported. In its call Reval gives itself its native name of Tallinn.

Finland possesses at least two main stations and has already erected several relays but, at the time of writing, the programmes are still in an embryonic stage.

The Helsingfors transmitter broad-

THE WEEK'S WIRELESS

MY wife said airily, "Oh, John,
"Make a wireless set. It's fun."
"All right, my dear," I said. "C'est bon."
That was **SUN.**

*Next day I bought some rolls of wires,
A soldering bit, and one by one
The valves and things that one requires.*
That was **MON.**

*To work! A wireless paper bought
Explained with photographic views
The way to build without a thought.*
That was **TUES.**

*So half my nights I laboured on,
When I should have been in bed.
My wife cried, "Will it work, dear John?"*
That was **WED.**

*"Don't worry, dear, you can't go wrong,
Read the book," I said to her.
I soldered, wired, all night long.*
That was **THURS.**

*Next night the set was really done,
The battery leads I plugged-in. I
Saw the valves blow, one by one.*
That was **FRI.**

*I BOUGHT a set—'twas all complete,
The local man fixed all up pat.
We found the wireless such a treat*
As down we **SAT.**
A. S.

certain days when a relay is effected from one of the opera houses, it will be found that the performance is carried on until almost midnight. If at other times music is being broadcast the listener will be given but little doubt as to its nationality, for melodies of strictly Russian composition will be recognised, and many concerts are given in which either the accordion or balalaika plays a prominent part. Folk songs of a purely Slavonic type will be heard in most of the transmissions, and these are rendered by excellent male and female choirs.

An interesting feature has now

casts concerts about three times weekly, and often draws upon the local opera house for its entertainments. This station possesses no peculiarity with the exception that the call is, for the Skyddskar transmitter, "Radio Helsinki," again the native name of the capital, and in the case of the smaller station which is being run by the wireless-telegraphy section of the military authorities, "Radio Bataljong."

Damaged by Lightning

The writer on two or three occasions has been successful in receiving these transmissions, but at the time these notes are being written the Skyddskar station has been considerably damaged by lightning, and for the present has been closed down.

Lastly, mention must be made of the new Warsaw transmitter (possessing a power of 6 kw.) of a type similar to many of the B.B.C. stations. It is unfortunate that a wavelength should have been chosen which is almost identical with that of one of our home main stations, and it is only when this latter transmitter is "resting" that it is possible to pick up the Warsaw broadcasts. The programmes have not yet been fully organised.

Except for the fact that the station starts its transmission with an opening signal similar to some of our own, but few hints can be given for its identification. The call is "Radio Warszawa," in which is also incorporated the name of the association responsible for its operation, Polski Radio.

Poland is, however, an ambitious country, and now proposes to erect a high-power transmitter, the present plant to be transferred to Cracow, where it will act as a relay to the Warsaw station.

Coming nearer home we find two broadcasting stations of recent construction in Czecho-Slovakia. Both the Prague and Brunn transmitters are at present working on respectively 368 and 521 metres, and are owned by the broadcasting company run by the radio journal in the capital. For the bulk of the transmissions, the Czech language alone is used, although for a period of approximately 45 minutes daily in both

cities a programme is also offered in German.

The native name of Prague is Praha, and this is given in the call. Before each item you will hear the announcer's "Hallo Radio Praha" or "Radio Journalu Praha," and at the end of the item, should an interval occur, you will pick up the following sentence:

"Yeden (or) twa (or) tschi minuti postuvka."

This indicates that there will be a pause in the programme for one or two or three minutes as the case may be.

On certain days the announcements are made in both Czech and German, and on big occasions when the station offers a special programme likely to arouse the interest of foreign listeners, the French language is also included.

In Brunn, to the call of "Hallo

These stations close down by playing the Czecho-Slovakian national anthems, of which there are apparently two, entitled respectively *Kde d'Omou Mui*, and *Pod Tatrou Se Blyska*, the last words of the announcer being in German: "Gute nacht," and its Czech equivalent: "Dobronoc."

Jugo-Slavia

In Jugo-Slavia, at Rakovitz in the immediate neighbourhood of the capital, a French company has erected a small transmitter for the purpose of broadcasting musical programmes and dance music. "Hallo Belgrade" is the call, but for the present, apart from a daily news bulletin, concerts are only given three times weekly.

Hungary for the present only possesses one station, that of the capital, and there is but little difficulty in identifying its transmissions when picked up. Bear in mind that Budapest, anxious to be up to date, has engaged the services of a lady announcer. If you have tuned-in to this wavelength (560 metres), you should pick up her initial call, which comprises both the name of the city and the wavelength on which the concert is given. She possesses a higher-pitched voice than that of her colleague in Rome, and accentuates the first syllable of each word. Phonetically the call is as follows:

"Hallia itt Bewdapescht, houllam otstzatz Neggiwen hat mayter."

Usually this is followed by a translation in the German language: "Hallo hier Budapest, welle 560 meter."

In the course of the programme the first three words alone are used.

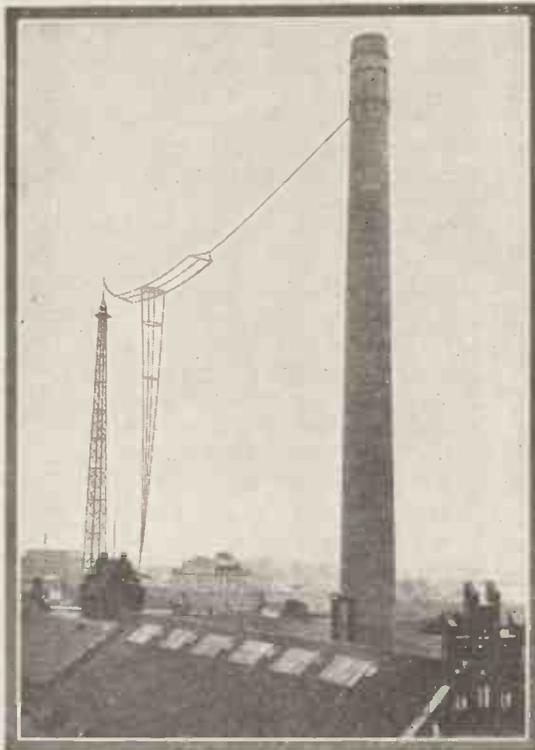
As an interval signal an oscillating valve will be heard, and a series of dots and dashes given out, the dots being of higher pitch than the dashes. The station closes down with the

playing of the Hungarian national anthem, and may be heard on many evenings giving dance music until midnight.

Such are the peculiarities of the Slav stations.

JAY COOTE.

THE "LUFT-LEITER" (AIR-LADDER)



A new broadcasting station in Westphalia.

Brno"—the name of the city being pronounced as if it were written Bruno—is added, in Czech, an indication of the wavelength on which the transmission is made: "Na wlnje pjetset dwacet jeden. metr," that is, 521 metres.



DR. RADIO is one of the latest additions to the field of public utility covered by wireless. He lives in America and his patients are the crews of wireless-equipped vessels who wish to get into touch with him.

There are many ships, small freighters, tankers, tramps and the like, which carry wireless, but who do not have the accommodation for or can stand the cost of a proper ship's doctor. Such vessels are, of course, fairly completely equipped with a medical chest and at least one of the crew may be relied upon to have a working knowledge of first aid.

Such equipment and knowledge, while sufficient as a rule against minor accidents, are not able to combat disease and this is where Dr. Radio is found an ever-willing consultant, and one, moreover, who charges nothing for his services.

A typical instance of the way Dr. Radio performs his useful and charitable services is given below. This is authentic and is actually what followed as a result of a message received by the New York station of the Independent Wireless Telegraph Company at 9 a.m. on January 29, 1924, as reported in *Popular Radio* :—

"Request information as to advisability of extraction of infected tooth.—*Maranzes.*"

Captain Maranzes of the s.s. *Casey* was very worried when he caused

that message to be sent. One of his crew had a dreadful toothache, accompanied by a large swelling, and the captain, a kindly man, naturally wished to get advice as to how to stop it. Also, he was probably a wireless enthusiast, for he had a pair of pliers with which to perform the operation, should Dr. Radio so advise him.

At all events, the Independent

.....
 ○ No longer is the sick seaman on a
 ○ tramp steamer obliged to get along
 ○ as best he can without qualified
 ○ medical attention, for although there
 ○ may be no doctor on board, wireless
 ○ is always at his service.
 ○ Medical advice by wireless, in fact,
 ○ is fast becoming of as much im-
 ○ portance as weather warnings and
 ○ shipping reports.
 ○ This article explains the procedure
 ○ adopted when the help of Dr. Radio
 ○ is needed.
 ○

Wireless Company were good enough to telephone the message to Marine Hospital No. 70, at New York. This hospital is run by the United States Public Health Service, and it sent back this reply to Capt. Maranzes :—

"Request information as to location and number of teeth, if there are any cavities in the

teeth and general symptoms of patient.—*Sprague.*"

This message, sent by Medical Officer E. K. Sprague of the hospital mentioned, caused Capt. Maranzes to suspend his tooth-pulling operations for a time, and later in the day he replied, sending the following message as to the sailor's symptoms :—

"One side of jaw badly swollen. Four to five teeth affected. No cavities in teeth. Has been in serious condition and has had fever and partial collapse. Incision was made in jaw and pus discharging. Is now somewhat better. If discharge continues, shall I extract teeth?—*Maranzes.*"

Poor Capt. Maranzes was not to have his job with the pliers, however, for Medical Officer Sprague, acting on the last message, telegraphed the following instructions :—

"Do not extract teeth. Apply continuous hot compresses to cheek. Give 5 grains aspirin every four hours. Give patient a dose of salts immediately. Wash out mouth every hour with alkaline antiseptic. If no alkaline antiseptic use a teaspoonful of salt to a glass of warm water. Take temperature and pulse every four hours. Keep us informed of condition."

The next day, however, the patient apparently grew worse and the hospital received the following message from Capt. Maranzes :—

"Patient shows signs of tetanus. Blood discharge very light colour. Very violent at times. One-quarter grain of morphine no effect."

The reply to this, received a short time later, was:—

"Continue treatment previously recommended. Have patience."

This was faithfully carried out, the captain took a long, last look at his pliers and put them away! But a day or so later he flashed back to the hospital:—

"Patient greatly improved. Thanks for services rendered."

So was that sailor cured and without the loss of any of his teeth. But one may imagine what might have happened to him had no medical advice been available. In all probability he would have died from that horrible disease, tetanus or lockjaw.

Medical advice by wireless is now quite a common thing on the high seas. Ships' doctors frequently consult one another by wireless when they desire a second opinion upon an urgent and dangerous case.

These messages, of course, may be in the usual medical language, but where ordinary seamen ask for advice only the very simplest language is used. The advice given, for instance, in the particular case quoted above contains no terms of the meaning of which the ordinary man in the street is not familiar.

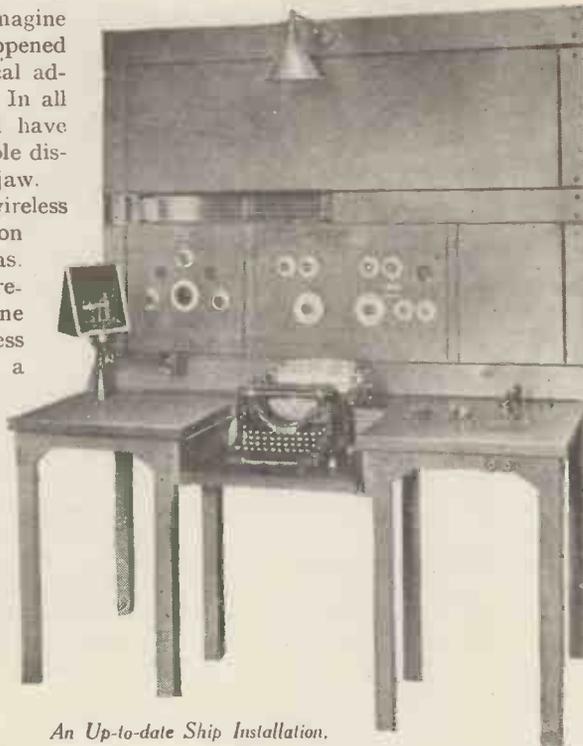
This American free medical service is now very complete indeed, and is a recognised public institution. In the majority of cases the messages are received by station W I M, which is a coastal station at Chatham, U.S.A., owned by the Radio Corporation of America. From there the messages are telephoned, either to Hospital No. 70 previously mentioned, or to No. 21 on Staten Island.

Originally the service was undertaken by the Seamen's Church Institute of New York, which had a small spark station on the roof of their

building. The co-operation of the Radio Corporation of America was afterwards asked and willingly given, and they agreed to receive and transmit the medical messages free of charge at all their Atlantic Gulf and Pacific stations.

The Independent Wireless Telegraph Company also agreed to perform the same offices and, more recently, Norwegian and Swedish Companies have followed suit. The only request is that messages shall be as brief and to the point as possible.

It will be realised what a boon this service is when it is stated that over 85 per cent. of the ships at sea carry no qualified medical man. It is true that the law requires officers to



An Up-to-date Ship Installation.

have a working knowledge of first aid, but this is only a recently applied regulation and applies only to ships of some nationalities.

That Dr. Radio's services are on the whole successful is proved by the fact that statistics compiled up to December of last year showed that only one man died after help was summoned. And it is thought that in this case he died before the recommended help could be given.

R. B. H.

AN archæologist assures us that there was wireless in the Stone Age. It looks as though B.C. and B.B.C. are close relations.

In a Ship's Wireless Office!

THE life of a wireless operator on a big liner is full of light and shade. Much of his time is spent in sending and receiving purely commercial messages, and he has more than a nodding acquaintance with tragedy, but there is also a humorous side to his work.

I recall the case of a woman passenger who came into "Marconi House" (the name generally given to the wireless office on a liner) when I was transmitting messages. She asked one of my colleagues what I was doing.

"Sending messages," he replied.

"How queer! I don't see them going!" was her surprising comment.

The reception bureau, where messages for transmission are handed in, is often productive of amusement if the operator is fortunate enough to be the possessor of a sense of humour. The bureau consists of a counter with a curtain-shaded grill round it, something similar to the grill on a bank counter.

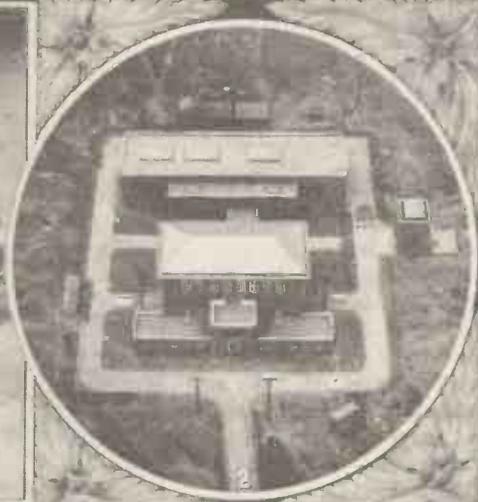
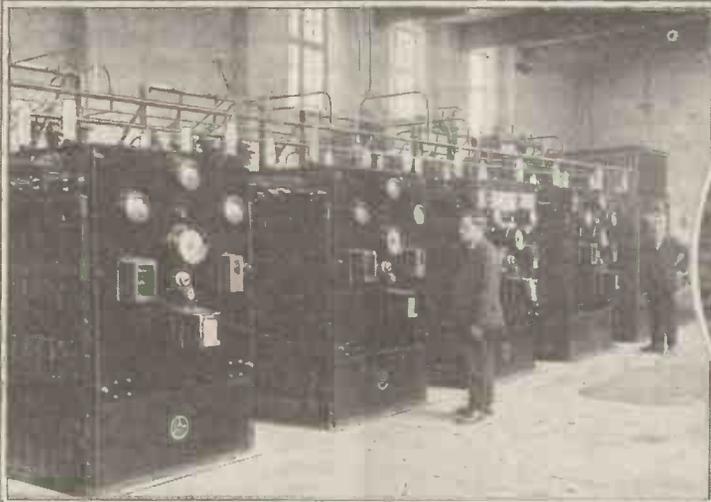
One morning a gentleman appeared at the counter. "Where can I get a Turkish bath?" he asked. He was referred to the proper steward. Five minutes later a lady inquired how far we were from the nearest ship (a popular question this).

It is the custom at sea for operators on a ship to have a little chat by morse with operators on other ships with which they get into touch, and sometimes these "conversations" produce refreshing samples of wit.

On one occasion the operator on a British ship established contact with an American vessel and asked if the latter were encountering heavy weather. Quick as a flash came the reply: "Heavy! We're rolling so much we have to use a rubber rake to clear the seaweed off the aerials"—an exaggeration that was wonderfully descriptive.

Perhaps to those on shore these instances may seem a very inadequate form of humour, but they come as a ray of sunshine to a man who has, in all probability, spent most of his four hours' watch in sending slight variations of "Home Tuesday Longing See You"

RUGBY—18,000 METRES!



1. View of transmitting panels.

2. The Rugby station seen from the top of a mast.

WELL known and much discussed as it is, Daventry has been overshadowed. Eight miles to the north-west of that station stands another super-station with silent pride—well known, perhaps, but little discussed.

With the passing of time a great unwieldy landmark rises up amongst us with an acute absence of why and wherefore.

Visit to Daventry

A visit to Daventry is worth while. The wireless station is to be found one mile outside the town on the London road. The two masts, each 500 ft. high and the same distance apart, the huge spider aerial, with the station buildings beneath, provide the visitor with a "worth-while" satisfaction.

The site is admirable, being the highest point for miles around.

The onlooker, however, cannot fail to notice structures whose heights can be plainly seen on the horizon. A nearer view will confirm what has hitherto been a hazy conception of the engineering wonders and great possibilities of a super-wireless station.

Hillmorton, a small village three miles south-east of Rugby, is the approximate location of the Gov-

ernment's wireless stronghold. A plateau of 900 acres alongside Watling Street provides a worthy site for continuous intercourse with the colonies.

Twelve masts, 820 ft. high and 1,320 ft. apart, support the extensive aerial.

The masts are of latticed steel construction, triangular in shape, measuring 10 ft. on all sides. The base is set in a concrete bed and measures approximately 3 ft. by 4 ft., rising upwards to a height of 6 ft.

This column is surmounted by an octagonal concrete block measuring 3 ft. on all sides and 6 ft. in height. This block supports the platform necessary for the accommodation of the aerial windlass. It is accessible by means of a portable wooden ladder only.

It is on the platform that the mast rests, the base proper being not more than 30 in. across. Formed on the ball-and-socket principle, intercepted with a series of porcelain insulators, the mast rests of its own gravity.

It is possible, however, should occasion demand, to raise the 140 tons by means of hydraulic jacks to permit the renewing of the insulators.

Three columns rise from this point, leaning outwards until the necessary

10 ft. is gained. Another platform is placed at the widest point, a steel ladder in the centre providing access from below. From this platform an electric lift, capable of holding three men and tools, is controlled. A double-runged steel ladder continues upwards to the summit.

Five sets of three stay-ropes are necessary to secure the structures. These are carefully insulated at the anchor blocks, the latter being situated at 200, 300 and 600 ft. from the centre.

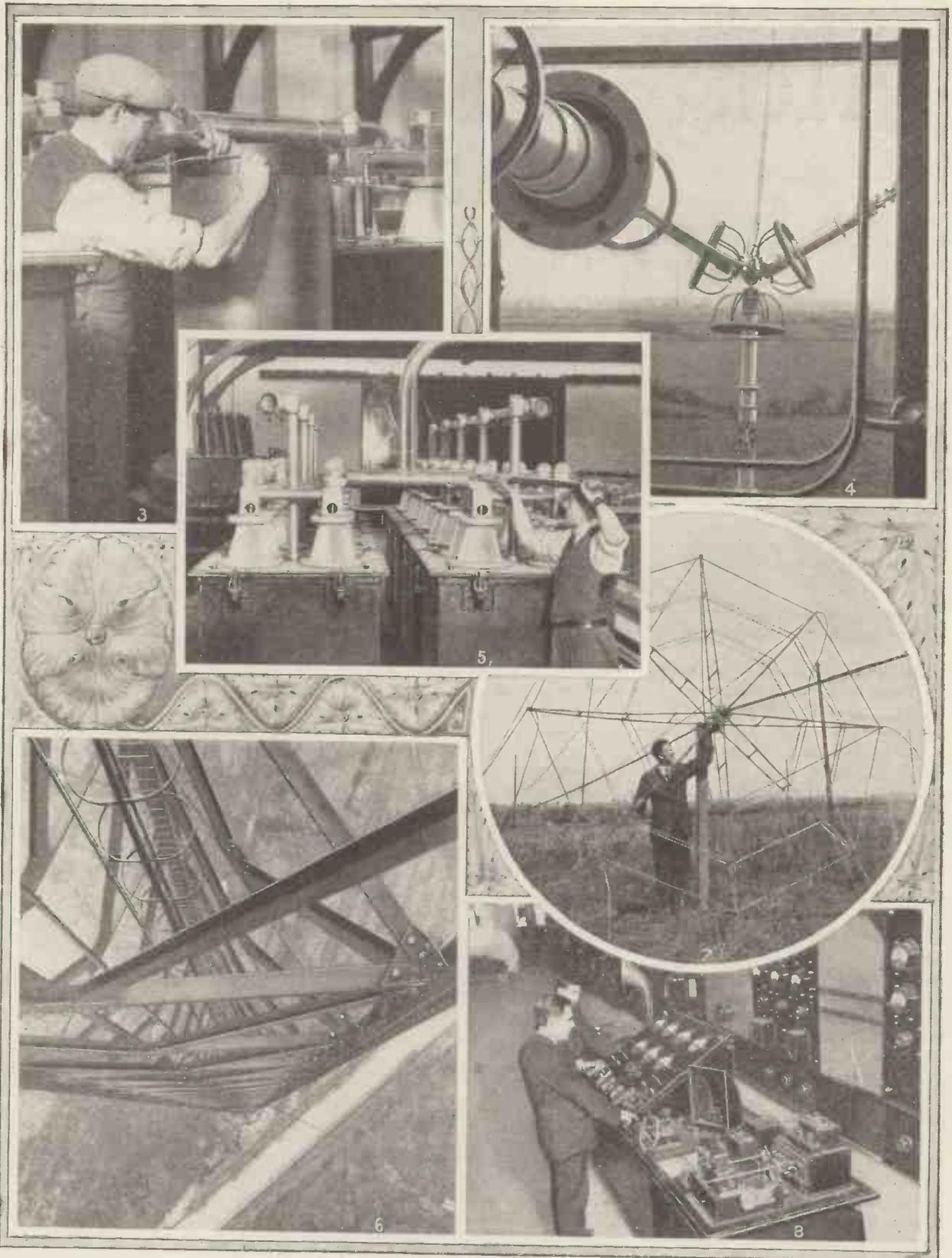
The steel wire rope used was specially prepared and manufactured on the site.

Twenty-six Miles of Aerial

The 26 miles of aerial is of spider formation, 12 ft. in diameter. Supported by a steel wire rope controlled from a slip-gear windlass on the lower platform, it is tested to a tension of 10 tons. The aerial is arranged in two sections, either of which may be used alone.

The earthing system comprises a network of copper wire (some 120 miles) covering the whole site. The alternating current which (after conversion) is used for transmission is supplied by a generating station 26 miles distant.

L. W.



3. Completing the assembly of a large coil. 4. Note the size of the aerial lead-in! 5. Making sure of a good connection to a huge condenser. 6. Looking down to earth from the top of one of the 820-ft. high masts. 7. An aerial spreader. 8. Control table for telegraphy, showing land-line apparatus and control panel.

A Long-range Three-valver With Special Toroidal Coils



Designed, built and tested by the WIRELESS MAGAZINE Technical Staff, this special three-valver is particularly suitable for long-range reception by virtue of the special couplings used between the high-frequency amplifying stages.

HIGH-FREQUENCY amplification is a subject that has received more attention, perhaps, than any other branch of wireless, especially in connection with the method of winding and mounting the inductances and coupling them together.

Two Methods of Coupling

It is becoming generally known that there are two ways by which the transfer of energy from one coil to another can take place, and on the manner in which these two forms of coupling are present depends the efficiency of the coupling.

These two forms of coupling are known as static and magnetic couplings, and it is sufficient to mention here that with a coupling between two coils in which the capacity of one coil to the other is high the efficiency is low, but where the coupling is nearly all magnetic the efficiency is high.

It is obvious that a coupling consisting of two coils tightly wound together is as much static as magnetic, and for this reason is inefficient, but if the coils are so arranged that the fields of each are tightly coupled together and the capacity existing between the windings is

negligible, the efficiency is greatly increased.

Furthermore, in H.F. amplification, where several tuned stages are employed, the field due to the coils in the first stage, say, will interfere with the field of the second-stage coil, and so on, producing undesirable effects such as uncontrollable self-oscillation.

A very convenient way of minimising this effect is to wind the coupled coils in the form of a torus, which, in effect, is a cylindrical coil, or solenoid, bent in the form of a circle. The external field of this form of coil is extremely small and therefore negligible.

Coils of this description are employed in the three-valve set described and illustrated in this article.

Circuit

A glance at the circuit diagram will show that two stages of H.F. amplification are employed, followed by a valve detector.

The toroidal-coil unit connected in the aerial circuit differs from those used as H.F. transformers in that the two windings of the latter are not connected together as in the former and the terminal markings are different. The secondaries are in each

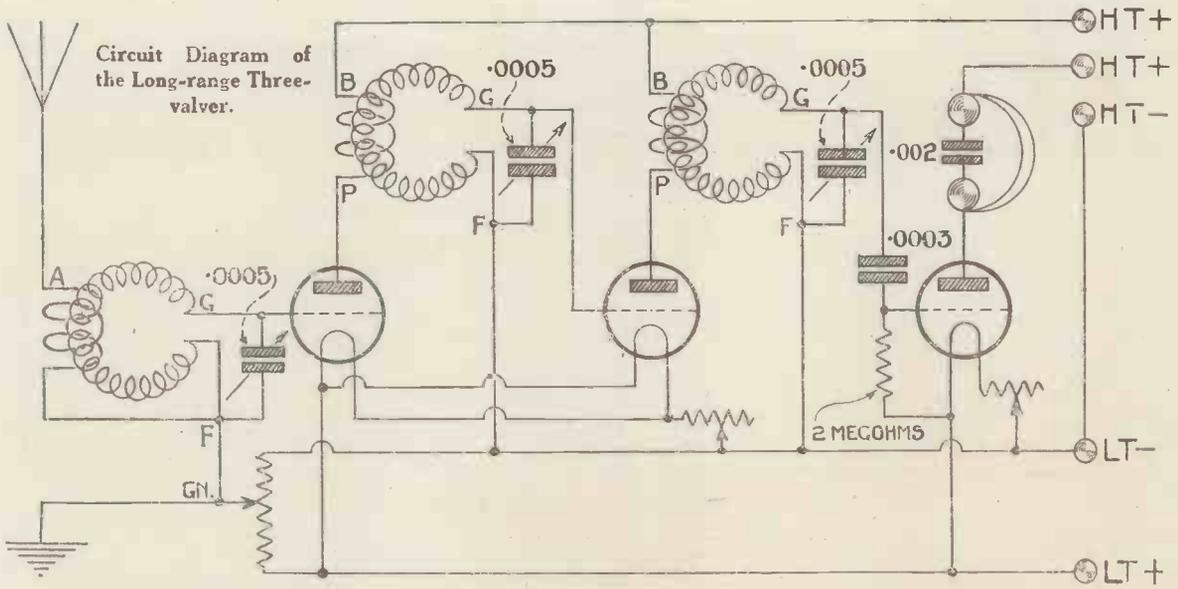
case tuned by a .0005-microfarad variable condenser.

Components Needed

A full list of the components is given here for the benefit of those who intend to make up this set:

- Ebonite panel, 18 in. by 7 in. (Trellebogs, or British Ebonite, American Hard Rubber, Clayton).
- Potentiometer (Burndept, or Lissen, Ericsson, G.E.C., Ediswan).
- 2 30-ohm filament rheostats (Ediswan, or Lissen, Radio Instruments, Wates, G.E.C., Polar, General Radio).
- 3 .0005-microfarad variable condensers (A. F. Bulgin, or Dubilier, Ormond, Ericsson, Ediswan, Radio Instruments, Raymond, Sterling, G.E.C., Peto-Scott, Metro-Vick).
- 3 special toroidal coils (Erla Balloon Circloids).
- 3 anti-microphonic valve holders (Bretwood, or Lotus, Benjamin).
- 2-megohm grid leak (Ediswan, or Dubilier, Mullard).
- .0003-microfarad fixed condenser (Wates, or Dubilier, Mullard, T.C.C.).
- .002-microfarad fixed condenser (Dubilier, or Mullard, T.C.C.).
- Wooden baseboard and cabinet (Unica Cabinet Co.).
- 9 M-type terminals, engraved as follows: A, E, H.T. + (two), H.T. -, L.T. -, L.T. +, P +, P -. (Bell-ing Lee).

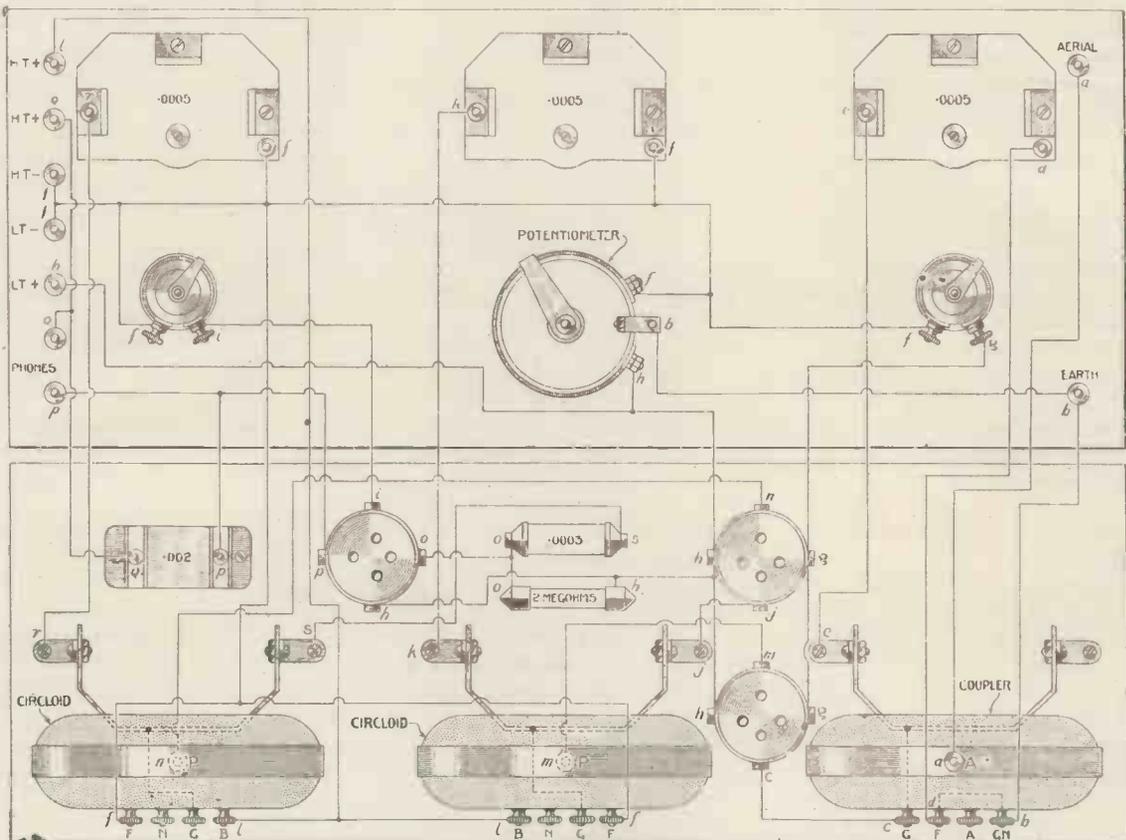
NOTE:—The particular components shown in the photographs and allowed for in the dimensioned layout are in each case mentioned first.



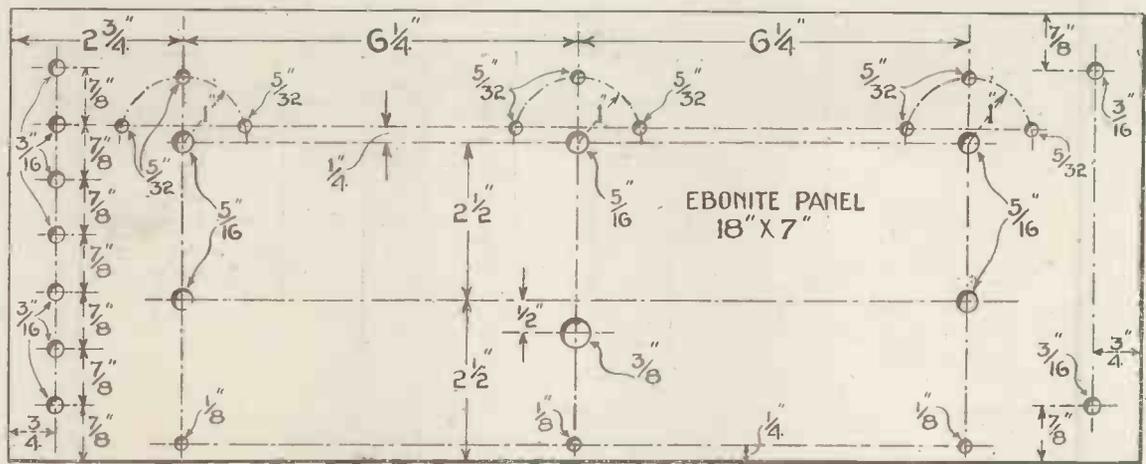
In order to save time and trouble the panel should be obtained cut to size, and it will be found that this is a standard size which is stocked by most of the firms who are mentioned in the list of components on the previous page.

Drilling may be started immediately, and for this purpose reference should be made to the panel drilling diagram, from which a full-size layout should be drawn on a sheet of stiff paper forming a template.

The latter should then be placed on the panel and the centres of all holes to be drilled marked through on to the panel. The template is then removed, and holes of the sizes indicated drilled at the marks made. When the drilling has been com-



One-third-scale Combined Layout and Wiring Diagram of the Long-range Three-valver.



Panel Layout of the Long-range Three-valver.

pleted, the three variable condensers, two filament rheostats, potentiometer, and the terminals are mounted on the panel and the remainder of the components screwed to the baseboard, the dimensions of which are 18 in. by 6 in. by 1/4 in. thick.

Toroidal Coils

The three toroidal coils are supplied with brass mounting brackets which allow the coils to be mounted at right-angles to the baseboard along the back edge. Plenty of room must be allowed for the three variable condensers. Besides the coils there are few other components mounted on the baseboard, and their positions are easily seen from the wiring diagram.

The panel is then attached to the baseboard by three 1-in. brass wood screws and the wiring-up started. It will be noticed that to each of the brass mounting strips of the three coils leads have been attached, and that some of the terminals on the coils are left unconnected.

Common Connections

The reason for this is that the terminal marked G on each of the coils

is already connected to the mounting frame, and therefore it is immaterial whether connections are made to terminal G or to the frame. The other terminals left unconnected are intended for use when the circloids are used in different circuits.

With regard to the lead from the aerial terminal to the terminal marked A on the circumference of

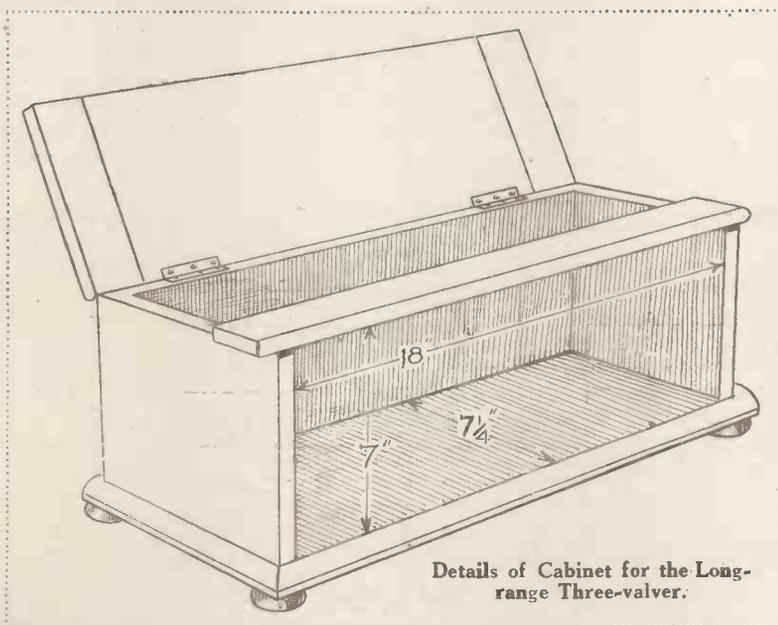
all the connections shown on the wiring diagram have been marked with a small letter.

All those connections marked a should be made first with one wire or as few wires as possible. Next, all the connections marked b should be made, then those marked c, and so on, until the connections to all the components are complete.

Suitable Valves

Suitable valves to use are the Osram DE 8 H.F. type, which require a 6-volt accumulator for filament-heating purposes. A 60-volt H.T. battery will be ample for the plate-potential supply of all three valves.

In spite of the three tuning controls, the operation of the set is quite simple, consisting only of turning variable condenser dials, and in keeping the settings of all three of these dials at any in-



Details of Cabinet for the Long-range Three-valver.

stant approximately equal. the first coil, this may be alternately connected to the terminal marked A mounted on the centre of the coil. As this connection is shown in the wiring diagram, a high degree of selectivity is obtained; but if less selectivity is desired, the connection should be altered as previously indicated.

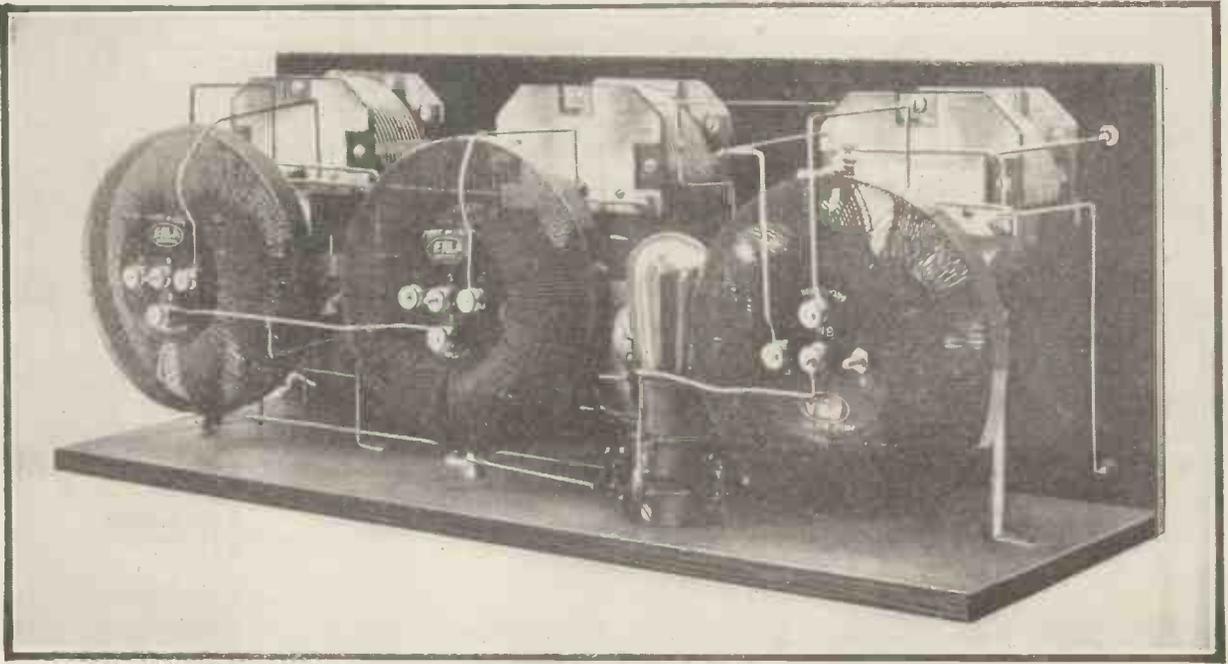
To simplify the task of wiring up,

stant approximately equal.

Self-oscillation is easily controlled by the potentiometer, and it should be seen that the slider is as far over to the negative end of the resistance winding as possible.

H.T. Voltages

The H.T.-battery voltages applied to the H.F. and detector valves



Photograph showing Disposition of the Components in the Long-range Three-valver.

should be adjusted to give best results when a station has been tuned-in.

The set was thoroughly tested during the Transatlantic tests at the beginning of this year. Nearly all the B.B.C. stations were received with surprising ease, and the way in which the various Continental stations were tuned-in one after the other was delightful.

Previous to these tests W G Y had

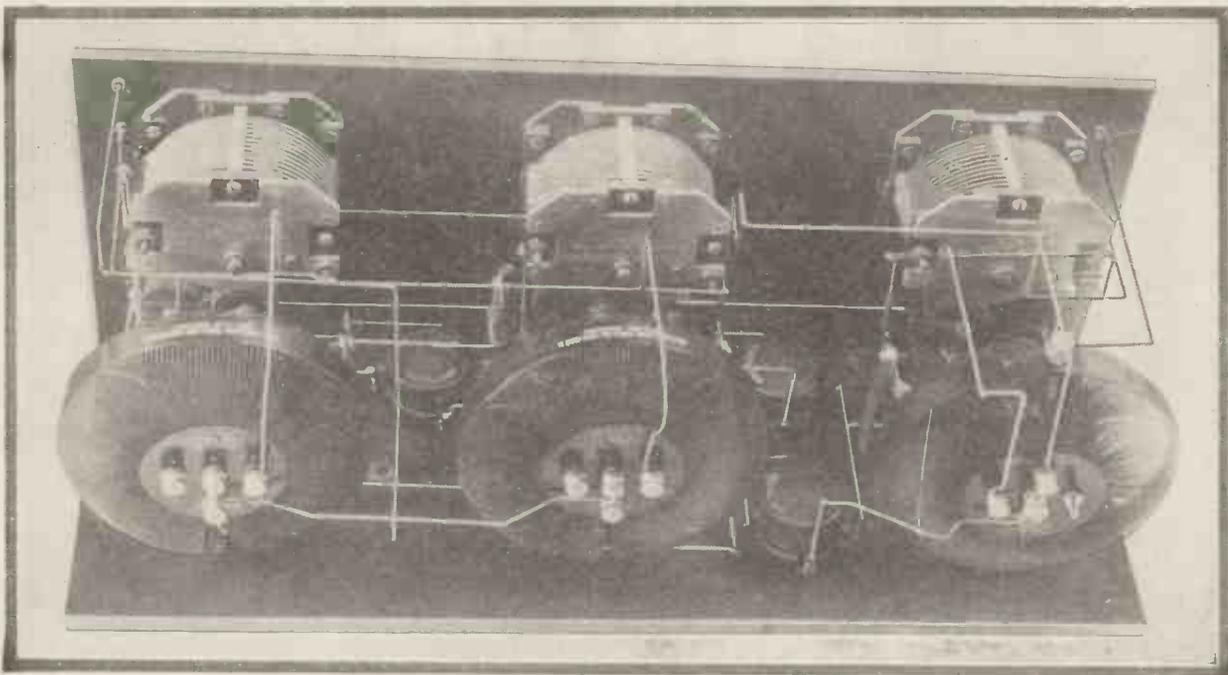
been received at excellent strength, but later on this station became very difficult to receive.

Once the potentiometer has been carefully adjusted it can be left alone, unless some very difficult tuning has to be carried out.

If the three variable condensers are matched and the dials so adjusted that, when a station is received, the same reading is obtained on each, tuning is rendered com-

paratively simple by rotating the three dials so that at any instant the reading of each is identical to the other two.

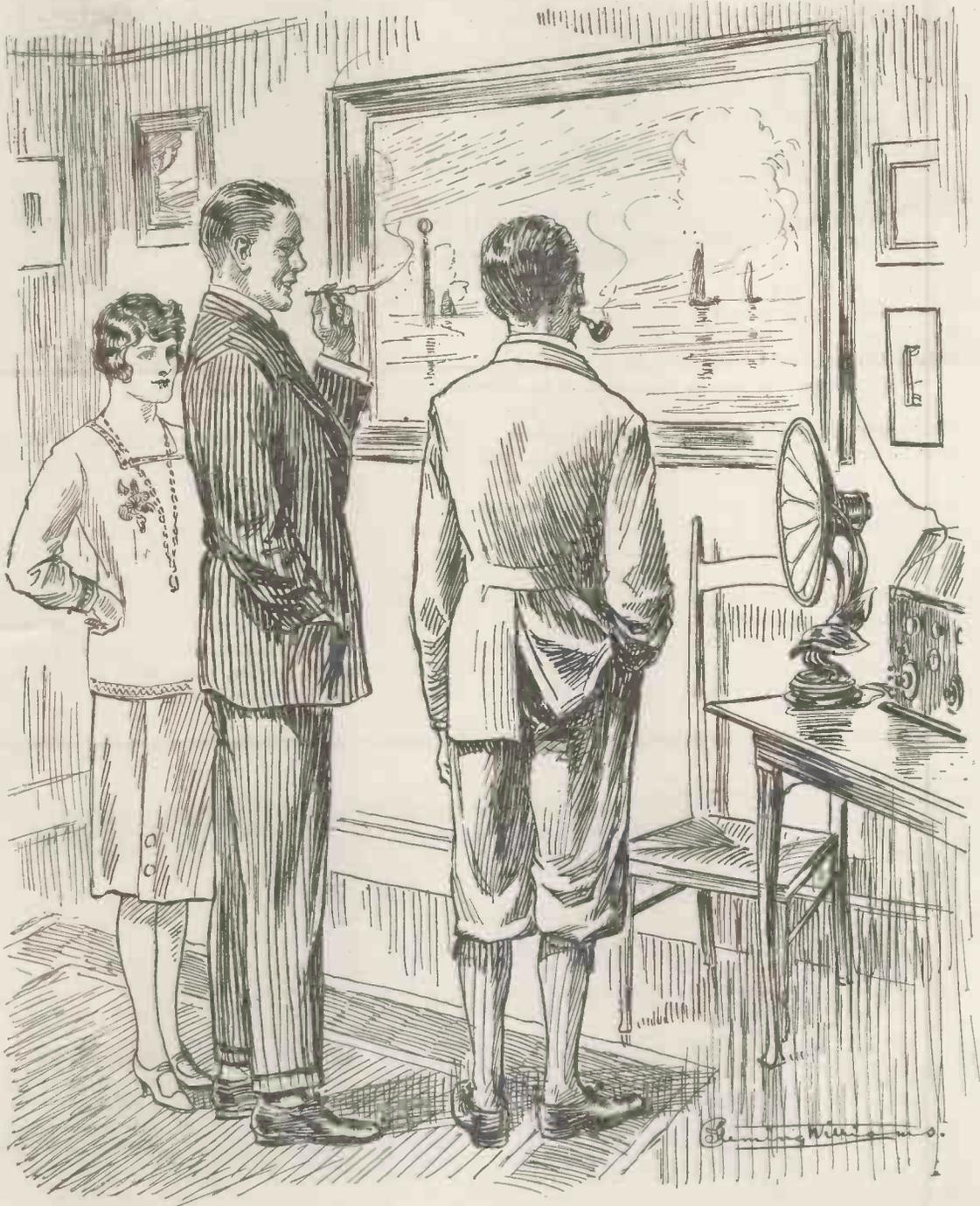
In some circumstances high selectivity is not required, and by altering the connection from the aerial terminal to the terminal A on the circumference of the first coupler to A, mounted in the centre of the same coupler, selectivity is decreased to a considerable extent.



Another photograph showing Disposition of the Components in the Long-range Three-valver.

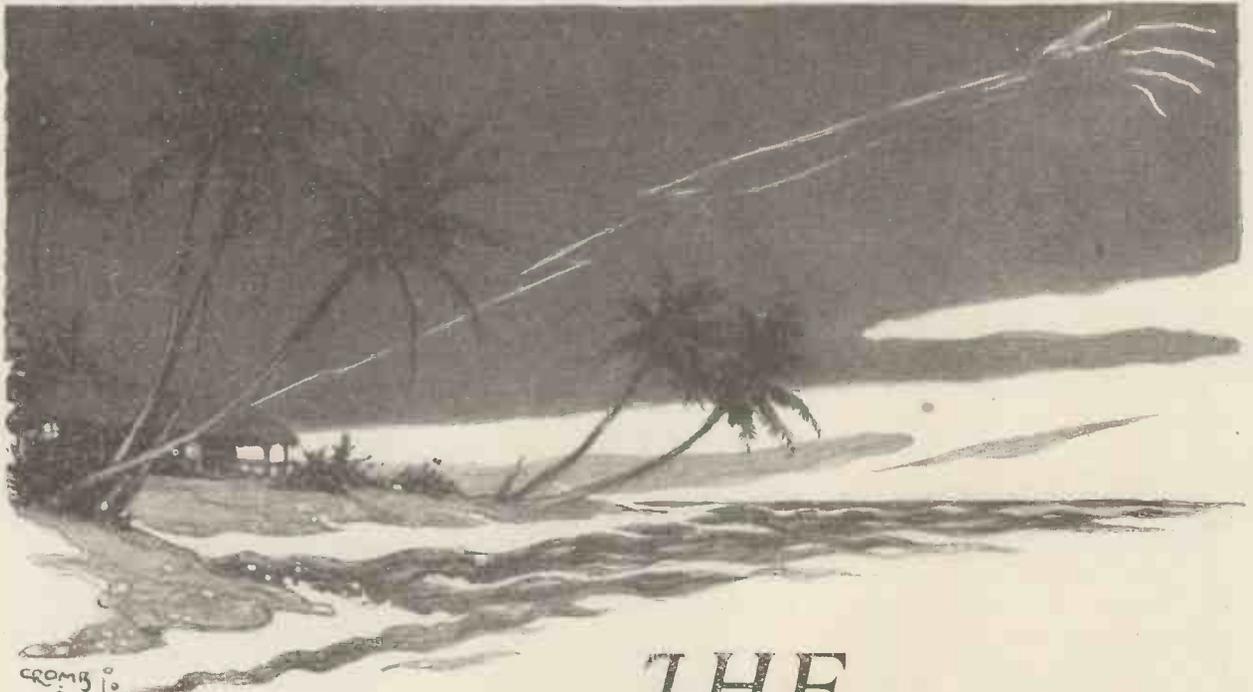
UTILITY!

A Drawing by
Major C. Fleming Williams



Friend: "I must say I think that picture is too big for the room."
Host: "Yes, but it makes a splendid frame aerial!"

*Coincidence can greatly affect the lives
of men—even wireless coincidence!*



CROMBIE

A Story by
Lt.-Com. H. W. Shove, D.S.O., R.N.
Illustrated by Charles Crombie

THE LONG ARM

WITH a gesture of impatience Antony Royle flung down the year-old magazine, hoisted himself out of the depths of his long chair and stood gazing moodily out over the turquoise waters of the Pacific, towards the rapidly dying glory of the tropic sunset.

"Buck up, old man," laughed his partner, Dick Parmenter; "mail ought to be in in the morning!"

"I'm sorry," returned Antony. "I am rather like a bear with a sore head these days. And it's hardly fair to expect a confirmed old bachelor like you to understand. Being out here, toiling every day for the real paying shell one never seems destined to find is only an adventure to you. To me it's—well, it means so much to me when we do succeed that the time of waiting's almost unbearable. And that drunken fool of a skipper putting the *Aropsia* ashore and losing the last mail hasn't made things any better! To-morrow'll be the first time I've heard from Pamela these six months."

"I know, old man. Thank God, I'm spared that, anyway! It's a pity your young woman isn't a wireless expert, isn't it?" Dick smiled, as he glanced upward to where the gleaming copper aerial ran down from the top of a high palm, to vanish above the eaves of the veranda of the little bungalow.

"Even if she were," sighed Antony, "I'm afraid the Reverend Edward's stipend wouldn't run to outfitting his daughter with a transmitting station! I know I oughtn't really to have spent the money on mine; but I felt I couldn't face being utterly cut off from the outside world."

"I'm jolly glad you have got your station, Tony," said Dick, rising wearily. "For I'm not so content with a hermit's life as you may think! What's on to-night? Can we get one of the Australian broadcasts, or are you going poking round on the short waves?"

"Well, I've fixed up a test with Penville for a start. But we can switch over to Melbourne later on, when it gets too light over in England

to keep touch with him." Tony glanced out over the now almost black waters. "I think I might make a start," he said, "it'll save my dying of the blues, anyway!"

Next to Dick Parmenter, Tony had come to regard Austin Penville, the English amateur transmitter, as his best man friend. Their acquaintance was purely "etheric." But, during the last three months, it had ripened into an almost daily intercourse, and, though they had never met, each knew the other's voice as well as his own.

For they had not been content with the comparatively impersonal Morse and, in favourable conditions, they could now converse as easily across the nine thousand miles which separated Hampstead from Palmotu Island as if they had been fellow townsmen and subscribers to the ordinary telephone service.

But to-night conditions were not of the best. Fading was very troublesome and even on the short waves the ether seemed more con-

gested than usual. Several times, during the first hour after Tony had shut himself into the little bare back-room of the bungalow which served as his wireless "den," did he manage to pick up a few words of the familiar voice. But he had almost decided that proper two-way communication was impossible when, quite suddenly, there came an improvement. Clear and strong came Penville's voice.

"Hullo! hullo!" it said. "Hullo, Royle! Can you hear me now? I've heard you for the last half-hour. I've put the frequency up 10,000, as you suggested. Is that better? Over."

Tony threw over his switch. "Yes, old man," he replied. "We've got proper two-way communication now. Your signals are R 4. What's your aerial current? Over."

As he listened for the answer he heard a scraping noise, as if Penville were rising from his chair to examine the aerial ammeter more closely. Then a muttered imprecation and Penville's voice, speaking in irritated tones. "Half a minute, old man," it said. "My wife's——" The end of the sentence faded out.

Tony sat for some time expectant. There was a faint hum, as of the carrier wave, in the phones: "Wasteful beggar," thought Tony, "he's forgotten to switch off." Then, far off and indistinct at first, he detected voices—a man's and a woman's. Mrs. Penville had evidently invaded the "sanctum." And as the voices grew in volume, as if the speakers were approaching the microphone, it became evident from their tones that the intrusion was not welcome. For it was clear, though Tony could not yet catch the words, that he had become an eavesdropper at a family squabble nine thousand miles away!

Suddenly the woman's voice took on an access of strength and with perfect clearness the torrent of reproach burst into Tony's ears. And then, petrified with amazement, he forgot the invidious part he played. Or rather, it now no longer seemed invidious. For, though the words were those of a wife, exasperated beyond endurance with a neglectful husband, the voice was that of his own fiancée! There was no more mistaking that than the import of the words!

"I gave up all for you," came the passionate tones, "everything that made life sweet! I sacrificed my

quiet happiness, my home, my parents whom I loved, the man who worshipped me! And now you are tired of the novelty, you fling me aside like a broken toy! If you had made another woman my rival I might have hoped that you had a human heart to soften! I might have won you back from her. But this! These lifeless bits of metal! It is too much; it's too utterly unbearable!"

Her voice rose to a scream, then suddenly broke off. For, perhaps, ten seconds there was silence. Then, very faintly, as though he spoke far back from the microphone, came an exclamation from Penville. "Drop it, you fool!" he cried. "The current's——"

Then again dead silence, in which even the hum of the carrier ceased. It seemed as if the switch must have been suddenly opened. But no! For again Pamela's voice sounded, clearer than ever. And in it there was now a strange ring of triumph.

"So God's justice has struck you down! I have you at my mercy now! Mercy? Ah, little mercy shall you have from me, for never have you shown me any! I shall not shrink from this blow! Only I hope your heart is not so cold that it cannot feel the chill of the steel as you have made me feel the chill of your indifference!"

There was a confusion of sounds, a panting, a sickening gurgle, a thud, and then——

"Haven't you done poking round yet, Tony?"

With an agonised cry Tony was on his feet. "Be quiet a moment, Dick, for God's sake!" he gasped, gripping the phones feverishly to his ears. But the interruption had been fatal. Only a barely audible crackle of atmospherics broke the stillness. Tony took off the phones and turned a blanched face towards Dick, standing agape in the open doorway. He felt his knees give way under him.

"Hold up, old man," cried Dick, "have you got a go of fever or what?"

Tony mouthed and gibbered. "Get—get me a drink, Dick," he stammered. "I want your help."

Dick Parmenter had a bad night of it. Dawn found him sitting, nervous and short-tempered from lack of sleep, at one side of the bare table in the living-room of the bungalow. Huddled forward in the

chair opposite, elbows on table, head in hands, feverish eyes fixed upon his, Tony, whom, for the dozenth time, he had just torn, almost by force, from his futile vigil in the wireless den, again sought relief for his tortured soul in a torrent of words.

"Look here, old man," said Dick, at last, "you'll drive yourself off your head if you go on like this. And frankly, as I've told you before, I think you must have made a mistake. After all, voices often resemble one another."

"There's no voice in the world that resembles Pamela's!" cried Tony for the hundredth time. "No possibility of my mistaking *that*!"

"But, my dear fellow, the whole thing's too fantastic! In the first place, why *should* Miss Robson have gone off with this other chap?"

"How do I know? Isn't the world full of fascinating rascals who make it their business to hypnotise women?"

"Hardly as full as some novelists might lead one to expect, Tony. Besides, you've always said what a decent chap Penville was. And from your account he hadn't another interest in the whole world except wireless."

"That's just it! What did she say? 'Lifeless bits of metal.' It was just because she found that he cared more about wireless than about her that she was so unhappy!"

"Oh, do try to get a sense of proportion, Tony! Surely you can't imagine any woman, let alone your own fiancée, committing a murder for such an inadequate reason?"

"I tell you I heard the whole thing! Probably she didn't intend at first to do more than smash up his apparatus. I heard him cry out at her. 'Drop it, you fool!' he said. Then he tried to snatch whatever it was she'd got hold of and paralysed himself with the shock. In her excited state she must have gone clean off her head and stabbed him with the knife she'd only meant to use to cut the wires. The whole thing's as clear as daylight!"

"Honestly, Tony, I think you must have imagined it all. But anyhow, what are you going to do about it?"

"I'm going back to England, of course. Thank God, I can start to-day, in the mail boat. Perhaps I may arrive in time to give evidence

at the trial. Perhaps my evidence may get the charge reduced to manslaughter. If nobody else heard that transmission, I alone know that the crime was not premeditated, that there was an open quarrel."

"If you ask me," said Dick, "you'll probably only make matters worse. And, if I were you, I'd let her take her chance without butting in. She seems to have treated you badly, whatever else she's done."

"I don't believe it, Dick. Something awful must have driven her to it. Pamela wouldn't have deceived me if she'd been in her right senses. And that may account for everything—even the dreadful end of it all!"

The prolonged hoot of a steamer's siren echoed through the stillness of the dawn. "The mail!" cried Tony, springing to his feet.

But the mail contained no letter from Pamela. And even Dick had to admit that this was, to some extent, confirmatory of the now utterly demented Tony's suspicions. And when, some two hours later, after seeing his friend aboard the steamer, he flung himself down to sleep the sleep of complete exhaustion, his last conscious impression was one of devout thankfulness that as yet no woman was in a position to ruin his life, as it seemed had been the fate of Tony Royle.

Tony never after remembered much of the happenings of the next few days. The little, old, out-of-date inter-island steamer chugged its weary, seven-knot way from one outlying pearling station to another, lone copra traders indulged in their quarter-hours of conviviality with the captain and mates in the little saloon, and discussed ancient news and future prospects with varying degrees of optimism or despair.

Once they encountered what the mate described as "a bit of a blow"—what the average landsman would have considered a "terrific hurricane." But, through it all Tony remained pent in his state-room, hardly emerging even for meals, sick with despair and impatience, anxious yet dreading to hear the news that should await him at Tahiti.

The worn-out tub that had replaced the wrecked *Aropsia* carried no wireless and their itinerary took them to no island connected with the cable system.

Tony had made up his mind that, if there were no news at Tahiti, he would risk cabling to the Rectory to see if, after all, there were not some ghastly mistake. But he realised that he would have to be circumspect, if he were to avoid arousing suspicion. He must have

some idea, before he in any way exposed his cards, as to how the land lay.

At last, eight days after that terrible night at Palmotu, a wild-eyed figure rushed into the clubhouse at Tahiti demanding feverishly every newspaper and cable slip in the place. Of course, he did not expect details. Only the bare outlines of the tragedy could yet have reached this outpost. But he had an access of wild hope when his first search of the week's files revealed—absolutely nothing. He flung the sheets upon the writing table before him, reached for the cable



A clear, bell-like voice issued from the loud-speaker. And the first strains of that voice killed John March

forms. Then from the middle of the topmost page a name seemed to leap out at him from an obscure paragraph whose heading had caused him to pass it over as of no possible interest. He paused, again caught up the sheet and read:

A STRANGE ACCIDENT

A London cable reports an extraordinary fatality. On the morning of the 7th inst. Mr. Austin Penville, a well-known wireless amateur, rose early to conduct experiments. A couple of hours later he was found dead in his laboratory, a large knife, which he kept among his tools there, being embedded in his heart. From the position of the body it is conjectured that Mr. Penville must have stumbled and fallen upon the knife in his endeavours to free a cat, belonging to his wife, whose electrocuted body was found

entangled in some live wires connected with his apparatus. Much sympathy is felt for his young widow, who made the tragic discovery.

Late that afternoon, Tony found himself wandering, distraught by the conflict of his emotions, the prey of a hopeless indecision, upon the waterfront.

The truth seemed plain. The "accident" must, of course, have been a clever plant. And Pamela must have engineered it! He alone could expose that plant. For, even if Dick's lips had not been sealed by the seal of honour, his evidence would be mere hearsay.

But what could be done? Should he go on to England now? How could he ever face the woman whom he knew to be not merely a double deceiver but a cunning and successful murderess? Should he go back to Palmotu?

Suppose Pamela should seek him, suppose there were some explanation of her desertion of himself for Penville and she should now come to him asking forgiveness and reconciliation? How could he act a lie, still less confront her with his awful knowledge?

No, there was but one course open to him. He must vanish from her life.

In his brown study he came near to stepping over the edge of the quay. Pulling himself up just in time, he looked down upon the battened hatches of a little schooner below. A weatherbeaten man paced masterfully upon her deck. He glanced upward, saw the hesitating figure above him. He paused in his walk.

"Hullo!" he cried hopefully, "you looking for a job?"

Inspiration came to Tony. "Yes," he answered promptly.

So the Captain of the *Island Rose* solved the pressing problem raised by the sudden illness of his mate on the very eve of sailing. And so Antony Royle ceased to be, and "John March" was born.

It was some six months later, the day after the conclusion of the *Island Rose's* prolonged trading voyage amongst the more out-of-the-way stations, that John March came by his end.

The scene of his passing was a bright little American bar, hardly a stone's throw from the quay at Sydney. And the manner of it was this.

It had been a slack afternoon aboard the *Island Rose*, for the old cargo had already been discharged while the new one was not yet ready for loading. So the mate had seized the opportunity of a run ashore and a tramp out into the country, during which his reflections had not been of the most cheerful.

He entered the bar about 9.30 p.m., attracted more by the glitter and brightness of the place than by any thought of drowning his cares in the single drink which he had determined to allow himself before returning aboard. Except for a couple of rather flashily dressed youths, engaged in a discussion of racing prospects at the far end of the counter, the bar was empty.

The tired-looking bartender served John March with his whisky and soda, flicked the marble-topped counter listlessly with a dirty napkin and hazarded a remark about the weather.

Disappointed at the failure of this opening he next sought to relieve the tedium of existence by turning the switch of a three-valve set, which stood among the gleaming bottles on the shelf behind the bar. A clear, bell-like voice issued from the loud-speaker. And the first strains of that voice killed John March.

Antony Royle gripped the counter with both hands. He snapped a fierce question at the indifferent bartender.

"Where's that coming from?"

"Woolpack Theatre," replied the other, after a startled pause. "What's biting you?"

"Who's that speaking?"

"That's the great Pamela Fearon. Ain't you 'eard of 'er? Where've you bin these last few months?"

"Up in the Islands. But tell me, man, quick!"

"Why, she only come out from England about six months back. Never bin on the stage before, they say. Parson's daughter. Leonard Dwighton, the producer, saw her in some village theatricals when he was over there. 'I must have that girl,' he says. 'She's great.' People wouldn't let her go. Defied 'em. Mad to get out here. Has a sweet-heart somewhere in the Islands. Dwighton put her into his new thing at the Woolpack. Of course, he was right about her acting. All Sydney at her feet in a week! Then she

tried to get hold of her young man Coul'n't find 'im. Gone to the devil, I rec'on, for his partner wouldn't say a word about it. Knocked 'er all to bits. Out of the caste for a month. But she had to go on again or starve. So to-night she's back and they're broadcasting the big scene in honour of it. Great, isn't it? You listen to this. Her husband's a gambler, you know."

He held up a silencing finger. Fascinated, Antony listened to the passionate words that issued from the loud-speaker.

"I gave up all for you! Everything that made life sweet! I sacrificed my quiet happiness, my home, my parents whom I loved, the man who worshipped me! And, now you are tired of the novelty, you fling me aside like a broken toy! If you had made another woman my rival——"

"Good God!" cried Antony, catching up his hat.

Fortunately the play was over by the time he reached the theatre. Otherwise the audience would undoubtedly have had to forego seeing their idol in the last act.

"But I can't understand why you ran away like that," she said at last, lying back, weak and hysterical, in the easy chair in her luxurious dressing-room. Then a shadow of anxiety clouded her eyes. "Was it—because you heard I was on the stage?"

Antony smiled. "No," he said. "I think it would be truer to say that it was because I *hadn't* heard you were on the stage. You see, to-night wasn't the first time I'd heard that big scene—or rather, scraps of it—broadcast. Only last time it must have been on a harmonic of the Sydney wave. And it happened to cut into something else. It was the long arm of coincidence that parted us, even as now it has brought us together."

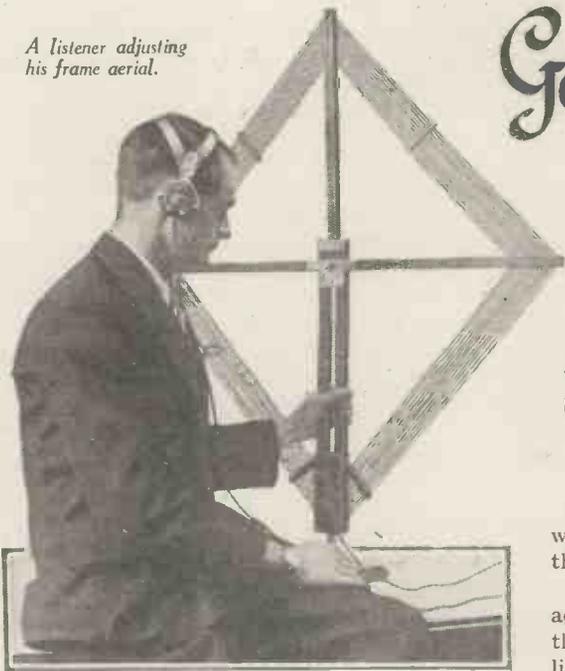
And then he told his story.

"You poor darling!" she cried. "But did you—could you really think that I would have done such a thing, Tony?"

He hung his head. "Forgive me, darling," he said. "But—well, I thought you might have been driven out of your mind. Driven even to the taking of a human life in your despair!"

"I very nearly was," she said faintly. "Oh, Tony, when you'd vanished, it was only cowardice that kept me alive!"

A listener adjusting his frame aerial.



Getting the Best from a Frame Aerial

All listeners who intend to use portable sets this summer should read this special article by

J. F. JOHNSTON

It is quite a mistake to think that a frame aerial is less efficient than an open aerial erected out-of-doors. On the contrary, a good frame aerial is far more efficient than the very best outside aerial.

Efficiency and Loudness

By this we do not mean that louder signals would be received when using the frame aerial. The word "efficiency" has nothing to do with signal strength. As applied to an aerial of any kind it refers simply to the proportion of the total energy received by the aerial which is usefully employed in operating the receiver. The higher this percentage, the greater the efficiency.

There are two main reasons for the greater efficiency of the frame aerial, the first being its low resistance. The losses due to resistance which occur in the outside aerial are considerable, however much care is taken to keep them low. Unless a counterpoise is used the majority of these losses occur at the earth connection.

When a frame is employed the whole of the aerial circuit is metallic, and if composed of heavy-gauge copper wire the resistance will be extremely small.

The second reason is that the whole of the inductance of the aerial circuit is connected between the grid and filament of the first valve when a frame is used. Everyone will have read, in connection with outside aerials, that signal strength is greatest

when the inductance of the A.T.I. is large. But in an outside aerial the inductance that can be used is limited by the fact that the aerial possesses a fairly high capacity and not much inductance is required in order to tune to the broadcast band of wavelengths.

Besides this a considerable proportion of the total inductance occurs in the aerial wire, down-lead and earth wire, which again lessens the size of the A.T.I. required.

If it were possible to do so it would obviously be desirable, in the case of an outside aerial, to connect the grid of the valve to the extreme end of the aerial wire and the earth terminal directly to earth. Then the whole of the inductance of the aerial circuit would be included between the grid and filament of the valve. But if this were done the aerial would cease to be an open one and would become a huge frame aerial having one turn only.

Less Re-radiation

Among less important reasons for the superiority of the frame may be mentioned the fact that the losses due to radiation are far less. It is a well-known fact that the open aerial is a good radiator of energy (hence its universal use for transmitting purposes), and it radiates, and therefore loses, a good deal of the energy it receives. A closed or frame aerial, on the other hand, is but a poor radiator.

However, the different types of frame aerial have themselves varying degrees of efficiency, and, as everyone wants to get maximum results which-

ever type of aerial is used, a few hints on the design of frame aerials are given here.

It cannot be too strongly borne in mind that the larger the area of the turns the better will be the results. In fact, as the size of the frame is increased signals will get stronger and stronger until the distance between the two sides of the frame is equal to half the wavelength of the station which is being received.

Methods of Winding

There are two methods of winding frame aerials in common use. In the solenoid type of winding the turns are put on side by side and all the turns are, of course, the same size. In the other manner of winding, the pancake method, the turns are all in the same plane and vary in size from the smallest turn (the inside one) to the largest turn (the outside one).

Now it is the average size of the turns which counts, and for this reason, for a given size of frame, the solenoid winding is the better. Here all the turns are of the same size. If the length of one side of the frame is 2 ft. the average size of the turns will be 2 ft. square, but a pancake-type frame the outside turn of which is 2 ft. square may have the inside turn only 1 ft. square, when the average size of the turns will be 18 in. square only.

As it is desirable to include the whole of the aerial-circuit inductance in the frame a loading coil should not be used in series with a frame aerial unless absolutely necessary. For this reason the amateur should wind a specially large frame for Daventry instead of trying to load up a frame intended for reception on the 300-to-500-metre waveband only.

However, it may sometimes be essential to employ a loading coil so that the reaction coil can be coupled to it. This is the case when one of the super-regenerative circuits is used. If H.F. amplification is employed in a frame-aerial set the reaction should be coupled, wherever possible, to the anode coil or H.F. transformer.

If the first valve is the detector the frame aerial may be wound as a Reinartz coil and the difficulty of obtaining reaction without employing a loading coil overcome in that way.

Everyone knows that the chief feature of a frame aerial is its directional property. However, the frame only serves to show the direction from which the waves actually reaching it have come. It does not necessarily point out the direction of the transmitting station.

Any large masses of metal, such as iron bridges, steel buildings, etc., are capable of diverting the course of wireless waves very greatly. Therefore it is not always satisfactory to set the direction of a frame aerial with the aid of a compass and a map.

Under some circumstances a frame

aerial may appear to lose its directional property entirely and receive almost equally well in whichever direction the frame is pointing. This is due to the existence of conducting bodies lying in various directions from the receiver. These conductors pick up the waves emitted by the transmitting station and re-radiate them. The waves will then appear to come from the direction of such conductors, and if they are distributed fairly evenly around the receiver it may be possible to receive with the frame directed towards any point of the compass.

:: THE BRAND OF CAIN ::

JACKSON was not a detective. I want to make that quite plain, so I will repeat it. Jackson was not a detective. But he had a certain aptitude towards the solution of crime. In reading his Sherlock Holmes he could always follow the workings of the mind of the great master. To him it was as plain as the missing letter in LON-ON. To him the *Police Gazette* was an open book—more or less.

Some people say that the Civil Service Department is only a theory, but then some people are wrong, for Jackson belonged to it. He was a clerk—a Civil Service clerk—and a very junior one at that. All through the day, for four or four and a half weary hours he toiled in the best interests of the State, putting new nibs in his pen and seeking a solution to the great problem of the day, namely, how to economise in the Department's expenditure.

But at night he was a different person. At night he would emerge from his rabbit hole off Tottenham Court Road, clad resplendently in a dinner-jacket of faultless design and second-hand acquirement.

Thus suitably disguised, he would perambulate the West End with a slow and dignified gait, scrutinising the faces of those who passed in the night. For it was Jackson's great ambition to alight on a really first-class crime, one into the middle of which he could step quietly but with effect.

Occasionally, in pursuit of this

quest, he would muster the necessary pence and sojourn in a bar, where he regaled himself with the talk of those around him and a bitter beer.

In spite of his assiduous study of the great masters of criminology Jackson's observant faculties were not yet very highly developed, and it was only after seeing the cringing man several times that it dawned on him that there was something peculiar about him, and during his brief three hours' leisure at the office one day he attempted to analyse it.

The man always wore his overcoat collar turned up around his neck and had a haunted, hunted look. Like Jackson himself he seemed to frequent the West End every night, but—Jackson noted—he appeared to find no pleasure in it. Always he hesitated before entering a bar, as if fearful of meeting someone he knew inside, and always he glanced round the lounge furtively before ordering his liquid refreshment.

But once assured of his safety—Jackson further noted—he proceeded to lower as many whiskies and sodas as possible in the shortest space of time.

Out in the street, before he would emerge from the obscurity of the crowded pavement to cross the road, he would hesitate again, and, having finally mustered up enough courage to take the plunge, he hurried over with almost incredible swiftness.

Jackson was intrigued. What was the mystery attached to this

man? Was he preparing the ground for a crime—a cat burglar, perhaps—or was he the perpetrator of some evil deed for whom the police were looking? He determined to find out.

So it happened that one night he followed the slinking figure across the shadows of Leicester Square and caught him up. Touching him lightly on the shoulder, he rapped out:

"What's the game?"

At his touch the other wheeled round, cowering.

"Game?" he whined, "it's no game, let me tell you that."

"Well, who are you and why do you slink about in this suspicious way?"

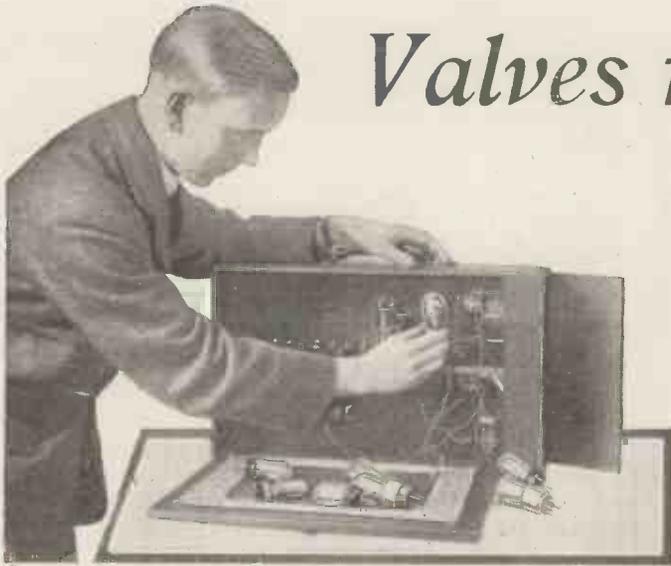
The man saw that he was trapped and yielded to the inevitable.

"I'm trying to hide myself from a vindictive world," he replied, with a look of terror in his eyes. "I'm trying to find oblivion—trying to forget. I thought I could make a fresh start, but the odds are against me. I live in terror lest anyone should recognise me—they would hound me to death. Here—in the West End—there is less risk but—" He shrugged his shoulders wearily.

"But who are you?" again demanded Jackson.

Looking up and down the street, the man saw no way of escape. Coming closer to Jackson and clutching the lapel of his coat, he told him.

"I am the man," he almost whispered, "who oscillated during the broadcast of Charlie Chaplin's speech from America." F. K.



Valves for Your Portable Set

Not all valves are suitable for use in a portable set, and your choice must be made with some care if you are to obtain the best possible results.

This article, and the table on the next page, will help you to get the right valves for your portable set.

ONCE upon a time it was a matter of no great difficulty to buy a valve (there were so few on the market), but the choice of a suitable one has now become a very important matter, necessitating careful consideration of the purposes for which it is required, the part it is to play in the circuit, and the price that is going to be paid.

Many Excellent Makes

Not that really good valves are few and far between. On the contrary, there is almost a surfeit of excellent makes. As each maker may produce anything from half a dozen to twenty or more different types, there would be no difficulty in picking out a valve suitable for a particular purpose were it not for the fact that most people acquire a prejudice in favour of one or two particular brands.

As there is little or nothing to choose between any of the well-known English valves, the actual make of the valve is not important. The principal thing is to get a valve suitable for the particular purpose it is to serve in the circuit, and one requiring a filament voltage and current which can be supplied by the L.T. battery available.

What Battery?

In choosing a valve or valves for use in a portable set the first thing to do is to decide whether a primary (dry) or accumulator (wet) L.T. battery is to be used. Then the voltage of this battery must be settled; it may be anything from just over one volt (given by a single dry cell) to six volts (given by a three-cell accumulator).

If a dry battery is decided upon you will be limited to valves requiring only about .06 ampere each, if really satisfactory results are to be obtained. Of course, if only one valve is used

available for use with an accumulator L.T. battery, depending upon whether this has a voltage of two, four, or six volts. As all these valves will give equal results with regard to reception the size of the accumulator should be the deciding factor.

WHEN YOU ARE IN TROUBLE—

do not forget that the Technical Staff of the WIRELESS MAGAZINE is always at your service to help you out of your difficulty and put you on the right path.

If you want advice on buying a set, address your query to the Buyers' Advice Bureau, not forgetting to mention how much, roughly, you wish to spend, where you are situated, what stations you wish to receive, and whether you intend to use phones or a loud-speaker for listening-in.

In all other cases, address your letters to The Editor, and not to the Buyers' Advice Bureau. Our address is the WIRELESS MAGAZINE, La Belle Sauvage, E.C.4.

When sending a query, write on one side of the paper only, and do not forget to enclose the coupon on page iii of the cover and a stamped addressed envelope for a reply.

large-size dry cells can be obtained which will supply current up to .25 ampere for a considerable length of time, but most portable sets use more than one valve.

Three different types of valves are

Suitable Valves

Having settled the type of valves, with regard to current requirements, you may now pick out suitable valves from the table on the next page. Nearly all the large firms make valves specially designed for H.F. amplification and for L.F. amplification. The former valves usually make the best detectors.

Some care is, however, necessary in the choice of L.F. valves. It seems to be a popular fallacy that a power valve is *bound* to give great volume. This is by no means the case. A power valve is simply a valve designed to handle a larger amount of power than could be dealt with satisfactorily by an ordinary receiving valve, but this power must be supplied by the preceding valves.

Power-valve Electrodes

The electrodes of a power valve are larger than those in ordinary valves, and this enables a large input to be adequately handled. But such a valve is not so sensitive to weak signals as the smaller type intended for ordinary L.F. amplification, and consequently it is seldom advisable to use a large power valve immediately after the detector, especially in portable sets. They are ideal in the second stage of L.F. amplification.

5 L.G.

Valves for Your Portable Set (Continued)

For 2-volt Battery				For 3-volt Battery (Cont.)			
Fil. Cur.	Make and Type	Fil. Volts	Use	Fil. Cur.	Make and Type	Fil. Volts	Use
·06	Six-sixty 3	2	G	·12	B.T.H. B6	2·8	L
·09	Cosmos SP18B	1·6-1·8	H	·12	Dextraudion	3	L
·1	Cossor R	1·8	H	·12	Ediswan PV8DE	3	P
·1	Cossor	1·8	G	·2	Marconi DEV	3	G
·1	Mullard PM1	1·8	G	·2	Marconi DEQ	3	D
·12	Marconi DE2 H.F.	1·8	H	·3	Dextraudion	3	L
·12	Marconi DE2 L.F.	1·8	L	For 4-volt Battery			
·12	Osram DE2 H.F.	1·8-2	H	Fil. Cur.	Make and Type	Fil. Volts	Use
·12	Osram DE2 L.F.	1·8-2	L	·06	Aneloy Economist	4	—
·13-16	Mullard PM2	1·4-1·8	P	·06	Dextraudion	4	G
·15	Cossor G	1·8	P	·1	Mullard PM3	3-3·7	G
·3	Cosmos SP18R	1·6-1·8	P	·1	Mullard PM4	3·8	P
·3	Cosmos SP18G	1·6-1·8	H	·1	Six-sixty 7	3·7	P
·3	Ediswan ARDE	1·8-2	G	·12	Dextraudion	4	L
·3	Six-sixty 2	2	G	·3	Marconi DE4	3·8	G
·34	Radion DE L.F.	1·5-2	L	·4	Extraudion	4	G
·34	Radion DE H.F.	1·5-1·8	H	For 6-volt Battery			
·35	B.T.H. B3	1·8	G	Fil. Cur.	Make and Type	Fil. Volts	Use
·35	Dextraudion	2	G	·06	B.T.H. B7	6	P
·35	Marconi DER	1·8	G	·06	Six-sixty 5	5·5	P
·4	Dextraudion	2	L	·12	Marconi DE8 H.F.	5·6-6	H
·4	Marconi DE7	1·8	G	·12	Marconi DE8 L.F.	5·6-6	L
·5	Ediswan PV6DE	1·8-2	P	·25	B.T.H. B4	6	P
·5	Marconi DE6	1·8-2	P	·25	Ediswan PV5DE	5·0	P
For 3-volt Battery				·25	Marconi DE5	5-6	G
Fil. Cur.	Make and Type	Fil. Volts	Use	·25	Marconi DE5B	5-6	H
·06	B.T.H. B5	2·8	G	·25	Marconi DE5A	5·5-6	P
·06	Dextraudion	3	G	·25	Six-sixty 4	5	P
·06	Ediswan AR06G	2·5-3	L	·25	Six-sixty 6	5	P
·06	Ediswan AR06R	2·5-3	H	·34	Radion Pyramid 1	5·5	P
·06	Marconi DE3	2·8	G	·34	Radion Pyramid 1A	5·5	P
·06	Marconi DE3B	2·8	H	Letters in the last column have the following significance:—H, high-frequency amplifier; L, low-frequency amplifier; G, general-purpose valve; P, power valve. It should be noted that because a valve is particularly recommended for a particular purpose, it does not necessarily follow that it cannot be used for any other function.			
·06	Osram DE3	2·8	G	SMALL CAPITAL LETTERS after the name or series number of a valve (such as Cossor R) indicates the distinguishing colour mark, as follows:—R, red; G, green; B, blue.			
·06	Radion DE L.F.	3	L				
·06	Radion DE H.F.	3	H				
·06	Radion Non-ring	2·7-3	—				

BROADCAST MUSIC OF THE MONTH

NOTWITHSTANDING the tendency which still prevails towards a superfluity of classical, and particularly Elizabethan, music, a lighter texture has been imparted to many of the programmes by the introduction of restaurant and seaside relays.

The first transmissions, made early last year, of the dance band of the Royal Bath Hotel at Bournemouth, followed by Albert Sandler at Eastbourne, proved that such relays are keenly appreciated, and accordingly we have had concerts from Brighton, Bexhill and Ramsgate.

"John Henry's Revels"

At the last-named resort, John Henry, the B.B.C.'s own comedian, is holding court, with a clever little band called "John Henry's Revels," and the relay of these was of special interest to London listeners, who have learned to look upon John Henry as particularly their own property.

Restaurant Music

The idea of combining classical music, great artists, and the dining table was a novel idea to many hotel proprietors, until the fashion was set at the Savoy, where, by utilising the Orpheans and Havana Bands, there was speedily shown such appreciation that most other big London hotels have followed suit.

Value of a Soloist

Even earlier still was the value of a great soloist realised, for as far back as 1920, the Hotel Victoria secured the services of Emilio Colombo, the Italian violinist, who has for many months broadcast, while at the Piccadilly, De Groot has been playing for many years.



Mr. Eric Coates.

The life of Emilio Colombo reads like a romance. An Italian by birth, he first claimed attention at Brussels, where he was unanimously awarded first prize with honours at the Brussels Conservatoire. Later he went to Petrograd, where he stayed for nearly ten years; he was a favourite soloist of the

late Tsar and his court.

Then came the revolution, at which time Signor Colombo was in the Crimea. He set out for a concert tour across Siberia, but the Bolshevik movement hurried him on.

Then he went to Vladivostok, and later to Tokio, where he played before the members of the Mikado's family. He next went to Java, Sumatra, India, China and thence to Japan again, and in 1919 he crossed to Canada for new worlds to conquer.

In London

London heard him first in 1920, and, except for occasional Continental tours, he has become one of the leading lights of musical London. His concerts are broadcast regularly by 2 L O and Daventry.

Artistic

Signor Colombo's programmes are always on the artistic side, and admirers of "jazz" must fain go elsewhere. A typical programme, for instance, that was specially

broadcast from 2 L O and 5 X X started with the Hungarian March of Berlioz, meandered through Wagner, Verdi, Gounod, Puccini, Leoncavallo and Massenet, and so enraptured his audience in the hall, apart from the invisible listeners, that cores were insisted upon at every turn.

Frascati's Restaurant has another well-known soloist in Camille Couturier. Late professor at the Academy of Rheims, M. Couturier not only plays the violin, but is a soloist-



Mr. Sinclair Logan.

A MODERN LOVE LETTER.

(Heart beats can now be recorded on a gramophone and then passed over the wireless.—Daily Paper.)

DEAR Joyce, although we're miles apart
And mails are few and far between.
The beating of my faithful heart
Will help to keep my memory green.
Each beat upon the gramophone
Has been recorded now, you see,
So listen-in when you're alone.
I'll woo you palpitatingly,
Because the wireless will transmit
My heart beats as a form of greeting—
This new invention's simply "it,"
I'm sure 'twill take a lot of beating!

LESLIE M. OYLER.



Miss Elsa May.

Mr. Hend
Wolters.



on both clarinet and saxophone.

His little band includes four well-known musicians, namely, Henri Willems, late Professor of Harmony at the Academy of Anvers, who is also a composer; Henri Carre, who won a first prize at the Paris Conservatoire; Couturier himself; and Mme. Couturier, who plays duets and conducts with her husband.

Each musician is able to play several instruments, hence the variety of their concerts.

The work of De Groot at the Piccadilly, Vera Clarke at the Trocadero, and De Pietro with Joan Revel at the New Princes, needs no comment, but recent additions have given us the orchestras at the new Verrey's Restaurant, the Hotel Cecil, Carlton, and Hotel Metropole.

Fascination of the "Mike"

By this time there are very few concert artists or composers who have not succumbed to the fascination of appearing before the microphone. Sir Henry Walford Davies has long given broadcasting his support, alike on the educational, the executant and

Miss
Helena
Taylor.



Miss Mill's talents may be better understood when one looks at some of the works in her repertoire. Debussy's Sonata in D minor and Brahms in E minor, as well as that of Grieg, are all works that demand not only finished technique but mobility of tone and expression in order to obtain the success that she has undoubtedly achieved.

Two violinists who deserve special notice are Pansy Newman, who has been heard from the Winter Gardens, Bournemouth, where she played with the Municipal Orchestra under Sir Dan Godfrey, and Cavalier Harry Solloway.

Although of Russian birth and parentage, Mr. Solloway is styled an American violinist, for he went to the States when very young and was brought up there. When he took up the violin professionally he was sent to Paris, where he studied at the Conservatoire Nationale.

When war broke out, Mr. Solloway had to abandon his instrument, and it was some seven years before he resumed his musical work. Proceeding to Hungary, he won the scholarship which gave him two years tuition under Jenö Hubay.

At the end of this time Hubay predicted a brilliant career for Mr. Solloway, and this has undoubtedly been won, for he has played before

One of the best known is "Everyman," a setting of the famous morality play as an oratorio.

Other concert artists who may be mentioned are Jean Sterling Mackinlay, who comes of a famous family, and is the sister of Sterling M. Mackinlay, the well-known vocalist. Miss Mackinlay has made quite a great feature of special children's vocal recitals for some years.

A classical pianist who will go far in her career is Agnes Mill, a young broadcaster who, apart from the success of her broadcasting work, has created a very favourable impression both in London and in Birmingham by her recitals. At the latter city she joined issues with David Sisserman, a London 'cellist of many attainments, who has also broadcast from both the London and Daventry stations.



Sir Walford Davies



Mons. C. Couturier.



Miss Agnes Mill.

the composition side of his art. His transmissions to schools from 2 L O have long been a standing feature of the week's programmes, and his compositions have also been heard.

Beginning his career as an organist at St. George's Chapel and Windsor Park Chapel Royal, he later became organist of the Temple Church in succession to Dr. Hopkins. His first important composition was a symphony produced by Sir August Manns at the Crystal Palace in 1895, and since then various compositions for orchestras, songs, cantatas, sonatas and violin have been played all over the country.



Signor
Emilio
Colombo



Miss J. S. Mackinlay.

Jacoba Wolters, another harpist, who is attached to the Bournemouth Municipal Orchestra, and whose solos were again broadcast recently.

Her brother, Hend Wolters, is a distinguished 'cellist, and also a member of Sir Dan's Orchestra; his solos are frequently relayed.

The average ballad singer is always well represented in every broadcast programme. In the provinces, particularly from Manchester, Miss Helena Taylor is a great favourite; she has specialised in modern French and English songs. She will be remembered as having taken part in the first S.B. programme from Manchester.

Lovers of real Scots songs usually keep a lookout for the name of Margaret F. Stewart, who holds a unique place by reason of her many activities. She has made a special study of Hebridean songs under the guidance of Mrs. Kennedy Fraser, the well-known authority on these songs, and Neil Orr, conductor of the Edinburgh Gaelic choir.

Born and trained in Scotland, Miss Stewart has achieved considerable fame for her work all over the country, including London, where she appeared at the Royal Albert Hall. She has also played leading rôles in the Edinburgh Grand Opera Company, in *Rob Roy*, *Guy Mannering* and other plays, and has broadcast frequently from the northern stations.

Elsa May, Jerome Murphy and Sinclair Logan are all familiar names to listeners. Sinclair Logan was born in Cheshire and educated at the Royal Normal College for the Blind. Despite his affliction, at the age of 19 Mr. Logan obtained the L.R.A.M. for composition and A.R.C.M. for solo singing. His songs are often sung by John Coates, Norman Notley and other well-known vocalists.



Miss Pansy Newman.

the King of Italy, and had conferred on him the title of Cavalier. Through the ether he has been heard to great advantage, and his recent broadcasts were made prior to a big Continental tour.

Other popular instrumentalists heard recently include Mavis Shellshear, a harpist heard very early in broadcast music, and

Mr. Sinclair Logan travelled for four years over England with Lady Pearson's Concert Party, helping to collect funds for St. Dunstan's.

He is now an organist in West London.

This artist makes a feat of memorisation, and can memorise such works as Somervell's "Passion of Christ," a complicated cantata occupying 75 minutes in performance, train

his choir and accompany the rendering, in a few weeks, as well as carry on his normal work.

Kennedy Arundel is another of our early broadcast stars, and one remembers hearing him from Marconi House as well as from Savoy Hill and the provinces. He was recently heard again from the Bournemouth station.

Composers

Two well-known composers and executants are Eric Coates, whose *Miniature Suite* is perhaps one of the most popular of his many works, and Warwick Braithwaite. The latter adds also to his executant powers by his work as musical director of Cardiff station, from

which his wife, Felice Hyde, is also frequently heard in excerpts from her operatic rôles.

Of special interest was the announced celebration of the Bridgwater Charter Day on June 26, relayed from the historic Cornhill.

Sea shanties are now familiar to all listeners, and of special interest was the performance by members of the Seven Seas Club, on June 25, at Anderton's Hotel, London. This club is composed of officers who have served not less than three years at sea either in the Royal Navy or Merchant Service, so they should be authorities on these songs.

STUDIUS.



Miss Mavis Shellshear.



Miss Margaret F. Stewart.



Mr. Harry Solloway.



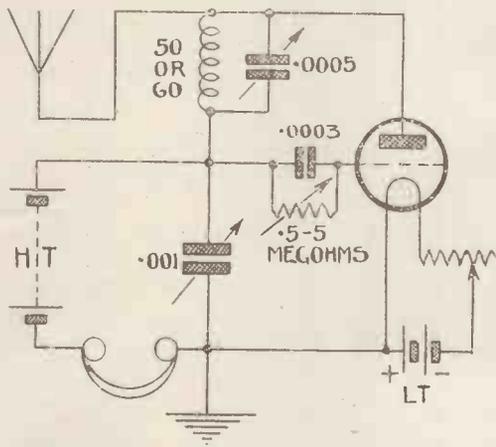
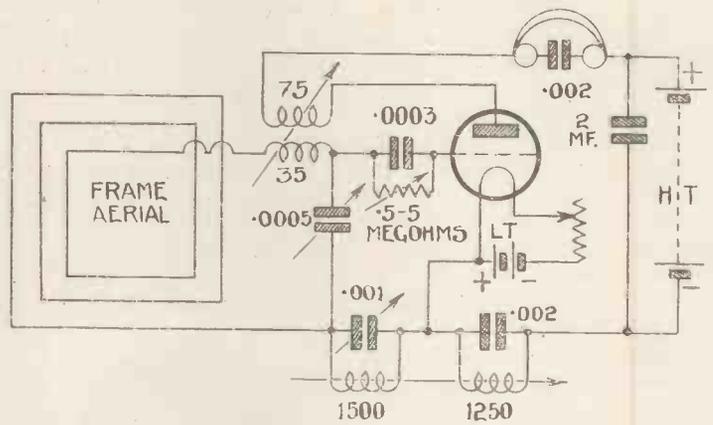
Mr. Jerome Murphy.

You Must Try These Special Single-valve Circuits

The Armstrong Super one-valve circuit, noted for its abnormal range and power, is shown here.

Used in conjunction with a frame aerial this receiver is capable of bringing in most of the main B.B.C. stations.

It is ideal for portable-set use with phones, where weight and bulk are important.



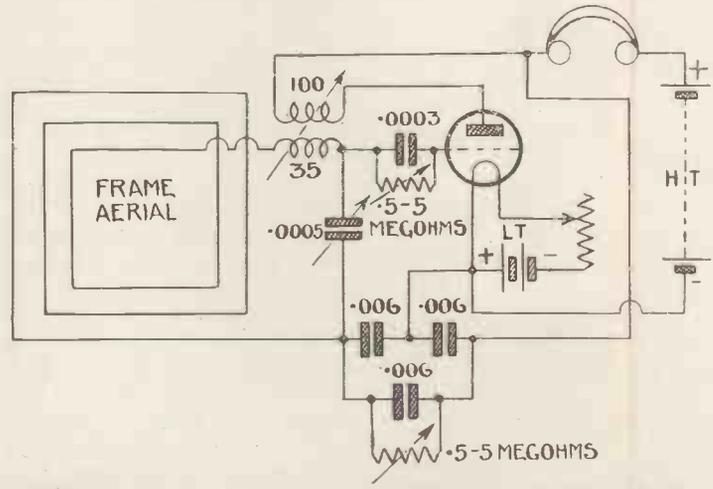
Known as the May circuit, this differs from the other two on this page in that it is designed for use with an outdoor aerial.

Owing to its super effect it is capable of very powerful radiation and as such should not be employed in a congested area.

It is suggested only for portable-set use, when its erection and operation in the country is not liable to interfere with the pleasures of others.

Another single-valve super circuit for use with a frame aerial is shown in this diagram; this is the well-known Flewelling circuit.

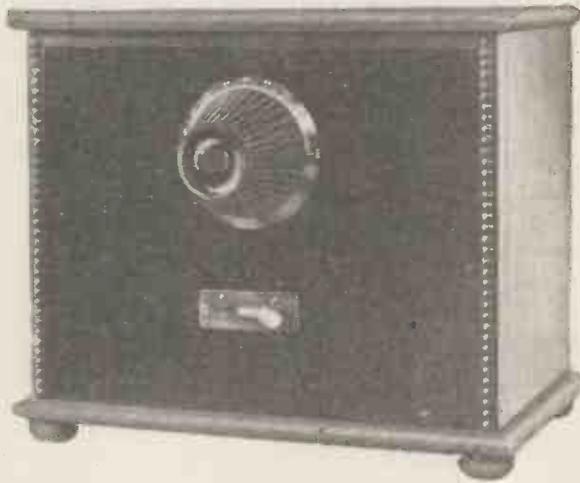
Although not capable of quite the same volume and range as the Armstrong, it gives extraordinary results compared with an ordinary single valver. It is very suitable for amateur use.



THE OLD FOLK'S CRYSTAL SET

Capable of receiving both the local station and Daventry when within range, this crystal set has the simplest possible controls.

A permanently-adjusted detector is used, and the tuning can be altered for the local station or Daventry by means of a simple lever switch.



Only the best components have been used in the construction of this set, which has been specially designed, built and tested by the Technical Staff of the WIRELESS MAGAZINE for those who want a receiver with the simplest possible controls and, at the same time, the greatest efficiency.

SIMPLICITY, both of operation and construction, is the feature that makes the crystal set described in this article eminently suitable for use by the old folk, who cannot be expected to view with equanimity the alarming array of knobs that is more or less inevitable in a larger and more complicated set.

Best Components

In this set the Technical Staff of the WIRELESS MAGAZINE has endeavoured to incorporate the most up-to-date apparatus, but simplicity has not been sacrificed for novelty in design.

Thus, although provision has been made for receiving either Daventry or a local station, the choice of either is governed by the flick of a switch, once the correct dial setting for each station has been found.

How this state of affairs has been accomplished is best understood from a study of the circuit diagram.

To be able to switch from a short-wave broadcasting station to a long-wave station, or, indeed, to any other wavelength, *without altering the dial settings*, necessitates the use of two separately tuned circuits, which in turn means two condensers and two coils.

In the circuit diagram there appear to be two variable condensers connected together, but in reality these two are incorporated in one instrument called a "bridge condenser," which has several advantages over the ordinary type.

Two good reasons for its use here are, firstly, the small panel space required—half that which two separate condensers would need—and, secondly, the simplicity of the wiring scheme.

Bridge Condenser

This bridge condenser consists of a bank of fixed vanes divided into two equal sections (electrically all joined together) and two independent sets of moving vanes (one for each section of fixed vanes).

The two control knobs which operate the two sections of moving vanes are mounted one above the other, as is clearly shown in the photograph.

What happens when the switch is moved from one coil to the other is that one half of the moving vanes is cut out of circuit, just as one condenser would be if two separate instruments were used.

This brief explanation should render the diagram quite clear.

The crystal detector used is quite foolproof, being one chosen from the many excellent types of permanent detectors now on the market.

Tuning Coils

The two coils seen in the diagram are of the modern low-loss plug-in type, a No. 40 coil being used for short-wave stations and a No. 250 coil for Daventry.

A list of components actually used in the construction of this set is given below:—

Cabinet and baseboard of dimensions shown (Unica Cabinet Co.).

Ebonite panel, 9 in. long by 7 in. wide (Trelleborgs or American Hard Rubber, British Ebonite).

Ebonite terminal strip, 4 in. long by 1½ in. wide by ¼ in. thick.

2 single-coil sockets (Athol).

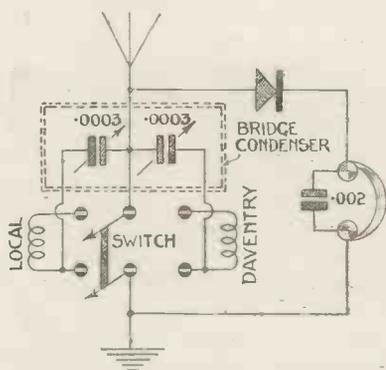
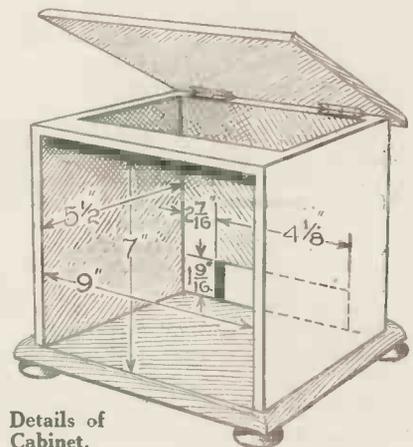
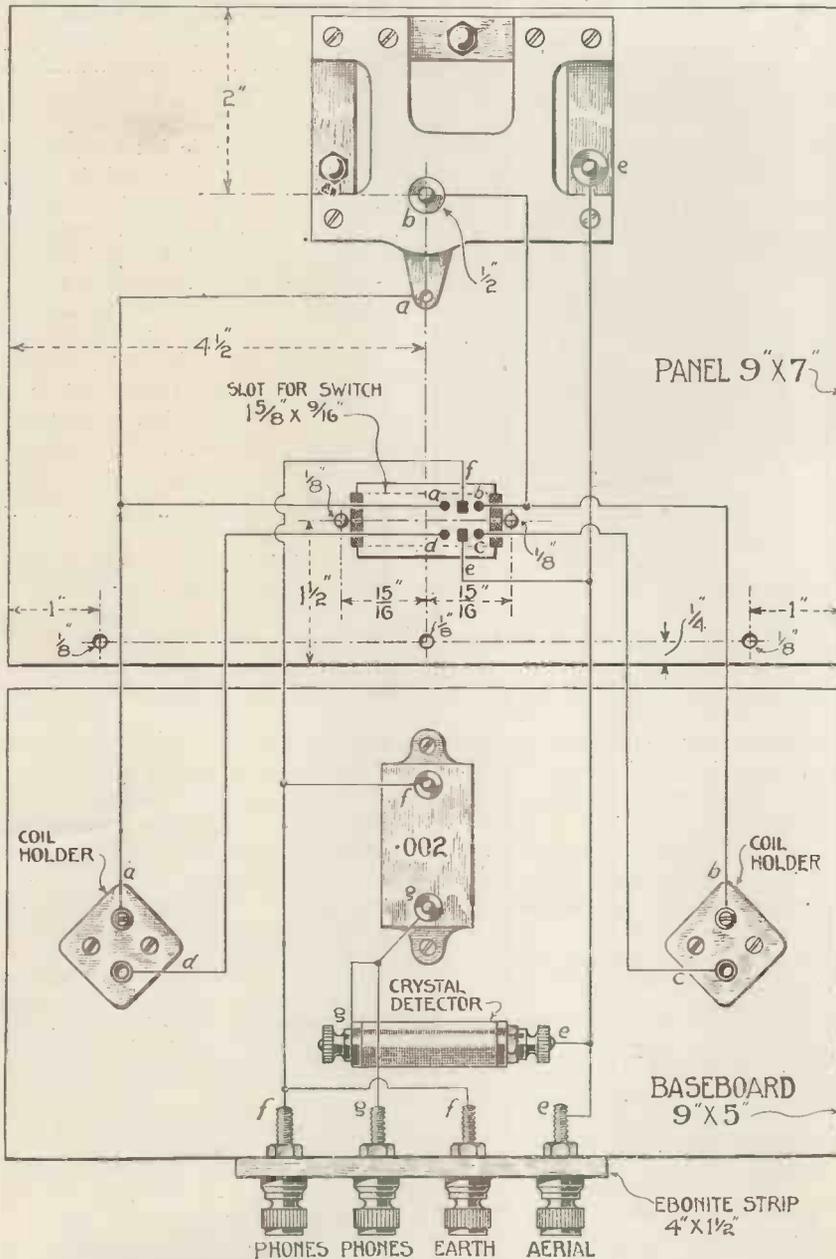


Diagram of Circuit used for Old Folk's Crystal Set.



Details of Cabinet.

The Old Folk's Crystal Set (Continued)



Combined Layout and Wiring Diagram of the Old Folk's Crystal Set.

Devicon Bridge condenser (Radio Devices).

.002-microfarad fixed condenser (Efesca, or Dubilier, Mullard, T.C.C.).

Double-pole change-over switch (T.M.C., or Dubilier, Ericsson).

Permanent crystal detector (Griffoco).

Terminals: One A, one E, and two PHONES. (Belling and Lee.)

Various wood screws, wire, solder, etc.

When all these components are at hand the fairly simple drilling operations can be started. Before start-

ing to drill, mark out the panel as detailed in the combined drilling and wiring diagram, and then cut the switch slot.

This is best done by marking out the rectangular space to the dimensions shown, drilling as many $\frac{1}{4}$ -in. holes in this space as possible, and then knocking away the remaining waste ebonite with a hammer.

The rough edges are then trimmed with a file and a fairly neat slot is the result.

Care should be taken when drilling the two holes for fixing the switch plate to the panel, as these are very close to the slot.

Variable Condenser

The hole for the variable condenser can be made by drilling as large a hole as possible, say $\frac{3}{8}$ in., and enlarging this with the end of a file to the requisite size. The other holes are straightforward drilling jobs, and should cause no trouble.

When this part of the work is finished, drill the terminal strip to take four terminals, spaced 1 in. apart. Two smaller holes near the bottom of the strip are required for the screws which secure the strip to the baseboard.

When the terminals are fitted to the strip in accordance with the combined wiring and drilling diagram, screw the strip to the centre of the back of the baseboard, so that it will easily pass through the slot in the cabinet.

After the condenser and switch have been secured to the panel, the latter should be screwed to the front of the baseboard by means of three brass screws.

Coil Sockets

With the panel in position it is easy to arrange the two coil sockets so that when the coils are plugged into them they do not foul the switch or condenser. The photographs may be of use when determining the positions of these sockets.

Now comes the most important part of the constructional work, namely, the wiring up of the various components. The photographs give an idea of one method.

Bare tinned-copper wire of No. 16-gauge is used, and every wire is either parallel or at right-angles to every other wire. It is just as efficient, though not so neat in appearance, to wire up the set with insulated wire, such as Glazite, and ignore bends except where they are necessary. The main point is to solder all the joints as efficiently as possible.

If the constructor understands the theoretical diagram he will no doubt wire up the set from this, but for

A Special "Wireless Magazine" Design

the benefit of those who find any difficulty in following such diagrams, a more simple procedure is to follow the combined drilling and wiring diagram.

Those points marked *a* should first be joined together with one wire or as few wires as possible; then those marked *b* in the same way, and so on.

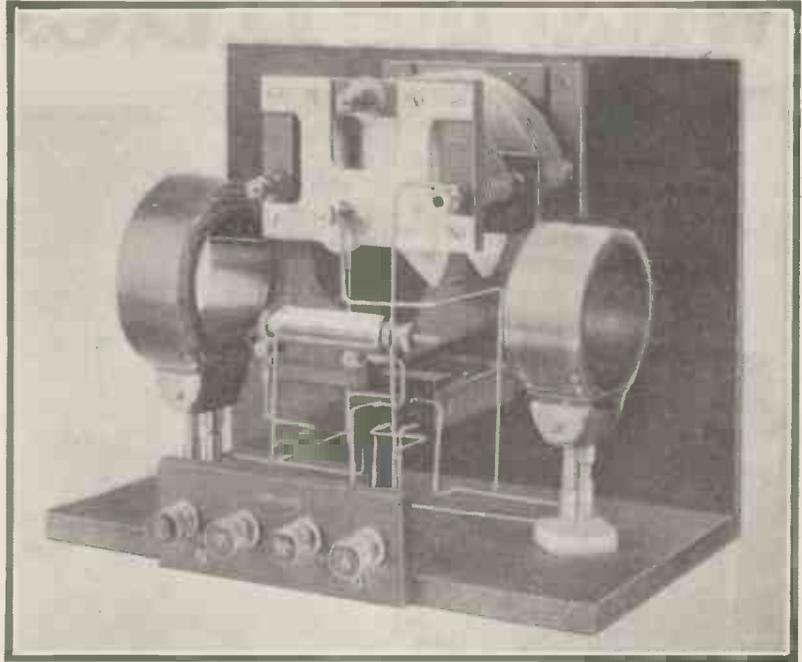
Wiring the Switch

Care should be taken to wire the switch connections correctly, and to space them as much as possible.

Two of the components, namely, the permanent detector and the phone condenser, are not secured to the panel or baseboard, but are held in position by the wiring.

When the wiring is finished the set can be housed in the cabinet, but before doing this a coil should be plugged into each coil socket. Here it should be noted that it does not matter which socket receives the big coil, but to avoid confusion it will be assumed that a No. 250 coil is plugged into the right-hand socket (with respect to the front of the set), and the No. 40 coil is plugged into the left-hand socket.

A pair of sensitive phones and a good aerial system are indispensable adjuncts to a crystal set, and pro-



Photograph of the Old Folk's Crystal Set.

viding these are connected to their correct terminals a search for signals will not long be in vain.

To receive Daventry, with the coils in the positions mentioned, the switch should be in the central position and the underneath knob rotated

until signals are heard. If the constructor is within range of a main B.B.C. station, a movement of the switch to the right, and the rotation of the upper knob, will bring in these short-wave signals.

Permanent Detector

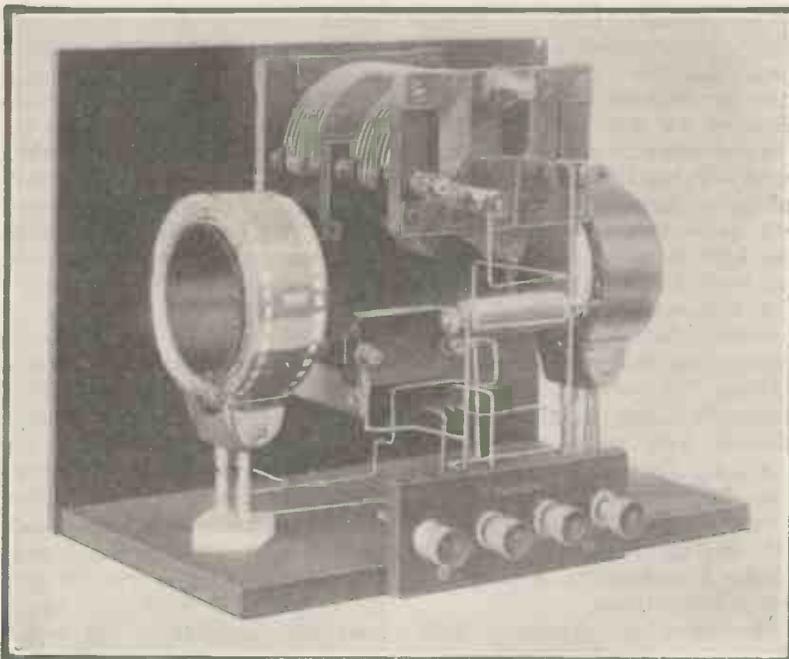
There is no adjustment required of the crystal detector, and once the correct dial settings for Daventry and the local station have been found, the only operation required to listen to local or high-power programmes is to place the switch one way or the other.

The old folk's first acquaintance with the set should be *after* the dial settings have been found.

SOME of the relay programmes are not proving very relay-able.

ONE of the Continental stations makes its announcements in five languages. Like father does when he learns that mother has been using the aerial to dry the clothes on.

A LADY listener from the London suburbs complains that the items in the women's talks do not tell the women what they want to know. But how can the B.B.C. be expected to find out exactly how much each next door neighbour's hat cost?



Another photograph of the Old Folk's Crystal Set.

A Feature Supplied by the Officials at Savoy Hill

What the B.B.C. Is Doing



London's transmitting gear, situated on the roof of a large Oxford Street store.

IT is not for the officials at Savoy Hill to attempt by self-laudation to emphasise the part that they played in connection with the broadcasting of news during the general strike in May; but it is desirable in the public interest that some particulars should be given of the conduct of the service in that very trying period when the great majority of the population would have been without any information at all had it not been for the wonderful instrument that science has placed at our disposal, and without which the agony and suspense of the isolation forced upon the country by the withdrawal of the newspapers might have had disastrous consequences.

Benefits to Industry

First, let us say that the wireless industry has benefited to an incalculable extent by the service which broadcasting rendered throughout the crisis. The capabilities of wireless were brought home forcibly to those who previously took, perhaps, only a mild interest in it and regarded it chiefly as a service of entertainment.

The increased sale of sets and components which was so encouraging

a feature of the early half of May is not expected to be just a flash in the pan; rather it may be hoped that the industry received a new impetus which the trade will not be slow in fostering.

Programme Modifications

The broadcast programmes generally underwent but little modification, considering the difficulties of transport facilities for artists and of adhering to the schedule times. But an enormous amount of additional work was involved in the broadcasting of news bulletins, and for that purpose the London station was kept working continuously at the beginning of the strike from 7.30 a.m. until 1.30 the following morning. On May 4, the first day, a dozen bulletins were put out.

When the work became more systematised, the special news transmissions took place regularly at 10.0 a.m., 1.0 and 4.0 p.m., apart from the general news bulletins at 7.0 and 9.30 p.m. Additional bulletins, dealing with the emergency railway arrangements, were broadcast at other times.

Altogether, seventy-seven bulletins were broadcast between 10.0 a.m. on the first day of the strike and

1.0 p.m. on May 18, when the last of the special bulletins was issued. Thousands of telephone inquiries were dealt with by the Emergency News Service staff from members of the public, who evidently regarded Savoy Hill as the repository of all knowledge respecting strike developments.

The whole of this extra work was carried out by the usual staff, some of whom left the premises for scarcely an hour on end throughout the nine days of the strike. All responsible officials of the Company had to be within call at practically a moment's notice, and precautions were taken to ensure an uninterrupted service.

* * *

Delicate Position

But all these matters were of minor importance in comparison with the delicate position in which we were placed vis-à-vis the constitutional authority and the strikers. Under the Emergency Regulations the Government might have decided to take control of the broadcasting organisation, and it was regarded as a gratifying indication of the confidence reposed in our loyalty and judgment that the Company was not commandeered, but was

A Review of the Latest Wireless Developments

Notings on the Month's Progress

Radio Pictures—

THE success of the Ranger method of transmitting pictures by wireless is confirmed by the Marconi Company's announcement that the system is now in commercial operation. The charge is naturally somewhat high, being approximately £10 for the transmission of a quarter-plate photograph, and double that amount for a half-plate.

The most suitable type of picture for wireless transmission is a black-and-white drawing, giving high contrasts of light and shade. The finer shades found in half-tone pictures are liable to be lost or impaired in transmission owing to the effect of atmospherics.

* * * * *

—And Television

As regards true television, where a moving-picture effect is aimed at, the nearest approach to success seems so far to have been achieved by Mr. C. F. Jenkins, in America, and by Mr. J. L. Baird in this country. The former utilises a rotating disc of prismatic lenses which cuts up the image to be transmitted into a series of sections, the light from which is thrown in rapid succession upon a light-sensitive cell.

In his Televisor apparatus Mr. J. L. Baird depends upon a combination of two rotating discs to cut up the rays of light before they reach the sensitive cell.

The first acts as an obturator, or stop-shutter, passing an intermittent beam of light ten times a second, so as to secure the well-known persistence-of-vision effect.

The second disc rotates at a much higher speed than the first, and comprises a series of holes or lenses arranged in spiral formation.

These cut up the light, as it passes through the slots in the first disc, into a number of parallel rays which traverse the object section by section, in rapid sequence.

* * * * *

In the course of a recent discussion before the Radio Society of Great Britain, Professor Eccles, F.R.S.,

gave an interesting summary of the manner in which varying atmospheric conditions affect the passage of wireless waves, particularly over long distances.

Quite apart from any reflection which may take place from the Heaviside layer, there is a natural tendency for the uppermost layer of a travelling wave to be bent or tilted forwards, owing to the gradual decrease in air density at the higher altitudes.

As the air-density diminishes, its specific inductive capacity lessens, and the velocity of the higher portions of the wave accordingly increases relatively to the lower parts, thus causing the wave-front to be tilted forward, more or less parallel to the earth's surface.

The presence of water vapour also affects the specific inductive capacity of the atmosphere, and so causes variable refraction effects, which may be likened to the quivering outline of an object when viewed across an intervening layer of heated air, such as that above a naked flame.

Fluctuations of this sort are responsible, to some extent at least, for the peculiar fading effect so often experienced by listeners to long-distance transmissions.

Density Fluctuations

It is well known to meteorologists that the density of the atmosphere some eight to ten miles above sea-level is subject to peculiar and violent fluctuations, as is proved by the behaviour of test balloons, which at this height are frequently observed to swing up and down every two or three minutes through distances of several hundred yards in their travel. This again tends to create erratic movements in the wave front of a travelling ether wave.

It is probable, however, that the most frequent cause of fading arises from the irregular ionisation of different atmospheric zones, due to fluctuations in sunlight.

* * * * *

Some curious effects were observed by Captain Round in the course of his voyage of investigation on board

the s.s. *Dorset*, particularly in connection with what may be called Antipodeal reception.

At a place called Kooweerup, near Melbourne, which is practically our antipodes, it was observed that, although there were two equal alternative routes open to them, the signals invariably preferred the path that was most in darkness. Sunlight means an increase in atmospheric ionisation, which hampers the passage of ether waves such as an ohmic resistance clogs the flow of an electric current, so that the path of least resistance is along the zone of night.

At those times when there was an equal gradation of day and night along both alternative paths, the signals were found to display considerable fluctuations in strength, owing to the waves from opposite directions arriving out of phase with each other. Any irregularity in the frequency of the waves as radiated from the transmitting aerial will obviously tend to increase such interference.

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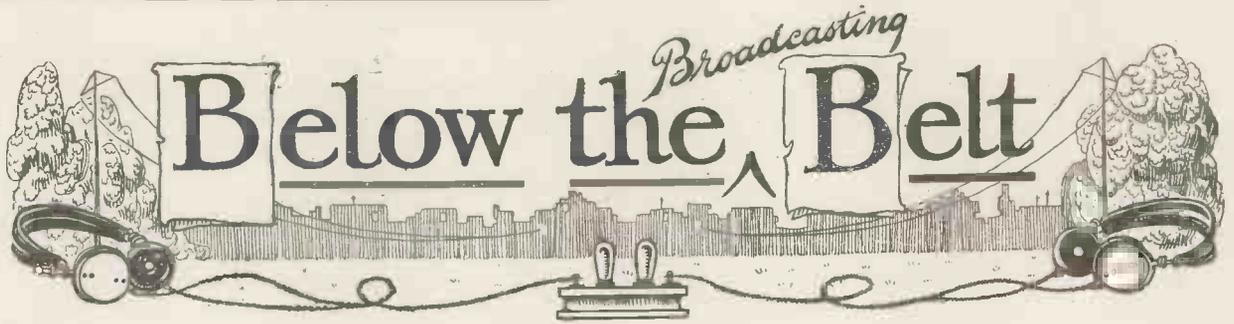
Tuning-fork Control

It is for this reason that particular care is taken to preserve a constant wavelength emission in the case of powerful long-distance stations such as Rugby, where the special considerations of selectivity which govern short-wave broadcasting do not apply.

In the Rugby installation, as well as in the Post-Office station at Northolt, the wavelength frequency is controlled by a special tuning-fork, which is automatically maintained in constant vibration by causing it to form part of the back-coupling link between the grid and plate circuits of an oscillating valve.

The actual period of vibration of the fork is 1,800 cycles per second, the high-frequency oscillations radiated from the aerial being obtained by selecting the ninth harmonic of the fork vibrations. Special precautions are taken to prevent any fluctuation in the master-control frequency, the fork being maintained at a constant temperature by means of an adjustable electric heater. B. A. R.

An Article by that Well-known Amateur
Transmitter and Experimenter — 5 Y M



Bad Conditions : Outbreak of Sunspots : New Continental Station ? : British Short-wave Station : Record for Miles per Watt : Great Game of "Card Collecting."

THE conditions of the last month have served at once to show the limitations of low-power short-wave work, and to demonstrate the patience and pertinacity of the amateur and his ability to get some sort of results even in the most unpromising conditions of the ether.

Amateurs Carrying On

Amateurs have been carrying on, and there has been quite a large amount of two-way communication with America—both North and South—Australia, New Zealand, Indo-China, and other far-away places. Take it all round, though, conditions in the first part of the year have been disappointing from the amateur point of view.

Bad conditions have been particularly noticeable in the afternoons and early evenings, when most of the ordinary short-distance work is done by the really low-power stations—those which use just a few watts of energy; "fly-power" stations they are now called.

Evening after evening these low-power stations have had the experience of being unable to reach out to anything like the distances to which they are accustomed. Those with not much experience, or with not a big equipment of measuring instruments, have turned to frantic overhauls of sets and aerials.

Sense of Security

Then, maybe, a couple of days of really good conditions would appear, and they would be lulled into a sense of security and the belief that they had effected big improvements in the station. Back, then, came the bad

conditions, and disappointment was the order of the day.

At my own station, now settled down to definite shape, I have been able to make some interesting observations on daily and monthly changes in these mysterious conditions of the ether, the atmosphere, or the earth, that make for good or bad transmission, and, quite frankly, I am just as much in the dark, just as puzzled, as I was a year ago.

All I know is that eight months ago I was, in daylight, transmitting to distances of fifteen hundred miles with a power of about fifteen watts. Recently I have had all my work cut out to establish daylight communication over 500-600 miles with twice the power.

Outbreak of Sunspots

The only difference in cosmic conditions of which I am aware is that there is now a very considerable activity in the sun, as evidenced by an outbreak of sunspots, whereas eight months ago that outbreak was only just starting.

Sunspots mean a very considerable increase in the amount of radiation from the sun, and there is every reason why this should affect the ether of space and also that very important layer of electrified particles which acts as a kind of "sounding board" above our earth. We depend on that "sounding board" for our low-power long-range work, and if it is disturbed our experiments must be upset also.

These bad conditions seemed to culminate on Whitsunday. I have never experienced a deader day. At first I put it down to the fact that

the whole of Europe was on holiday and enjoying the sun; but, by switching in another valve and listening hard, I could hear that there were quite a number of stations working; but they were so faint that they were hardly readable.

Giving It Up

Every now and again a station using 100 or 200 watts would sing out clearly; but I soon found that it was no use calling them when the utmost power I could put into my valve was 30 watts. I gave it up and played tennis instead—which was probably better for my health.

Recently there has been a continental broadcasting station working on very much the same wavelength as the short-wave station of W G Y, that is, between 38 and 39 metres. I have not yet been able to get its call sign, as the quality of the transmission is very poor. I believe, however, that it is a French station. Some of my readers may have been more lucky. If any have I shall be glad to know what this station is, so that I can inform others.

British Short-wave Station

Touching the question of short-wave broadcasting we are still waiting for a British short-wave station. I hear that we may have one next year; also that it will probably be situated at Daventry. But whether this is a fact or not I do not know. I have heard tests on short waves that, apparently, emanated from B.B.C. stations; but so far nothing has come of this work, save the wireless link between the Old Vic

BELOW THE BROADCASTING BELT (Continued)

and 2 L O, which is not often used nowadays.

Not a Great Deal of Money

The fact of the matter is the B.B.C. has not a great deal of money to spare for experimental work outside that absolutely necessary for keeping the ordinary stations up to date and progressing.

I know there is an idea around that the B.B.C. is very rich. It would be well off if it got 7s. 6d. out of each ros. collected by the Post Office—but it doesn't, or anything like it. This question is not in my province, however, so I will leave it alone and dive down below the broadcast belt again.

* * * * *

When you read this holidays will be looming, if not actually being enjoyed, and the amateur transmitter will be recruiting his health and strength and endeavouring to save a little money for further efforts in the autumn.

When we say good-bye to summer time, then the amateur will begin to sit up and take notice. We are all looking forward to the autumn, and hoping that really good conditions will return and that we shall be able to get to the far corners of the earth once more on quite low powers.

And, talking about that, I suppose the record for miles per watt is still held by the British amateur G-5SI, who twice worked with an American station on in input of just over half a watt. It is a tremendous achievement, and we British "hams" are proud of our 5SI.

* * * * *

"Card Collecting"

The great game of "card collecting" is growing apace. Some months ago I wrote a note in this magazine encouraging receiving stations to join in the fun and help the transmitting amateur by sending in reports of calls heard. The game, as I explained it then, was that you send a post card to the transmitter giving him details of what you heard, and he responds by sending you one of his station cards, printed in two colours, as a rule, in return.

But if you join in the game you must know the rules. A transmitter

is not grateful to you for sending him a card with "Heard your signs on Sunday, please send me one of your cards."

Most active stations have very considerable correspondence, and such a card as I have quoted—it is copied word for word from one I received—is of no more use than a piece of old stamp paper and of not so much use as a dud valve. It is certainly not worth a card and a penny stamp to acknowledge.

Information Needed

The kind of information the transmitting amateur is anxious for, and glad to get and acknowledge by a card, is that which concerns the loudness of his signals; the kind of note he is sending out; whether there is any fading; whether his wave is constant or swinging; the exact hour of the reception, stated in GMT; the state of the weather at the receiving station and the number of valves used for reception.

The code used is as follows: Q R K means "your strength is" and is usually indicated on the R scale, starting with R-1, "inaudible or just audible, but not readable," and ending with R-9, "full loud-speaker strength." Naturally this scale shifts with the number of valves used, and so it is important that this information is given.

"Your Note Is . . ."

Q S B means "your note is—" and the sort of information required is whether it is a pure D.C., a D.C. with a ripple in it, an interrupted D.C., an I.C.W., a rectified A.C., or a raw A.C. In the last case it is often useful if the frequency is given, if it can be estimated.

Q S S means "your signals are fading" and is usually followed by an R-scale indication of the minimum signal strength. That the wave is swinging is usually indicated by Q S S S, and though this is not on the official scale it is understood by all amateurs.

The above looks somewhat formidable when set out as I have done, and some of the information may be beyond the capabilities of the receiving amateur to supply. But when sending reports as much information as possible should be given.

Little Fellows

There is just one other point. You are not doing much good, as a rule, by sending reports to powerful stations within a hundred miles. It is the little fellows, with the faint signals, who are interested in what you have to say about them. The powerful stations know that they can be heard over large areas, and they are only interested in reports from considerable distances. Don't worry them unless you have something really interesting to say.

After all, anybody can get the big stations; it is the weak and the very distant ones that show the capabilities of your receiver and your skill in operating the controls. 5YM.

R.A.F. Rotating Loop Beacon

IT is not, perhaps, generally known that the Royal Air Force has developed a special method of transmitting directional signals for the guidance of aircraft, in which the messages are radiated from a rotating loop aerial, as distinct from the Marconi beam or reflector system.

A loop aerial, when used for transmission, transmits maximum energy in the plane of the windings, and zero energy at right angles to its plane.

The loop is rotated at a constant speed, say once a minute, and long morse dashes are radiated on C.W., or interrupted C.W., with distinctive signals at true north and west.

True Bearings

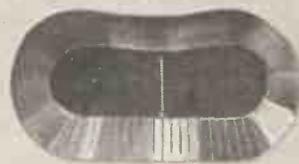
The long dashes are heard to swell in intensity as the plane of maximum energy swings past the observer in the aeroplane. Knowing the rate of rotation of the loop, a stop watch, combined with the distinctive compass signal, will give the listener his true bearings.

Although a loop aerial is generally considered to be a bad radiator, accurate readings in the air have been secured by this method at distances up to 200 miles from the beacon station. B. A. R.

For the Crystal User Measuring Signal Strength At a Glance

Making an Ampliometer for Your Own Set

AMPLIOMETER



THE adaptation of a micro-ammeter (Weston relay) to a crystal set results in an extremely interesting and useful combination. A little reflection on the working of a crystal set will make the advantages apparent.

Direct Indication

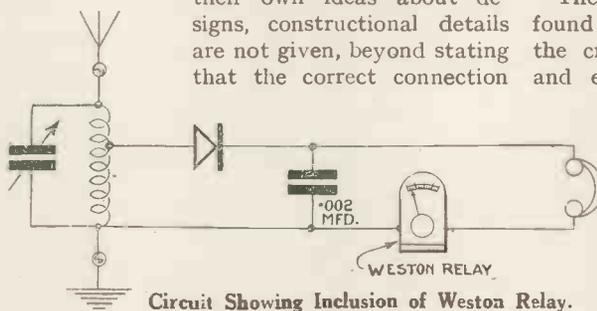
A crystal set operates solely on the energy collected by the aerial, there being no other power available as in a valve receiver, so the measure of the rectified carrier wave is the direct indication of the ultimate loudness. By the inclusion of a micro-ammeter in the manner indicated (see diagram) the desired effect is obtained.

A closer examination will reveal the fact that as the required carrier wave is tuned by the inductance and the condenser, a voltage is developed across the coil. The resulting built-up potential is applied to the crystal detector, which rectifies the high-frequency alternating current to a pulsating direct current

to which the telephones and the micro-ammeter respond.

That is, the bigger the current the greater the movement of the indicator, hence the louder the signal in the phones.

As individual constructors have their own ideas about designs, constructional details are not given, beyond stating that the correct connection



Circuit Showing Inclusion of Weston Relay.

to the micro-ammeter is essential; it should be carefully ascertained beforehand by an exhausted flash-lamp battery.

The instrument known as a Weston relay is readily obtainable in any wireless store for about 12s. 6d. The indicator needle is a strand of lighting flex and it should be as light as possible. The oblong window is made first by drilling three holes

$\frac{1}{4}$ in. in diameter, afterwards filed and scraped to the desired shape.

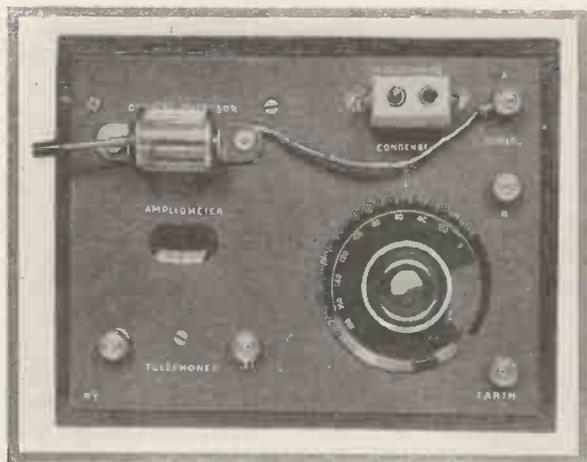
The scale used is a portion of the 180° condenser scale which is usually found on transfer sheets, from which the word "Ampliometer" is also obtainable.

The instrument in operation is found to be extremely sensitive to the crystal and other adjustments, and enables the writer to record much valuable information concerning the relative efficiency of coils, aerial systems, ratio of inductance to capacity, and of crystals, etc., and it bids fair to become one of the most treasured instruments on his bench.

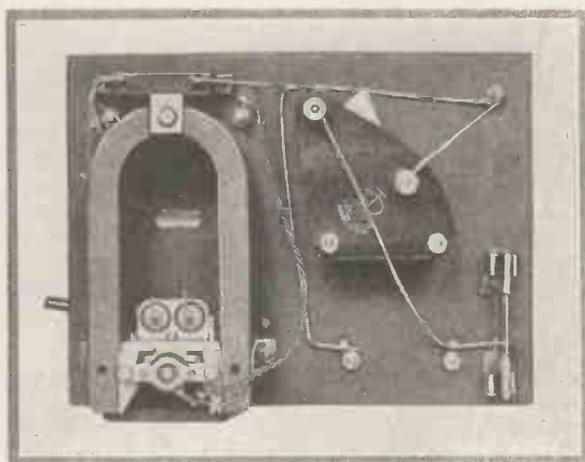
Easy Adjustment

It should have a wide appeal to broadcast listeners and experimenters alike on account of the ease with which the crystal detector can be adjusted. S. Y.

"DON'T be too hard on the announcers," says the Press, "they are trying." They are. Very.



View of Set with Ampliometer Device.



Rear View Showing Weston Relay.

socially as far apart as Mayfair and Stepney Green—and all in one forty-five minute programme a day.

Critics of the broadcasting of birthday greetings may be surprised to know that every attempt to reduce the time allowed for these announcements (now eight minutes a day) brings a shoal of protests and alienates warm supporters. The limit is now fixed at about 100 greetings a day, and the B.B.C. "simply daren't cut the number down any further."

Issue with the Parents

The issue is not, of course, between the critics and those responsible for the Children's Hour, but between the critics and the many parents who make the requests for the greetings to be broadcast. Mr. Darke states that "it should be possible to satisfy all children in the course of a week." After examining all the evidence Mr. Hodges (who arranges all the programmes) has come to the conclusion that a month is the basic period necessary to cover all the features that may be looked for reasonably.

In any four-week period will be found all the following features:—

Fairy stories, school stories, adventure stories, specially written episodes from "classics," folk tales and legends, animal stories, whimsical stories, a railway talk, a talk about astronomy, Zoo talks, a "nature month-by-month" talk, piano solos, other kinds of instrumental solos, orchestral music, dance music, ballad songs, humorous songs, traditional songs, popular songs, songs with choruses, verse recitations, humorous dialogues, a special news bulletin, a competition, and a play.

These items, it should be noted, are the main elements. There are others which are only occasional or difficult to classify.

As far as stories are concerned there is a great dearth of really good material (from the broadcasting point of view), Mr. Hodges told me. Copyright restrictions are still a great obstacle, but one which is slowly being overcome.

Slowly but surely prejudice in this direction is being ousted by interest, enthusiasm—and knowledge.

It is, of course, very difficult to judge to what extent one item appeals more than another. When he took over the control of the Children's Hour in April of last year Mr. Hodges set himself a safety-margin of 10 to 1, that is, if the proportion of letters of appreciation to letters of criticism was less than 10 to 1 in

Such a considerable increase aroused my curiosity, and I asked on what lines the programmes had been developed to bring about this result. "Well," I was told, "on the whole the programmes are more recreative. Children listen to the broadcasting soon after they get home from school, and do not want any more lessons, so as far as is desirable we are cutting down the amount of educative matter in our programmes."

"Ragging About"

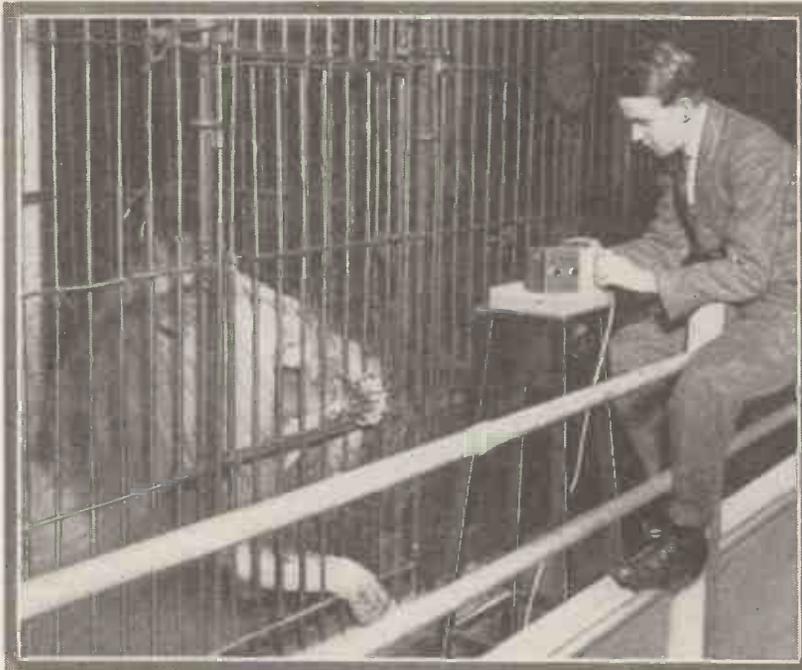
Throughout his article Mr. Darke inferred (and, until I learnt better, I must admit that I thought so myself) that the Children's Hour was conducted by a number of irresponsible Uncles and Aunts who rather enjoyed "ragging about" in the studio.

Fortunately I have been able to see enough of the actual broadcasting to know that the inference is quite wrong. The Uncles and Aunts do enjoy broadcasting—but they have very definite ideas of their responsibility and, I am convinced, they do their best to make the Children's Hour a success. They take their job seriously and, although any listener is entitled to his own opinion as to what extent they make the programme a success, nobody can rightly say that they take no interest in the things they do.

That is the truth about the Children's Hour. Listen to it carefully for a few days before you criticise it adversely; in the light of what I have explained you will be surprised how interesting it all is. If you have any suggestions to make, well—Mr. Hodges, or Uncle Peter if you prefer to know him by that name, will be glad to hear of them!

BM/PRESS.

AN "OUTSIDE" BROADCAST!



The King of Beasts roars his greetings to the children.

respect of any particular item he was prepared to cut it out.

I have seen an analysis of all the letters received (those obviously written by grown-ups are not taken into account) for the last seven months; the proportion of letters of appreciation to letters of criticism has risen from 44 to 1 in November to 685 to 1 in May—figures that surely speak for themselves.

Continental Notes

Collected by

JAY COOTE

THE broadcast publicity to which I referred in these notes last month appears to have spread to more continental stations. During the last fortnight I have picked up many transmissions from Radio-Paris, of which the daily afternoon concerts have now been resumed.

In order to secure a further source of income it has been found necessary to resort to radio advertisements, and listeners will notice that during the intervals between musical and other items, references are made by the announcer to wireless and other goods on sale in Paris shops.

Long-winded "Puffs"

In some instances the attention of the public is merely drawn to the fact that the transmissions can be particularly well received on a certain manufacturer's make of apparatus, but in others quite a long-winded "puff" is given in which publicity is disguised in the form of a lecturette.

Although it is possible that the station derives some pecuniary benefit from its broadcast of "ads," there is very little doubt that these interruptions considerably detract from the continuity and character of the programme, and after you have heard two or three of them they are apt to get on your nerves, in which case I very much doubt whether this kind of publicity is favourable to the sale of the goods in question.

Radio Belgique, in Brussels, has adopted the same method, and on several occasions, I have heard more than a casual mention made of a film then being shown at a local picture palace. Not only is a rough synopsis of the story broadcast, but the comfort of the "movie-palaces" is extolled, and prices of the seats are also given.

Most of the German stations, including Berlin, at the end of their nightly programme and news bulletin put out what is termed a film and theatre review. As a matter of fact this is not an impartial criticism of cinematographic productions such as we get from our home stations, but a boost of certain programmes. As regards the dramatic review, the

titles of the plays, names of theatres, and of artists in the cast are given in full.

To a certain degree, such a procedure in Germany is explained by the fact that the daily newspapers do not devote so much space to the stage as is usual in the United Kingdom, and consequently this information is of considerable utility to listeners.

The possibility of the appointment of Dr. Adenauer, the Burgomaster of Cologne to the Chancellorship of Germany had aroused considerable hopes in the hearts of his fellow citizens. For some time past the Rhineland has been clamouring for a high-power broadcasting station to feed not only the liberated areas, but the areas still under occupation, and rival claims have been put forward both by Cologne and Dusseldorf for the possession of such a transmitter.

Had the Burgomaster of Cologne taken up this appointment his influence, no doubt, would have been brought to bear in certain quarters with the object of installing a broadcasting station in his native city.

As it is, however, in view of the experiments which have recently been made, it has been definitely ascertained that the provisional transmitter erected at Elberfeld, in order to possess a wider range, should be installed on top of a hill near Langenberg, and it is on this site that it is proposed to build a 60-kw. broadcasting station. The aerial masts are to be roughly 320 feet high, and it is hoped to complete the installation for operation during the coming autumn.

Transfer of Relays

In this event both the Elberfeld and Dortmund relay stations of Münster would be transferred to the southern districts of Germany. In order to satisfy Dusseldorf and Cologne, the high-power transmitter would be fed by studios in both cities, the transmissions being conveyed by the usual land-line.

Connections would also be made

to the local opera houses, concert halls and to Berlin, by which means concerts and entertainments given in the Rhineland could be the subject of an S.B. to all German centres possessing transmitters.

Much good work has already been done by the Union Radiofonique Suisse, the association incorporating all Swiss broadcasting stations. By its means Zurich, Berne, Lausanne and Geneva are able to tap each other's programmes by land-line, and where a special entertainment is being given at one or other of these cities, it is the subject of an S.B. to all.

Lausanne Opera House

For some reason or other, considerable use has been made of the opera house at Lausanne, where performances are given in both French and Italian; it is regularly visited by some of the best Paris and Rome artists.

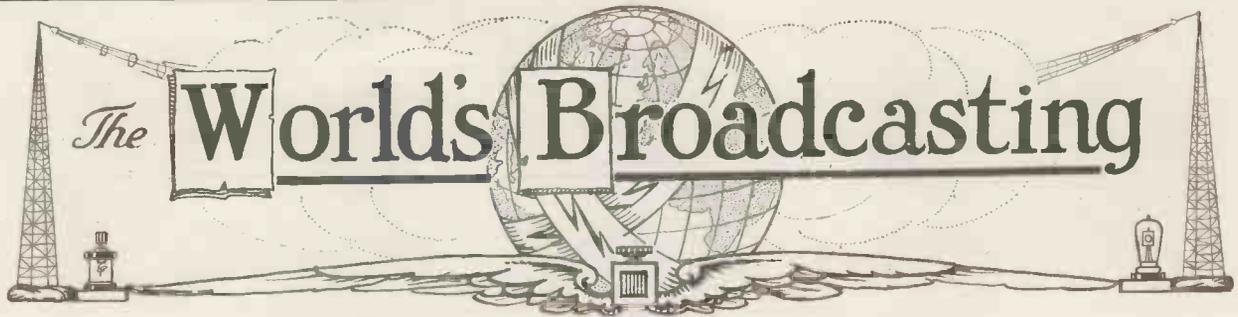
On several occasions I have tuned-in to Berne, which appears to be one of the Swiss stations best received in the United Kingdom; in two instances, although nothing was mentioned in the programme, I listened to excerpts of performances of *Rigoletto* and *Carmen*. The relays were particularly good, and to my mind proved vastly superior to those which I regularly received last winter from the Barcelona stations.

For some unaccountable reason my reception of Zurich is nearly always spoiled by morse interference, but that of Berne is with but few exceptions fairly free from this trouble. It is a station to which the attention of listeners should be drawn, as the programmes are very varied, and have been greatly enriched by these S.B. transmissions.

At the same time, as the lady announcer conscientiously gives out not only the call, but also the items, in at least three languages, you can identify this station without difficulty, and are thus supplied with full particulars of the entertainment heard.

JAY COOTE.

A Guide for Every Listener

Principal European Broadcasting Stations
with Their Wavelengths and Call Signs

Wave-length in Metres.	Station.	Call Sign.	Wave-length in Metres.	Station.	Call Sign.	Wave-length in Metres.	Station.	Call Sign.
196	Karlsrona .	S M S M	335	Hull .	6 K H	452	Leipzig .	—
199	Joenkoeping .	S M Z D	338	Plymouth .	5 P Y	458	L'Ecole Sup. .	P T T
205	Strasbourg .	—	340	Madrid .	E A J 4	462	Barcelona (Radio	—
208	Gefle .	—	340	Nuremberg .	—	462	Cata'ana) .	E A J 13
215	Umea .	—	346	San Sebastian .	E A J 8	462	Königsberg .	—
220	Montpellier .	—	347.5	Copenhagen .	—	467	Linkoeeping .	—
221	Karlstadt .	S M X C	350	Agram (Zagreb) .	—	470	Frankfort-on-Main	—
233	Kiel .	—	350	Paris (Radio LL) .	—	475	Riga .	—
233	Uleaborg .	—	351	Marseilles .	—	479	Birmingham .	5 I T
235	Helsingborg .	—	353	Cardiff .	5 W A	480	Warsaw .	—
237	Orebro .	—	357	Seville .	E A J 5	482	Swansea .	5 S X
241	Stettin .	—	358	Bergen .	—	485	Munich .	—
245	Säffle .	S M T S	360	Cadiz .	E A J 3	486	Lyon-la-Doua .	—
250	Eskilstuna .	—	364	London .	2 I. O	487	Brussels .	—
251	Gleiwitz .	—	368	Tamerfors .	—	495	Aberdeen .	2 B D
253	Kalmar .	—	370	Falun .	S M Z. K	504	Berlin (Vox Haus)	—
259	Elberfeld .	—	371.5	Berlin .	—	504	Helsingfors .	—
260	Norkoeeping .	S M V V	372	Prague .	—	515	Zurich (Höngg) .	—
270	Malmo .	S A S C	373	Madrid .	E A J 7	521	Brünn .	O K B
273.5	Cassel .	—	378	Manchester .	2 Z Y	531	Vienna (Radio Wien)	—
277	Bremen .	—	382	Oslo .	—	550	Sundsvall .	S A S D
280	Radio Lyon .	—	385	Varborg .	—	560	Budapest (Csepel)	—
280	Toulouse .	—	386	Bournemouth .	6 B M	561	Jyvaskyla .	—
283	Dortmund .	—	390	Mont de Marsan .	—	582.5	Vienna (Radio Wien)	—
288	Gothenburg .	S A S B	392	Hamburg .	—	720	Ostersund .	—
292	Kristinehamn .	S M T Y	392	Madrid .	E A J 6	760	Geneva .	H B 1
294	Dresden .	—	397	Dublin .	2 R N	810	Odense .	—
297	Hanover .	—	402	Graz .	—	850	Lausanne .	H B 2
300	Angers (Radio Anjou)	—	404	Newcastle .	5 N O	940	Leningrad .	—
300	Seville .	E A J 17	405	Salamanca .	E A J 22	1,000	Basle .	—
301	Sheffield .	6 F L	410	Moscow (Radio	—	1,010	Moscow (Popoff) .	—
306	Stoke-on-Trent .	6 S T	410	Peredacha) .	—	1,060	Hilversum .	H D O
310	Bradford .	2 L S	410	Munster .	—	1,150	Ryvang .	—
315	Dundee .	2 D E	411	Bordeaux .	—	1,150	Sorö .	—
318	Radio Agen .	—	415	Bilbao .	E A J 9	1,200	Boden .	S A S E
320	Milan .	—	417	Breslau .	—	1,200	Radio Luxemburg	L O A A
321.5	Leeds .	2 L S	418	Bilbao (Radio	—	1,300	Königswuster-	—
322	Trollaattan .	S M X Q	418	Vizcaya) .	E A J 11	1,350	hausen .	L P
324	Barcelona .	E A J 1	422	Glasgow .	5 S C	1,350	Karlsborg .	S A J
325	Saragossa .	—	425	Rome .	1 R O	1,400	Nijni Novgorod .	—
326	Nottingham .	5 N G	430	Radio Toulouse .	—	1,450	Moscow .	R D W
327	Reykjavik .	—	430	Stockholm .	S A S A	1,600	Daventry .	5 X X
328	Edinburgh .	2 E H	435	Berne .	—	1,650	Belgrade(Rakovitz)	H F F
330	Bordeaux (Radio	—	440	Belfast .	2 B E	1,750	Radio Paris .	C F R
330	Sud-ouest) .	—	440	Helsingfors .	—	1,800	Norddeich .	K A V
331	Liverpool .	6 L V	446	Stuttgart .	—	2,020	Kosice .	—
333	Le Petit Parisien .	—	450	Moscow (Trades	—	2,125	Amsterdam .	P C F F
335	Cartagena .	E A J 15	450	Union Council)	—	2,650	Eiffel Tower .	—



What the Reader Thinks

Valve Adventure

To the Editor of the "Wireless Magazine."

SIR,—While dusting my set I happened to give the valve a nasty knock. When I came to try the valve I found that it would not light across the filaments, but to my surprise it lit perfectly well across one filament and the grid.

This showed me what was wrong, and I resolved to try and knock it again to separate the filament from the grid.

After about a minute I accidentally dropped it on to a cushion. Imagine my surprise when, on picking it up, it lit quite all right, and has been working well ever since!—H. SHARP (Headcock).

Working Under Difficulties!

SIR,—I am one of your boy readers and a constructor, and I wish to tell you of my experiences with a two-valve set (detector and L.F.), which I made myself at school.

As wireless sets are forbidden, I naturally listen under great difficulties; each night I erect my aerial, about 20 ft. of insulated wire, at the top of my cubicle wall, on which I have hooks for that purpose.

Daventry is extraordinarily loud on my loud-speaker, a Baby Brown, and also Birmingham. London is quite often good on the loud-speaker, and always on the phones. I also receive Nottingham, Bournemouth, and Manchester at good phone strength; I strongly recommend a plain two-valve set for any general use.—"SCHOOLBOY" (— School).

A Leaky Panel

SIR,—My set acted in a very puzzling manner the other day, and it is not till lately that I have discovered the fault.

I had changed my two-valve set over to a new panel and placed it in a cabinet. I switched on the valves and tuned-in for 2 L.O. The first thing I heard was a terrific scratching and fizzling that nearly deafened me, and only a very faint sound of 2 L.O. The set would not oscillate at all and only 5 X X and the local station could be tuned-in, the signals of which did not stir my friends to utter words of praise for my handiwork.

At first I blamed the H.T. supply, which was of the usual type of small cells connected in series, but on testing this was found OK, and I then went carefully over each wire and component and found everything intact.

I was at a loss to know what to do until an idea struck me. I connected up a flashlamp battery to a free terminal

VALVES FOR LETTERS!

Have you any interesting comments or suggestions to make on any phase of wireless that will interest other readers of the WIRELESS MAGAZINE?

If you have, then write them briefly on a piece of notepaper (write on one side only, please) and address them to the Editor.

To the writers of the letters published each month we award valves. This month's letter-writers will each receive a B.T.H. bright-emitter valve; next month's writers will be sent a Marconi bright-emitter valve each.

on the set, and the other terminal to one tag of the phones; with the other tag of the phones I touched the adjoining panel and, as I had half expected, a loud click was heard.

On changing the set over to a piece of genuine ebonite, the results were perfect and free from unpleasant noises.—W. H. EDMUNDS (Ilford).

Radio-Paris on a Crystal

SIR,—With reference to Mr. Ranken's letter in the May number of the WIRELESS MAGAZINE, he may be interested to know that I am able to hear Radio-Paris almost any night on my simple crystal set.

When 5 X X is transmitting the news at 9.30 p.m. the Radio-Paris concert comes in clearly. Otherwise music from 5 X X naturally drowns Paris.

The Eiffel Tower concerts are not so clear on the crystal set, but I suggest Mr. Ranken should try for Hamburg, which I hear sometimes nearly as loud as 2 L.O. Speech and music are very clear on my crystal set.—B. DUNN (Stock).

Mysterious Conversations

SIR,—Often during intervals in the wireless programme or when there is no station on, I can hear what sounds like a distant conversation going on, so distant that it is impossible to follow what is being said.

As I live at a post office, and my aerial wire runs parallel to the telephone wires at a distance of 50 ft. I think I must be overhearing telephone conversations.

Have any other of your readers who live near the telephone wires noticed this?—H. WHITESIDE (Barkway P.O.).

A Good Earth

SIR,—For an earth I have tried connection to a water main, and also to an iron rod sunk in the earth, both giving good service.

We have had an old fireguard lying about for some time, and the thought struck me: "Why not make an earth of it?"

Readers will perhaps know the kind of fireguard I mean, a large one composed of iron and steel wire mesh bound in a brass frame.

I flattened this out with a hammer, and when laid out straight it measured about 5 ft. by 4 ft. I connected an insulated earth wire to one point only and made a good soldered joint. Then I buried it about a foot deep directly under the aerial.

I was amazed at the results obtained, especially on the distant stations, tuning being sharper and oscillation more easily controlled. This, no doubt, is the result of the greater surface area presented.—A. E. RUTTER (Co. Durham).

Phone Diaphragms

SIR,—Many listeners have no doubt at various times needed a new diaphragm for phones; here is a temporary way out of the difficulty.

Place a piece of thin paper (cut to the size of the cap) over the magnets, put an ordinary flat safety-razor blade over the paper, screw on the cap and the result will no doubt be as surprising as it was to me.—R. W. WILLEY (Stockton-on-Tees).

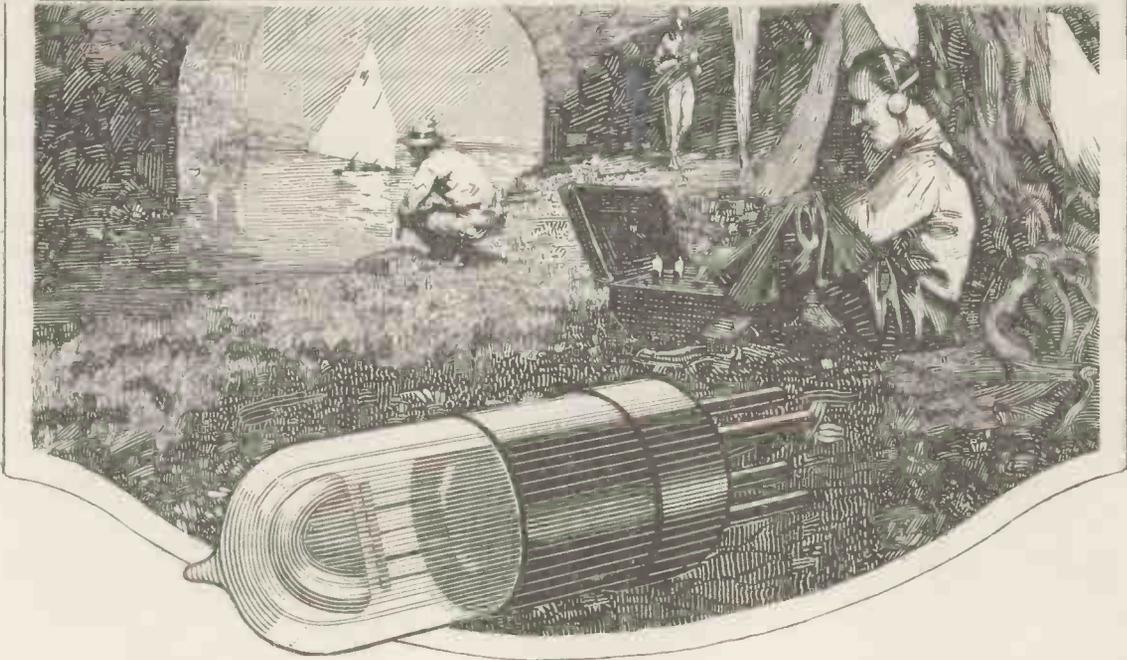
H.T. Battery Fault

SIR,—While receiving upon a one-valver, signals suddenly ceased, although the valve remained alight. On taking out the H.T. + plug, only a faint noise was heard in the phones. The plug was then placed in another socket, at a lower voltage than before, and the usual loud click was heard, while signals were now normal.

It was evident that there was a broken connection inside the battery, between the two indicated voltages. Upon taking away the paraffin wax insulation between the sockets, and testing the various cells with a pair of phones, a broken connection was found. When this was re-joined the battery worked as usual.

It had been noticed before that the wax was swelling up in places, due to the gas from the cells, and, as a swelling had been directly above the broken joint, it must have put so much pressure on the wire that it broke it away from the cell, as the joint where it was soldered had been broken.—R. H. ROWLAND (Worcester).

The Dull Emitter which popularised Summer Radio



SO long as bright-emitter valves were the only ones available the really portable Receiver was impracticable. No one wanted to carry big 6-volt accumulators out into the country for the pleasure of enjoying a Radio concert in the meadows—it wasn't worth the trouble. And even when the first dull emitters became more popular their extreme fragility rendered them unsuitable for the inevitable rough handling which every Set must get when carried from place to place.

And so the portable Receiver lagged in development. But, with the introduction of the Wuncell, summer Radio becomes a new delight. It is now quite easy to design a three-valve Receiver which can be fitted into an attache case complete with a 2-volt unspillable accumulator. Such a Receiver will give at least 10 to 12 hours' reception on one charge. And, what is more important still, the

Wuncell valves will not be harmed by the vibration and rough usage to which such a Receiver must inevitably be subjected.

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- W.3 The Loud Speaker Valve - 18/6
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*Also in special base with resistance to suit 2, 4 or 6-volt accumulator 16/-

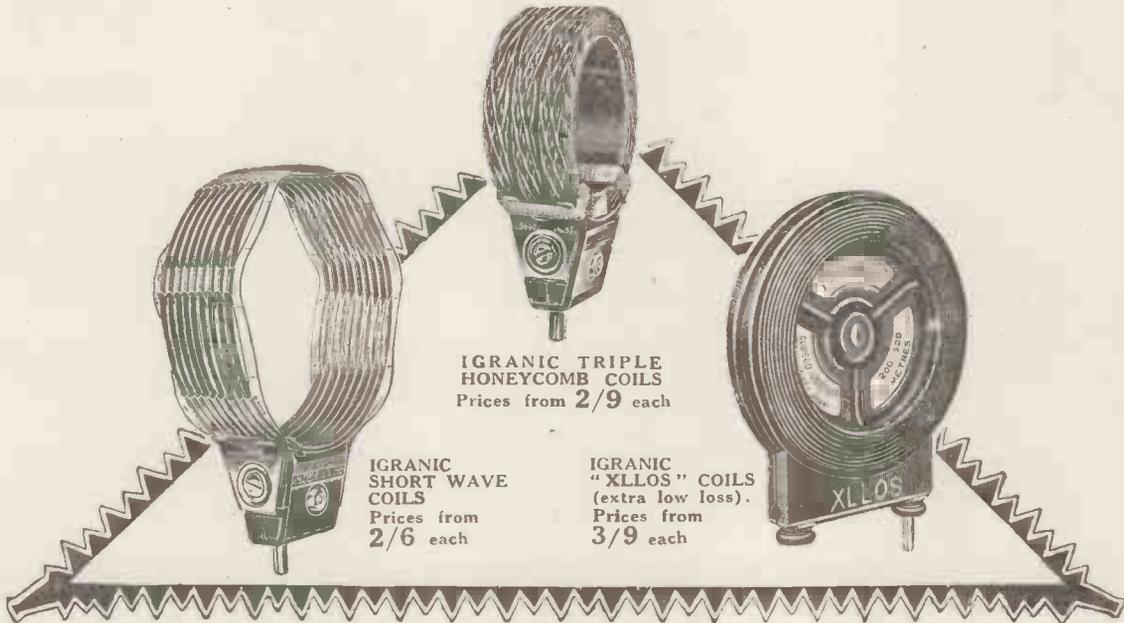
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Issued by A. C. Cossor, Ltd., Highbury Grove, London, N.5.

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Questions Simply Answered (Continued)

Poor Reaction Effects

Q.—I fail to obtain satisfactory reaction effects from my receiver, and yet I feel sure that my aerial-earth system is quite efficient. This has recently been overhauled and various earth connections have been tried. Reversing the connections to the reaction coil has no effect, although I get a little reaction on the long wavelengths. Can you suggest a possible cause and remedy?—F. A. (Cardiff).

A.—Your trouble is no doubt due to your having a defective grid leak in the grid circuit of the detector valve or the value of this component is not suitable. Try various values of grid leak or use a variable grid leak, but be sure that the latter is of reliable make.—L. A. C.

Frame-aerial Winding

Q.—I wish to construct a frame aerial for use in conjunction with a super-het receiver. It is my intention to design the frame with 3-ft. diagonals, and I would be glad if you would specify the number of turns of wire and gauge that should be wound upon this, together with the spacing of the turns.—M. P. (Folkestone).

A.—Use No. 20-gauge d.c.c. copper wire. Wind upon the frame 16 turns, the turns being spaced $\frac{1}{2}$ in. apart along the diagonals. Using a .0005-microfarad variable condenser for tuning this

frame, it will be found satisfactory for covering the wavelength range used by most British broadcasting stations.—K. M.

Best Portable Receiver

Q.—What is the best type of receiver, regardless of expense, for portable work? The size, within reason, will not matter, as I intend to use it in conjunction with a car.—E. B. (Woking).

A.—The best type of receiver for portable work is doubtless a super-het having seven or eight valves. As well as this a straight-circuit four- or five-valve receiver is advocated when an ordinary portable (not frame) aerial can be used.—L. A. C.

Capacity of Condensers

Q.—How can I determine the capacity of any condenser that I wish to make? A formula for British standard measurements would be very acceptable.—H. G. (Putney).

A.—The following formula will be found to be sufficiently accurate for all practical purposes:—

$$\text{Capacity} = \frac{A \times K \times N}{5,000 \times 900 \times d}$$

where A = area of one plate in square inches; K = specific inductive capacity of the dielectric; N = the number of

plates used minus one; and d the thickness of the dielectric in inches.—L. A. C.

Best Valve for Reflex Receiver

Q.—What is the best valve for use with a reflex set regardless of its being a bright- or dull-emitter?—V. S. (Devon).

A.—A general-purpose valve is recommended, as the characteristics of such valves lend themselves to the dual duties required of them. Special valves for H.F. work cannot be expected to deal efficiently with L.F. currents, whilst the comparatively large capacity between the electrodes of a special L.F. valve will prevent efficient H.F. amplification. Where long-distance reception is not sought, but maximum volume is required from a near-by station, a small power valve is advocated.—B. S. M.

H.T. and L.T. from D.C. Mains

Q.—You mention in No. 16 of the WIRELESS MAGAZINE that it is quite a simple matter to use D.C. mains for H.T. and L.T. for a valve receiver. Could you give a circuit or any information upon this matter?—R. W. (Dorking).

A.—This subject was extensively dealt with in *Amateur Wireless* Nos. 143 and 144, price 7d. each, post free, from this office. Details for obtaining H.T. only from D.C. mains appeared in No. 10 of the WIRELESS MAGAZINE.—K. D. P.

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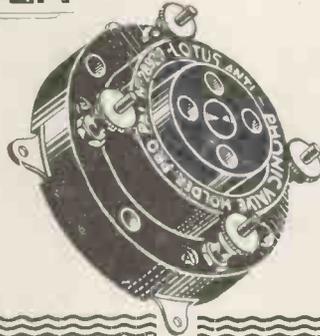
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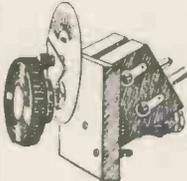
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THE ECONOMICAL COMBINATION
2v '08 H.F. and L.F. . . . 9/- each
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**Catalogues
and
Pamphlets**

Copies of these publications can be obtained post free if the "Wireless Magazine" is mentioned

FULL particulars of the thermionic relay and a diagram of a new circuit in which it can be used will be forwarded on request to Autoveyors Ltd., 84, Victoria Street, Westminster, S.W.1.

A new folder, issued by the Marconi-phone Co., Ltd., 210-212, Tottenham Court Road, W.1, describes the Marconi-phone range of amplifiers.

Designed to work absolutely from the house mains, the Gambrell Baby-Grand two-valve set is fully described in a new booklet issued by Brown Bros., Ltd., Great Eastern Street, E.C.2.

Competa & Decko components are described and illustrated in two new pamphlets obtainable from A. F. Bulgin & Co., 9-11, Cursitor Street, Chancery Lane, E.C.4.

Wilkins & Wright, Ltd., of Utility Works, Kenyon Street, Birmingham, have issued a new catalogue giving full particulars of Utility components.

Etherplus accessories and components are the subject of a new list issued by M. Andaw, 9-15, Whitecross Street, London, E.C.1.

A leaflet containing particulars and prices of Eelex components can be had from J. J. Eastick & Sons, Eelex House, 118, Bunhill Row, E.C.1.

A folder describing the new Nilphonic valve holder can be had from Hambling, Clapp & Co., Ltd., 11, Agar Street, Strand, W.C.2.

The new Philips filament fuse is described in a leaflet obtainable from Philips Lamps, Ltd., Charing Cross Road, W.C.2.

A leaflet of interest to all set constructors can be had from the Express Radio Service, Factory Square, Streat-ham, S.W.16.

A well-illustrated catalogue, giving full particulars of A.D. primary cells for wireless work, can be had from Le Carbone, Coventry House, South Place, E.C.2.

The "Osram Bulletin" for July will be sent to any dealer applying to the General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.

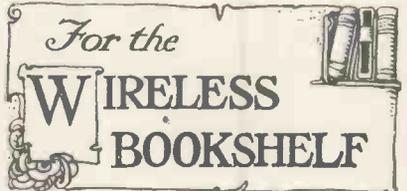
B.S.A. sets and components are illustrated and described in a new booklet issued by the B.S.A. Radio, Ltd., Small Heath, Birmingham.

New Branches and Works

A new branch and distributing centre of Philips Lamps, Ltd., has been opened at 34, Marsh Street, Bristol.

Wright & Weaire, Ltd., makers of Wearite components, have opened new works at 174, High Road, Tottenham.

In connection with the description of the Trix phone distribution board on p. 550 of this issue, it should be noted that the studs are connected in series.



"The Blackadda Radio Building System and Circuit Book"

COMPILED to serve as a guide to the amateur constructing sets the Black-adda way, "The Blackadda Radio Building System and Circuit Book" (published by the Blackadda Radio Co., Ltd., Sadler Gate, Derby, price 1s.) is of particular value to the amateur.

It contains particulars for the building, without previous experience, of any type of receiver.

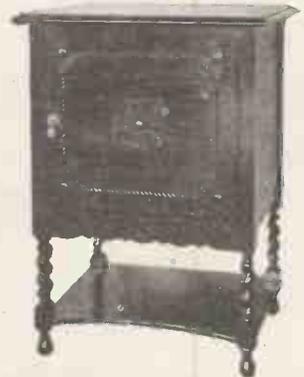
The advanced experimenter, too, will find much of interest in the publication, for included in its pages are circuits for transmitters and most of the well-known American receivers. In all, the book contains some fifty circuits.

A large number of pages are devoted to general wireless information, and no amateur can peruse these pages without considerably increasing his knowledge.

As is becoming common with all books on wireless, several pages are allowed for hints on the tracing and remedying of faults, but in this case the subject is treated in so interesting a manner that dullness is entirely avoided.

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A Stand for the Wireless or Gramophone, with cupboard for the instrument when not in use. Convenient for many other purposes.



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This handbook, which is compiled from the writings of many contributors to "Amateur Wireless," seeks to show in close detail, and with the aid of 112 illustrations, how to make and operate about ten different types of valve sets.

Crystal Receiving Sets and How to Make Them

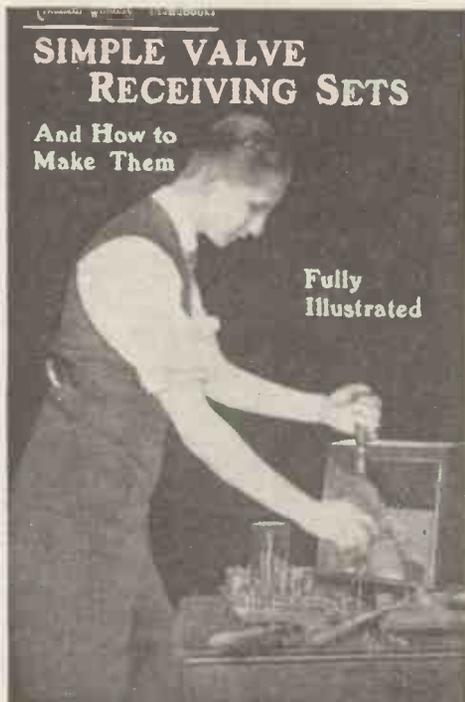
Compiled from the pages of "Amateur Wireless," this handbook deals in a simple, straightforward manner with the making of a number of crystal sets. With 114 illustrations.

Wireless Component Parts and How to Make Them

Detailed instructions for making the various component parts of many kinds of wireless receiving sets. It does not describe the making of any one complete set, but just all the parts likely to be required. With over 200 illustrations.

Wireless Telegraphy and Telephony and How to Make the Apparatus

This revised edition is by Mr. E. Redpath, the well-known writer on wireless. The explanations of principles are up to date, and there are directions for making apparatus, including detectors, amplifiers, single-circuit and complete short-wave receiving sets, a valve panel, and a five-valve amplifier.



Wireless Telephony Explained

CONTENTS: The Electron; Induction and Electro Magnetism; Waves and How They Travel; Inductance and Capacity; Rectification; Amplification; Reaction and Beat Reception; Aerials and Earths; Transmitting Systems; Receiving Sets; Useful Formulæ and Data; Index.

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The "Wireless Magazine" Buyers' Guide

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