

SPECIAL ARTICLE: RADIO AND ABYSSINIA

Popular Wireless & TELEVISION TIMES

WHERE CONSTRUCTORS
GO WRONG
★ ★ ★
THOSE SCHOOL BROADCASTS
★ ★ ★
ON THE SHORT WAVES

EVERY
WEDNESDAY
PRICE

3^D

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Sept. 14th, 1935.

THE FAMILY APPEAL

One of the most welcome features of the new season's sets is the ease with which they can be operated, a fact which is strikingly exemplified by this delightful domestic scene in which one of the most popular Marconiphone sets—the model 296—is the chief centre of interest. There is little doubt that the efforts of manufacturers generally to produce instruments that can be operated successfully by the whole family have contributed greatly towards the present popularity of broadcast entertainment.



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Filament Volts	-	-	-	2
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MANAGING EDITOR: N. F. EDWARDS.

TECHNICAL EDITOR: G. V. DOWDING, Associate I.E.E.

ANOTHER RAY
ABOVE 1,000 METRES
NEW ORCHESTRA
FAREWELL FÉCAMP?

RADIO NOTES & NEWS

TELEVISION RECORD
PLATE ACOUSTICS
THE CROONER
I.O.M. PLAN

The "Morrissey" Again.

THE famous American exploration ship, the little "Effie M. Morrissey," known to British short-wave fans by her wireless feats, is off again on her adventures.

Her captain has wirelessly from off Greenland to the New York Zoo: "Have a baby walrus on board which I want to bring you. The little devil won't drink milk, and we can only forcibly feed him. Can you suggest method of feeding?"

The Zoo, very anxious to have such a rarity on its books, replied by radio, suggesting shredded codfish six times a day.

So if you have picked up any short-wave messages that apparently referred to a baby with a colossal appetite, don't worry about the young rascal—it will be the "Effie M. Morrissey's" walrus minor.

Another Little Ray of Sunshine.

I HEAR of a new ray developed by American naval experts. It is claimed that the ray can be focused into a beam, which can be used to sweep the horizon and indicate the presence of vessels when they are invisible.

It was tried experimentally from a disused lighthouse, a switched-off searchlight being arranged to follow the movement of the beam. When the new ray indicated that a target had been found the light-beam was switched on, and nearly every time this was done the light revealed something that the invisible ray had found. The range of operation is about five miles, and the war-time possibilities are immense and lurid.

On the Long Waves.

IT is easy to get into the habit of neglecting the long waveband, because it has so few stations comparatively. The habit, however, should be curbed this season, for there is much of interest going on and coming on above 1,000 metres.

Right at the top of the dial is Kootwijk, the Dutchman, spiritedly radiating the Hilversum programme on high power, in place of Huizen, who has evaporated. On the same wavelength (1,875 metres) Roumania is trying out her new Brasov transmitter (150 kilowatts)—using mostly speech for testing.

The other long-wavers are in good form, and I particularly commend to your notice

the German national (1,571 metres), who has been putting in fine style—first putting his power up, and then putting up a new type of non-fade aerial, the first of its kind on long wavelengths.

Here and There.

SWITZERLAND has asked the League of Nations if she can borrow its Prangins short-wave station now and then, to keep Swiss who reside abroad in touch with the homeland. The League assented enthusiastically.

The B.B.C.'s experimental thirty-line television transmissions are to end this week.

Heard in the 'bus: "I feel sorry for some of those B.B.C. people in this heat wave."

Force; he won mention in despatches for dressing wounds in the front line, and later was awarded the O.B.E.

Radio Orchestra for Scotland.

THE B.B.C. announces—and not before due time—that a permanent broadcasting orchestra is to be formed in Scotland.

This orchestra is to consist of thirty-five players, and will thus be able to execute every form of music required for the Scottish Regional programmes. It is expected that the orchestra's first appearance in the programme will take place in the autumn.

The new body is not intended to knock out any existing organisation, but was formed by the B.B.C. in consultation with its Music Advisory Committee, the Glasgow Choral and Orchestral Union, and other interests.

Germany's Amateurs.

WHEN the firm hand of Herr Hitler descended on Germany, its radio amateurs became mum. Until then they had, like their colleagues in other lands, a tendency to gossip—"Hullo, old man, how r mi sigs? Fine biz., old man. C. U. later," and so forth. But under Nazi rule they cut out the cackle and closed down.

Now Vice-Admiral Groos, president of the official German short-wave organisation, the Deutsche Amateur Sendedienst, announces a governmental blessing upon their frosty paws; and says that in addition to the three hundred licences for transmitting already in force another two or three hundred

will be issued soon. We extend a warm welcome to our returning friends of the prefix D.

Fécamp to Move.

THE Radio Normandie station, roped into the French Regional scheme, is to move from Fécamp to a site near Rouen. The idea is that instead of the English Channel and Great Britain getting the full benefit of the programmes, these should be distributed better over Northern France.

The power and equipment of the new station will be unaltered in the main, but the aerial will be quite different, France having determined to try out one of the

(Continued on next page.)

RADIO FOR INDIAN VILLAGES



Mr. Mahaboob Ali, director of Wireless for the Nizam of Hyderabad, who is studying the latest wireless developments in connection with a scheme to bring radio to thousands of Indian villages. This photograph, taken in London, shows Mr. Ali chatting with Colonel H. R. Hardinge of the Indian Village Welfare Association.

"Why?" "They've such a lot of brow to mop."

The new Orient Line mail steamer, "Orion," launched by wireless from Brisbane last December by the Duke of Gloucester, is now on her maiden voyage—a pleasure cruise to the Mediterranean.

Canada's Radio Padre.

MANY thousands of Canadian and U.S. listeners are mourning the passing of Canon Allan Shatford, Rector of St. James the Apostle, Montreal, and confidant, friend and counsellor of a wide radio public.

During the war he was, for four years, a chaplain to the Canadian Expeditionary

WEDDING ACCOUNT BROADCAST BEFORE CEREMONY TOOK PLACE!

anti-fading aerial systems that are now all the rage.

The actual site of the station will be at Louvetot, some three miles from Caudebec-en-Caux, where connection will be made with the underground land-lines to Paris from Rouen.

Apt Answer.

THE surprising results which can be obtained by hearing a question broadcast from one station answered by tuning-in another programme have just been recalled by a story told by Canon "Dick" Sheppard. He recounts how a man was listening to a fire-and-brimstone type of sermon, and how, disturbed by the invective, he decided to re-tune his set.



At the same moment, on a different wavelength, Canon Sheppard was telling his hearers about the "St. Martin's Review." So what the listener heard was the first preacher's searching inquiry: "What would it cost you, my friend, to be saved?" followed by a reassuring and calm voice saying: "Just send sevenpence to the vicarage!"

Ultra-short's Ultra-long Range.

GERMANY'S interesting television experiments, which have been carried on with great pertinacity, are yielding strange fruit. It was thought that the ultra-short wavelength adopted, some six metres, would give a maximum service range of thirty-five miles; but judge of the German surprise when a letter was received from a gratified New Yorker, who had not only heard the Berlin sound programme, but had "looked in" to the television.

Sitting there surrounded by his native skyscrapers, he could hardly believe his eyes when he saw "li' ole Yurup" on the screen, in defiance of all radio theory and of the Atlantic.

Further details are awaited with interest. In the meantime it seems certain that a six-metre vision programme has telescoped itself across the Herring Pond.

Truth Will Out.

ONE of the South American republics, which fitted up the Senate with a microphone and amplifier system, had a remarkable demonstration of the new method's sensitivity.



The House was listening dejectedly to a somewhat gesticulatory speaker, who rambled on and on, when presently he accidentally knocked the microphone round to face his neighbours, just as one of these was whispering to another. And so the assembly suddenly heard

what everybody was thinking: "How long is this wretched bore going on talking this balderdash?"

Ready Retort.

ONE of the nicest letters in my mail-bag this week was from E. G. S., of Fulham Road, Sparkhill, Birmingham. E. G. S. is evidently one of those delightful tit-for-tat fellows who believe it is more blessed to give than to receive; for since I've had the luck to make him smile over some wise-crack or other, he sends me the following instance of radio repartee, culled from a Birmingham newspaper.

"My man," said the lady, "you're making a terrible racket with that soup." Tramp: "It ain't me, mum, it's the acoustics of this 'ere soup plate what's so terrible!"

BROADCASTING TOPICALITIES

Delius's opera "Koanga," preceded by an explanatory introduction, will be broadcast to National listeners from Covent Garden Opera House on September 23rd.

"Cabaret Follies," presented by Sidney Hott, will be relayed for Western listeners from the Queen's Hall, Minehead, on September 16th.

On September 17th a relay will be given from Boston, Lincolnshire, the first to be arranged from North Lincolnshire since the county was incorporated in the Northern broadcasting area. An exchange of greetings has been arranged between the Lincolnshire Boston and Boston, Massachusetts, where the three hundredth anniversary of the famous common is being celebrated.

A concert party programme will be provided for Northern listeners on September 18th by Tom Vernon's "Royal Follies" and Ernest Binns' "Arcadian Follies." Many popular entertainers will come to the microphone.

Hold It.

ONE of the most famous radio crooners of America—no, it wasn't Bing!—has just revealed why it is that he will not have a single musical instrument, except a piano, in his house. His many friends knew that they dared not take a flute, saxophone, or similar instrument when they visited him, but they thought it was a fad until he explained.

It seems that in his early years, before crooning made him wealthy, his bandmaster hated to have an idle vocalist sitting on the stand, so made him hold an instrument between songs. Harp, oboe, piccolo, violin, clarinet—he held them all, and played none of them, while waiting for his turns at the mike. Now he's wealthy and can please himself he won't even look at the things!

British Battle of the Marne.

ALMOST exactly twenty-one years ago the battle of the Marne was making the world hold its breath. And now a revised battle, on similar lines and British soil, has been "fought" with the aid of wireless-equipped tanks.

The tank contingent, including transport, comprised some three hundred vehicles, mostly equipped with radio communications. The 1st Tank Brigade, night marching through Chippenham and Marlborough, had to operate against a retiring

enemy, and half the battle depended on whether wireless could keep the fast tanks in touch with their commander, who controlled them from a steel-clad tractor.

Observers could naturally get no statement from the parties concerned, but they got the impression that those tanks responded to their wireless instructions like well-trained troops to the sergeant-major.

B.B.C.'s Biggest Brick.

AN Irish reader of "P.W." gleefully grabs pen and paper to tell me all about the Biggest Brick Ever Dropped by the B.B.C.—a full account of an Ulster wedding the day before it happened! By some fearful mischance the dates got mixed up, and so the bridesmaids, instead of bothering their pretty heads about what they would look like on the morrow, merely had to listen to the news bulletin the night before to hear how the ceremony went off!

It must have been a great relief to the best man to know, a day in advance, that he had not forgotten the ring!

Sponsored Programmes?

IS the Isle of Man to have a broadcasting station outside B.B.C. control? It has been announced that a member of the Manx House of Keys, Mr. J. H. Cowin, is pursuing the project, and that there is considerable support for the idea among those who would like to see the B.B.C. monopoly assailed by advertisers.

I do not fancy the chances of any part of this country slipping one across the B.B.C. in this way. For better or worse, our broadcasting officials regard every listener in the country as a Sacred Responsibility in their charge; and nothing will be allowed to stop them from Doing Us Good—even if it kills us!

Case Dismissed.

THE tonic effect of a few successful wireless prosecutions for failure to obtain licences is well known, and as soon as a case is reported in the papers the local post office expects a brisk demand for new licences from the conscience-smitten.

In one district an amusing story is going round about an apparently clear case in which, to everybody's surprise, the magistrates retired to consider their decision. Later the chairman announced that the defendant would be given the benefit of the doubt. Case dismissed.

Still later the same day—the three magistrates all bought wireless licences!

ARIEL.



Where CONSTRUCTORS Go Wrong

by JOHN SCOTT-TAGGART M.I.E.E., F.INST.P., FEL.I.R.E.

IN my last instalment I emphasised how valuable it was to know the probable results of any adjustment of a control knob. A very large proportion of amateurs work on a hit-or-miss principle. Sometimes this results in affected reception, but it invariably slows up the process of tuning and causes annoyance to other people in the room because of the resultant squeals, groans and other obnoxious and useless noises. Also, interference can be caused to neighbours through oscillations in the case of some sets.

The Hit-or-Miss Method.

Although a few get quite good results on the hit-or-miss principle, i.e., trying out different combinations of settings of various knobs, probably a great many get results far below those which they would obtain by an intelligent and a technical appreciation of what is happening when they turn this or that knob.

The first law of operating a receiver is that you should be able to tune it to give the best results. In other words, you must be able to realise when you have obtained the best results. You can only tell that you have obtained these results by doing something which makes them worse. For example, tuning a single condenser to a station is something which the average inexperienced person cannot do. Women and children seem worst at this simple process. What they usually do is to turn the knob until they hear the station quite well and then leave it. They make no definite attempt to make certain that the position of the dial gives optimum, i.e., the best, results.

The Proper Way.

Now the proper way of tuning the condenser is to adjust it to the loudest point and then to alter the tuning a little to each side; this movement to the side should produce a weakening of the signals. If this does not occur, then something is wrong either with your adjustment or the receiver (excluding very special circumstances). The chances are that, having roughly found the loudest point, you will, on adjusting the condenser a little to one side, get a weaker result; you then tune the other way until the signal begins to weaken. Between two points where the signals weaken is the correct tuning point.

On a highly selective receiver the point of optimum signal strength may be very critical; the slightest movement of the

control will cause a big variation in signal strength. If, however, the receiver is unselective e.g., a crystal receiver, you may find that the maximum signal strength alters very little over quite a wide portion

★.....★
PART 5: The Practical Operation of a Receiver

Mr. Scott-Taggart has some trenchant things to say about tuning and reaction controls.

★.....★

of the dial. If you could actually measure the signal strength you would probably find that there was a point where the loudest results were obtained, but the human ear can only make a rough guess at the loudest point. Where the tuning is very flat you would adjust the condenser to a point half way between the points where signals noticeably begin to fall off.

Failure to obtain a maximum tuning-point may be a very valuable indicator of a fault. If, for example, in a two-circuit receiver one of the circuits tunes correctly and gives a maximum tuning-point, but the other does not tune at all, signals being the same strength at all points on the dial, this is clearly an indication that there is something wrong with the second circuit; possibly the condenser is disconnected

were tuned to the long waves while the first tuned circuit was on the medium waves. Such an action might occur with the operator failing to switch both circuits on to the medium waves, or it might be due to a faulty switch, or switch-contact in the case of a ganged switch.

Sometimes you cannot obtain a maximum tuning-point because the station received is at one end or other of the tuning condenser. In such circumstances you get a weakening of the station in one direction but no weakening in the other. You can usually do nothing about this; but you must realise that possibly the station is not accurately tuned. Of course, the fact that the station is not tuned to give the last ounce of signal strength does not mean that unsatisfactory results are being obtained.

Look Out for Overloading.

But if a station is received at the extreme end of a tuning dial, you may quite likely fail to get any improvement in signal strength by carrying out some other operations, such as increasing the reaction. Since this set is not really in tune at all, reaction will not improve signal strength.

Failure to receive signals at a clearly defined maximum point on the tuning dial may be due to the fact that overloading of the set is taking place. This may mean that one or other of the valves may be overloaded by signals, or the loudspeaker itself may be handling all it can comfortably manage.

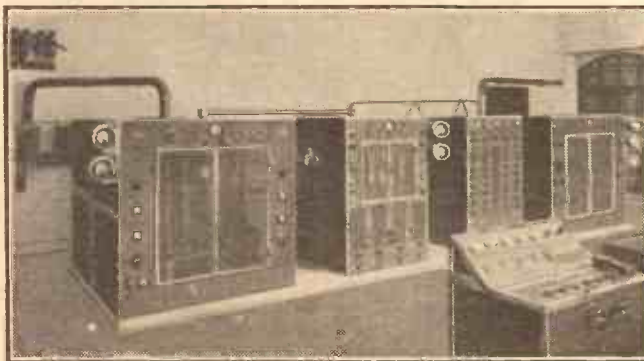
Sometimes the overloading is genuine, and at other times it may simply be that signals are so very loud that changes in signal strength cannot be discerned by the human ear. If signals are very strong, there will be a large spread over the dial in the case of many sets. The first thing to do, therefore, is to cut down the input of signals to the receiver, and this can be done by means of any of the controls which reduce signal strength.

Reduce the Input.

The overloading may occur at any point in the receiver; but a reduction of the input high-frequency currents will tend to cure every kind of overloading. If there is an aerial series condenser, this can be set to a lower value to reduce signal strength. If there is a volume control this will also cure, in most cases, overloading troubles and enable a fairly sharp tuning-point to be obtained. A sharp tuning-point should be obtainable

(Continued on next page.)

NEW TRANSMITTER FOR ITALY



A new Marconi short-wave transmitter, with a wave-range of 13-100 metres, has been installed at Coltano. All the latest refinements of short-wave transmitting technique have been incorporated in this installation, which has an output of 56 kw. on C.W. and 35 kw. on telephony. The transmitting panels and control desk are shown in the above photograph.

inside. Sometimes the signals may be loud at the bottom end of the second condenser, and gradually get weaker as the condenser is turned to what should correspond to longer wavelengths.

This would occur if the second circuit

WHERE CONSTRUCTORS GO WRONG

(Continued from previous page.)

on any modern receiver. If reaction is employed, this will increase selectivity enormously; but the effect is not obtained, or not appreciated, unless the input signal is brought down to a low enough value; so that when reaction has been applied the output signals are as loud as, but not louder than, the strength desired. So many amateurs get loud signals over a wide spread on a dial and then apply reaction. This is a quite hopeless procedure; and the final results as regards selectivity and distortion are almost inevitable.

This brings me to the question of reaction. Reaction has two effects: one is to increase signal strength, and the other is to improve selectivity. Actually the use of reaction as a selectivity improver is fictitious. What it really does is to improve the desired signal; it does not decrease the strength of an interfering signal. The use of several tuned circuits, on the other hand, decreases the strength of the interfering signal but does not improve the desired signal (in fact, it will reduce it somewhat, but not as much as the interfering signal).

In practice the thing that matters is the ratio of the desired signal to the interfering signal. But reaction must be used with a full knowledge that its result is to increase the desired signal. If, therefore, there is considerable interference before applying reaction, you may get the desired signal much louder; but you will also hear a background of interference. If, now, we cut down the signal strength of everything by an equal amount, we are able to make the interference signals so weak that they are incapable of being heard.

Keep Something in Hand.

The desired signals, however, have been made so loud by the use of reaction that they will still be quite strong enough, but will now be free of the background of the interfering station. Wherever you are using reaction to cut out interference, you need to reduce signal strength on the high-frequency input currents first. You do not apply reaction and then reduce the input so as to cut down the full level of output and interference; it is a more practicable operation to reduce the input high-frequency signal, e.g., by a variable- μ volume control, or by an aerial or anode-coupling condenser, and then apply reaction.

You may find that as you apply reaction, signals become very loud indeed; if you desire a greater selectivity you will have to cut down the signal input more, and then apply more reaction; this will give you the same output from your speaker, but with greater high-frequency selectivity. The great test of correct critical reaction adjustment is that, if you increase the high-frequency input by means of a coupler or

volume control, signals from the loud-speaker will be louder. In other words, you should always have just a little signal strength in hand; you should never be working the set absolutely full out when reaction is being employed to give you selectivity.

It is an almost invariable experience that, for a given setting of the reaction condenser, the reaction effect will be stronger as you tune to points lower down on the dial—in other words, towards lower wavelengths. In practice this means that if you are receiving a station at the bottom end of, say, the medium waveband, and have adjusted reaction to a critical value, i.e., just before oscillation occurs, you will, on tuning to stations of longer wavelength, have to increase the amount of reaction to bring the set to the best critical position for maximum signal strength and selectivity.

Tuning Down the Waveband.

The first rule, therefore, is that as you go up the dial so you must increase the amount of reaction. The second rule, which is far more important from many points of view, is the exact reverse: as you go down the dial reaction should be reduced.

Suppose you are listening to Budapest at the top end of the medium waves. If no reaction has been applied, you are quite safe in tuning down to a station at a lower point on the dial; but if you have applied

not hear the station at all; on the other hand, there is no risk whatever of oscillation due to tuning to a lower wavelength.

The second method is to reduce the reaction slightly as you go down the waveband. A few minutes' experiment with the set will soon show you what change in reaction adjustment is necessary at the two ends of the dial. By just keeping the reaction a little below that ultimately used, you will maintain the receiver in a highly sensitive condition. That is the method that I myself would use, but it calls for some little experience and judgment.

On the Long Waves, Too.

For example, if you have been listening to Budapest, and you wish to listen to Stuttgart, you would reduce the reaction a little, tune-in Stuttgart, and then bring the reaction up once more. If, after that, you desire to tune-in Rome, you would reduce the reaction a suitable amount, tune-in Rome, and then bring the reaction up. This is done with every station as you go down the dial. The beginner, however, is advised to search for stations on the way up the dial instead of down. The unforgivable thing is for an operator to tune down without altering his reaction. In other words, he has to be reminded every time by the set oscillating. It is quite possible that some constructors do not even know that the set will break into oscillation as you

tune to a lower wavelength after having adjusted reaction critically at a higher wavelength.

The effect of requiring more reaction as you go up the dial applies equally well to the long waves, and here it may be noted that when changing over from the medium waves to the long waves you should, unless experience has taught you differently, reduce the reaction value, because on the long waves conditions may be entirely different, and the setting of the reaction condenser may cause the set to oscillate on the long wavelengths.

Recognising The Symptoms.

When making a careful search for as many stations as possible, you naturally desire to keep the set in a highly sensitive condition, and this can be done by applying critical reaction. Good results with actual oscillation can be obtained if you learn to recognise the symptoms immediately prior to oscillation. Signals will have a squelchy sound about them when reaction is very critical, and the signal is not too strong to begin with. This squelch effect is only heard when tuning over the stations; when exactly in tune the station comes in perfectly well. If you tune slightly to either side of this best position, signals sound very unnatural and have a high-note hissy sound.

When you are tuned with full reaction to, say, Budapest, and without reducing the reaction you tune to a station lower down in wavelength, you should be able to tell just before the set is going to break into oscillation and reduce the reaction accordingly. It is difficult to express exactly the sound which warns you as the set is going to oscillate, but a little practice and a slow

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"SEEING" HER VOICE



Hildegard, the popular Continental croonette, getting a "close-up" of her voice in the Cossor cathode-ray oscillograph. This device shows the waveform of vocal sounds picked up by the microphone.

a large amount of reaction, and the set is on the verge of oscillation, even a small change in tuning to a lower wavelength will cause the set to break into oscillation. Heterodyne whistles will be heard and every station passed over will be mutilated. Even if only a little reaction has been applied to Budapest, you may easily find that by the time you have got down to London Regional the set will oscillate.

There are two ways of tuning down to a station correctly: one is to set the reaction back to zero and bring it up cautiously when you hear the station you want. This suffers from the disadvantage that the set is in an insensitive condition and you may

Our Readers' Opinions

NATURE'S DEEPEST SECRET.

Sir,—The eleven-year cycle of sunspot activity is approaching its maximum, and short-wave working is given a further impetus as the lower portion of the band again comes to life.

Closely connected with sunspot phenomena is the periodical variation of the earth's magnetic field. Would it not arouse greater interest in short-wave work if magnetic readings were studied in connection with the incidence of good and bad days for reception?

There is a daily regular movement of the magnetic needle, with occasional fluctuations beyond the normal, which coincide with sunspot activity. Quite recently, even the powerful beam transmissions were seriously interrupted during sunspots, accompanied by magnetic storms.

Consider the matter a little farther. Apart from daily and seasonal variations, there is a continuous change in this magnetic field throughout the years and centuries.

In the year 1657 the declination in London was zero; that is, the geographical and magnetic poles coincided. The declination then commenced drifting westward, reaching its maximum in 1818, since when it has gradually dropped back again towards zero.

Is it not probable that the incidence of short-wave transmission—skip distance—apart from periodical and seasonal variations, is also slowly changing through the years? This would also apply to the night propagation of medium waves.

Consider also that, as far as records go, the earth appears to be making one complete oscillation about its magnetic axis, from zero to east, back to zero and on to west and again returning to zero, approximately every 650 years. What hidden power lies behind this strange movement?

Popular astronomy entertains us with the incomprehensibly high speeds of planetary bodies, yet here is a movement majestically slow.

Can it be the influence of another celestial system, invisible, unknown, and inconceivably remote?

Yours truly,
B. S. T. Wallace.

103, Pollards Hill South, Norbury, London, S.W.16.

(This letter wins the guinea prize offered by the Editor in accordance with the details on this page.)

"WHAT DO YOU DO?"

Sir,—Is there any solution of the problem of how to keep up to date in radio reception and, at the same time,

- (a) Avoid bankruptcy;
- (b) Escape from accumulating a vast hoard of components, sets, etc.?

It is a bewildering position to try to resist the temptation to purchase every

new type of component introduced, and when the temptation wins, to find some use for the discarded parts rapidly becoming obsolete. Should every nut and valve-pin be carefully hoarded, "just in case," or should they be consigned to the dust-bin? Should old components be passed on to fellow-enthusiasts, or scrapped, or donated to the "Wireless for the Blind" Fund?

Actually, an old brass variable-condenser, of 1925 vintage, is still in place in an

ONE GUINEA FOR A LETTER!

AN INVITATION FROM THE EDITOR TO "P.W." READERS

I WANT readers of "P.W." to help each other. I want them to use the columns of this paper to express their views on all and every aspect of the great hobby of radio; I want them to "swap" experiences; I want them to tell about their triumphs—and their failures—with the various sets they have built, I want, in short, to encourage an exchange of views, opinions, likes and dislikes.

Send me letters for publication, in order that "P.W." can become, more than ever, the best medium for imparting all kinds of knowledge about radio.

YOU must have had, many and many a time, interesting experiences when building or operating your set. Tell other readers about your radio experiences. And, incidentally, get to know each other through the medium of "P.W."

For the best letter out of each batch published I am offering a prize of one guinea. Send your letters to the Editor, "Popular Wireless," Tallis House, Tallis Street, London, E.C.4.

experimental set of mine for testing components. Quite effective, too!

I wonder if radio constructors really ever throw away any part, or fail to purchase any one of the red-hot up-to-the-minute components or receivers?

Yours truly,
M. K. Huggart.

22, Longford Terrace, Monkstown, Co. Dublin.

"SELF-TUNING."

Sir,—The most remarkable instance of long-distance reception I have ever encountered was caused by a dial. It happened last winter; I had designed and constructed a twelve-valve A.C. superhet, which worked so well that I decided to make it my permanent receiver. So I bought a radio-gramophone cabinet and one of the latest straight-line dials, and made quite a nice job of fitting-up the set.

Now this dial worked very stiffly and had a pronounced springy action; that is, when set to one reading it used to drift slightly away from that reading after a time. I did not do anything about the dial at first because I thought it would probably wear right.

Looking up a list of programmes, I found that there was a good orchestral concert from Hilversum at 8.10 p.m. I listened to this for twenty minutes when at 8.30 p.m. the dial started to drift and, to my amazement, the set tuned itself to another station. A voice said, "We will be with you at the same time next Friday, 3.30 p.m. Eastern Standard Time. This is the National Broadcasting Company." Three notes on a piano. "This is station W B Z in Boston."

Needless to say I stayed up quite late that night. I had heard American stations many times before this, both on the short waves and on medium waves, but never as early as 8.30 p.m. on medium waves, not mentioning the peculiar way in which it was tuned in.

Yours truly,
S. Kharbanda.

98-100, Mill Road, Cambridge.

"SPLITTING" THE ELECTRON.

Sir,—In your issue of Aug. 17th, Mr. R. L. James suggested that the ether theory may, in the near future, be exploded.

In my opinion, the vital significance of this theory has not yet been realized; for, apart from the apparent necessity of some such medium in the propagation of light and electro-magnetic energy, the assumption of a fundamental, all-pervading element provides us with the only logical explanation for the creation and evolution of our universe.

The Milky Way appears to us as a luminous mass, and yet we know it to be a zone of innumerable stars. Any one of these stars might be split up into myriads of molecules; the molecule consists of atoms, and the atom can be resolved into electrons.

Why should the possibilities of this splitting process stop at the electron? Is it not conceivable that it can be carried out indefinitely, and that "in the beginning" our universe was a homogenous mass of particles so infinitely small, and interspaced so minutely, that creation at that time might be regarded as an impalpable aggregation of "nothingness"?

To our perceptions the fundamental realities of existence are matter and motion, and as neither can be created nor destroyed, both must always have existed. So our infinitely small particles must have had motion, but within such restricted spaces that the mass was, to all intents and purposes, stagnant. To put it simply: Matter split to infinity, with movement restricted to infinity, is equivalent to stagnant nothingness.

The to-and-fro bumping movement between our particles would have carried on indefinitely, and we ourselves should never have existed, had it not been possible for a glancing collision between two particles to produce a spinning motion, e.g., two

(Continued on page 26.)

RADIOLYMPIA IN KILTS

A brief review of the Scottish Radio Exhibition which ended last week.

By a SPECIAL CORRESPONDENT.

WHEN I left Olympia on the last night of the great National Radio Exhibition many of the exhibitors were talking about "putting Radiolympia into kilts." It was not until I had driven 400 miles northwards and entered the Kelvin Hall, Glasgow, that I fully realised what they meant. You see, I found "Glasgolympia" was essentially a kilted reflection of Radiolympia.

But it was a very powerful reflection withal, for most of the big firms represented at Radiolympia were to be seen up there. In fact, the majority of them had transferred their stands to Scotland lock, stock and barrel. Familiar Radiolympia faces were to be seen on all sides. Mr. David Strachan, the genial secretary of the Radio Manufacturers' Association, was in his element because for once in a way everybody seemed to know the correct pronunciation of his name.

A Thriving Industry.

Mr. Alex. Moody, the organiser of every R.M.A. show, was working as hard as ever, and although I did not actually see it, I am assured that he had his famous Radiolympia bed fixed up in his office so that whenever he was kept working late at the Kelvin Hall he could sleep there.

However, they were not all London people-whom I saw. Scotland has a very important and thriving radio industry of its own, and even if very little radio apparatus is actually manufactured north of the Tweed, there were sufficient Scottish wholesalers and others to take more than fifty per cent. of the stands in the Kelvin Hall. As a matter of fact, there are supposed to be well over 5,000 men and women employed in the Scottish radio industry.

I must not forget the stand at which a special appeal was being made for money to equip every hospital in Scotland with wireless sets. It is being run in conjunction with the nation-wide Hospital Wireless Fund, but all money collected in Scotland goes to the Scottish hospitals. If I needed any disillusioning regarding the alleged parsimony of the Scot I received it at that stand—the generosity of the visitors astonished me.

Keen Home-Constructors.

Now about the individual exhibits. There were actually 85 firms showing wireless apparatus of various kinds. Manufacturers know full well that in Scotland they like to build their own sets whenever possible. The percentage of home-constructed instruments in that part of the world is reputed to be at least twice as great as in England. Hence many firms made a splash of their components and kit sets. On the other hand there was a second school of thought which said "No, the Scot has made his own sets for so long that he may now be tired of doing so. Therefore we will try to sell him complete instruments."

I wonder if they were successful. (Manufacturers have to keep the details of their sales so secret that it is almost impossible for me ever to hope to find out.)

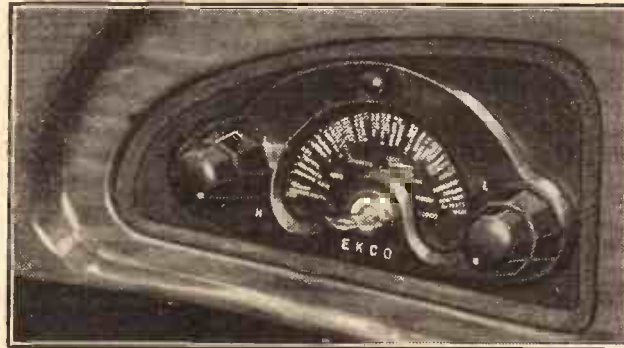
Coming to individual stands, there is every justification for mentioning first of all, H.M.V. This enterprising company had shipped direct to Glasgow its £2,000 prize-winning Radiolympia stand. Naturally it merited a great deal of attention in Scotland and displayed the fine sets and radiogramophones to advantage.

The Riot of the Show.

After that I should refer to Telepathovox—the riot of the whole show. This wonderful Marconiphone robot caught the Scot's imagination.

"How does it work?" "Is it telepathy?" "Ventriloquism, perhaps?" "Whose is the voice?" No one discovered the secret of this chromium-plated monster which answered the most awkward questions with uncanny accuracy. Touring the main hall I noticed a big

A FINE CAR-RADIO OUTFIT



"Car radio was one of the big Ekco attractions at Glasgow." Here is the control panel of the Ekco equipment fitted neatly into the dashboard of a car. The illuminated dial is of the non-dazzle type and is calibrated in station names.

crowd round the Cossor stand, where among other interesting exhibits was a high-vacuum cathode-ray oscillograph which enabled visitors actually to see their own voices.

Scotland apparently knows the horrors of electrical interference. At all events, there was a rush for the Belling and Lee stand, where a full range of suppression equipment was to be seen together with examples of installations necessary to cure every conceivable type of parasitic radio noise.

Car radio was one of the big Ekco attractions. There are not, at present, a great many cars equipped with radio in Glasgow, but I should imagine that E. K. Cole will soon be able to put that right!

At Radiolympia there was a revival of interest in headphones, and I noticed that this interest was sustained in Glasgow. Ediswan were selling the famous B.T.H.

phones at 12s. 6d., and seemed to be doing a brisk business.

Economy being an important factor in these hard days there was, naturally, much interest in Clarke's "Atlas" mains-units which pay for themselves over and over again in avoiding the expense of renewing batteries.

Short-wave sets and all-wave sets drew thousands to the Lissen stand, where the big attraction seemed to me to be a short-wave kit set. On the other hand, the short-wave experimenter who likes to design his own receivers found himself fascinated by the exhibits of Stratton and Co., who also showed a range of their famous Eddystone short-wave receivers.

A Very Full Range.

On the Ferranti stand was the chassis of one of their "Nova" receivers encased in a glass tube, and so arranged that it could be turned round and viewed from all angles, thus permitting one to see the fine construction and workmanship.

Perhaps the fullest range of receivers shown at the Exhibition was that of G.E.C. They had mains sets, battery models, car radio, and special overseas short-wave apparatus.

On the Kolster-Brandes stand, where a large model of their unique Fototune dial was being used to demonstrate the ease of tuning on K.B. receivers, I saw a number of women buyers expressing admiration for the cabinet-work of all the sets.

Real radio enthusiasts went to the Westinghouse stand, where the "all-metal way" of rectifying was the great attraction. A steady flow of technical questions were being answered by Westinghouse experts.

Where loud speakers were concerned W.B. seemed to collect the crowd. The demand for their new "Stentorian" speakers seemed to indicate that Scotland is going in for quality this year.

Then there were the battery stands with famous names such as Exide or Oldham or Siemens blazoned across them. The attention paid to each of these stands showed that batteries and accumulators with a name are the only ones that stand a chance in Scotland.

REMEMBER THESE DATES

September 16th and 17th are red letter days for many listeners, for on those dates John Watt, the deviser and inimitable compère of "Songs from the Shows," will revive this most popular feature, first on the Regional and then the National.

In this series Mr. Watt will contrast the songs of different composers. Lionel Monckton and George Gershwin are the composers whose songs will be dealt with on September 16th and 17th. The B.B.C. Variety Orchestra and Chorus will be conducted by Stanford Robinson, and Harry S. Pepper and Doris Arnold will be at the pianos.

ON THE SHORT WAVES



MORE 5-METRE NEWS

Development in ultra-short wave work is proceeding apace and, as described by W. L. S. in this article, remarkable results have been obtained in U.S.A.

BEFORE the season of fine weather and field-days closes, I have just time to get in another brief résumé of recent 5-metre work. One of the most pleasing aspects of this summer has been that so much fresh blood has been brought into the ultra-short-wave game that we now have enough keen owners of stations to keep things alive all through the autumn and winter.

There is, too, a surprising amount of keenness on the part of readers—there's something about these ultra-short waves that seems to awaken enthusiasm as soon as one comes in contact with them. My post-bag for a while was full of letters from people who wanted me to put them into touch with the nearest amateur transmitter who used 5 metres.

Startling Results in U.S.A.

If only there were a thousand active amateurs instead of about a hundred, I have a feeling that I should have to devote part of this short-wave section to the "ultra-shorts" every week, instead of giving them a series of spasmodic "puffs" as at present.

The most startling news of the whole year comes (need I say it?) from U.S.A.

Long ago I made the prediction that if only someone would stop fooling around with wobbly transmitters and noisy quenched receivers, we should find a reflected wave that would cover really long distances.

In the States several amateurs are putting out crystal-controlled transmissions on 5 metres, and these, unlike the wobbly telephony transmissions, can be received

splendidly on a superhet. Several superhets likewise have been installed, and the latest news is that the owner of one has heard all the U.S. licensing districts on 5 metres, involving distances up to 2,000 miles!

The longest two-way contact that I have heard of has been over a distance of 1,100 miles—and that's pretty good going, and surely implies the existence of a "sky-wave."

We all know that 7-metre transmissions from South America have been heard in this country. This is not surprising, because 10-metre *amateur* contacts between Europe and South America are now being made quite frequently, with low powers too. When will the first 5-metre wave rise to the occasion and fly clean out of Great Britain, to land either in North or South America? I shall be very disappointed if it hasn't happened by next year.

(Needless to say, I should rather like to be the owner of the said wave, but I'm not quite so optimistic as that.)

Long distance on 5 metres, you may

weeks ago, has been hopelessly beaten by microscopic affairs using the new midget valves.

The two pictures on this page show my new transmitter, which isn't exactly a pigmy in size. It *could* be made smaller, but I built it with convenience as a first requirement. An ordinary push-pull circuit is used, its usual designation being "Tuned-plate untuned-grid," or "T.N.T." in the States.

Two 6-volt receiving valves are employed; the grid-leak and H.F. choke are standard receiving components; and the tuning condenser is an ordinary baseboard mounting "neut."

The aerial coupling coil is mounted on two little stand-off insulators, and underneath them is a kind of strut from which the whole thing may be suspended. One wants a 5-metre aerial to be as high and clear as possible naturally, but if this implies the use of very long feeders from the "shack" to the aerial proper, one is under a disadvantage.

A Popular Scheme.

Accordingly it is becoming a popular pastime to hoist the whole thing—transmitter, aerial and all—into the air, simply feeding the juice to it along a three-way cable.

The upper photograph on this page shows the little transmitter all ready for

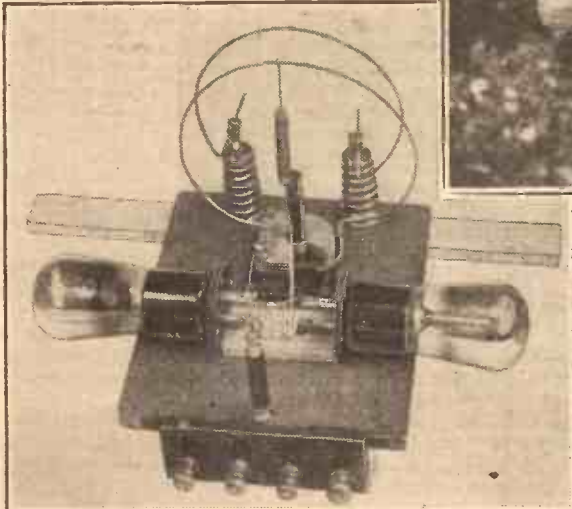
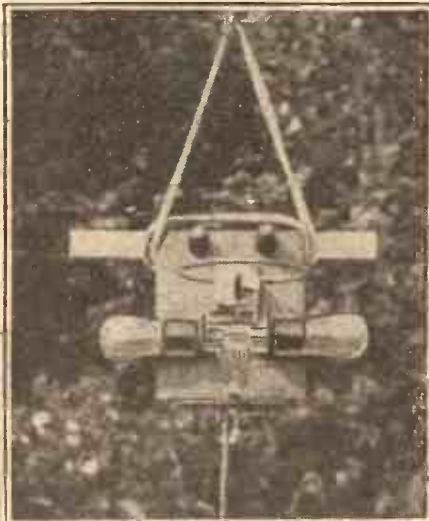
hoisting to the top of a pole or tree. The aerial is not attached, but consists of an ordinary horizontal di-pole—two arms roughly 4 ft. in length—attached directly on to the coupling coil.

At the time of writing I have not had very much time for testing this little chap out under those conditions. Working at home, however, on my fixed aerial I have covered roughly 20 miles with it, using an input of about 2 watts.

The distances being covered by amateurs are steadily increasing. G 5 R D at Abbots Langley and G 2 J U at Harrow are now making quite consistent contacts with the South London stations, the most distant of which from them is probably G 2 A W at Keston. G 2 N U at Romford is also heard very well in South London.

Six months ago it was unusual for any amateur from his home station to cover a distance of more than about 12 or 15 miles, so that these 30 and 35-mile contacts show that we are progressing.

★
FOR
OUTDOOR
WORK



Using two 6-volt receiving valves, this transmitter works on 5 metres. For outdoor use it is slung to a pole or tree in the manner indicated by the top photo.

depend upon it, is going to be achieved on multi-stage superhet receivers and frequency-stabilised transmitters—both of them as far removed from the portable gear that we use as the North Pole is from my aerial mast.

The portable aspect, however, continues to be very fascinating, and tiny receivers and transmitters are still being built almost daily. My midget receiver, shown a few

★

ON THE SHORT WAVES—Page 2.

Points from the POST-BAG

A. B., a seafaring reader, writes from Rio to know whether I used the correct connections to the coils in the "B.C.L." Two! The cause of his doubt is a diagram, which he has recently seen, showing the thin wire coil used for reaction and the lower winding for aerial coupling. I assure you, A. B., my connections were correct, and the set did work!

Yes, I think you're right when you say that an H.F. stage before the detector is an absolute necessity if one is working on board ship. You will find the information you want on page 543 in the August 3rd issue.

Overseas Conditions.

R. A. S. (Calcutta) makes the usual fully justified complaints about the conditions under which overseas readers have to work. One little trial is thousands of electric fans whirling for 24 hours *per diem* (query: What is a silent background, Daddy?), and another is the fact that "P.W." costs twice as much.

H.F. chokes fall to pieces after the damp season, and very few components really stand up to the climatic conditions of Bengal. R. A. S. wants a specially designed set for Dominion readers in "P.W."

R. C. S. (Anerley) wants a complete Guide to Short Waves, for which he would be prepared to pay untold wealth, and he even thinks that other readers might do the same. Your idea has duly been passed on, R. C. S.

P. B. S., another Indian reader, reports that the Empire transmissions have recently shown a wonderful improvement, and says that they are now second to none in the world. G.S.G., in particular, is absolutely free from interference in his locality. He runs a four-band, all-wave receiver, which he has calibrated accurately on all bands, and I note that he has received Hamburg on the medium broadcast band.

B. J. L. (Pinner), having missed "P.W." for a little while (Shame!), wants to know whether I have recently described an all-mains short-wave superhet. No, B. J. L.; the one that I said was "on the way" a long time ago is still coming. I've been using it for months, but it's hardly in publication condition, and I honestly think it's too complicated for the requirements of this section.

Long Service from the H.T.

B. J. L. mentions that he has a high-tension battery that has seen continuous service since April, 1933. That strikes me as pretty good, although I have one that was put into use on November 11th, 1933.

A. C. (Wallsend) writes to tell me about conditions up North, which seem to be very good at present. He finds the 20-metre amateur bands and the shorter

broadcast bands the most interesting, and also mentions C.M.C.D., the new Cuban on 49 metres, approx. He takes me to task for "disparaging remarks" about the ardent collectors of verifications (which I don't remember having made, by the way), and says that they have often served to convince "B. C. L.'s" who otherwise were very sceptical about short wave work in general.

A Crocodile-Clip Hint.

C. H. M. (Marazion) studied my article on aerial couplings to such good effect that he now has a receiver incorporating three of the methods outlined. He also passes on the tip of terminating one's earth lead with a crocodile-clip, which can be fastened on to other parts of the set for the different wavebands.

He finds that if ever hand-capacity crops up it can be cured by shifting the position of this clip, say from the moving plates of the tuning condenser to the low-potential end of the coil, actually on the coil holder.

C. H. M. has subscribed to "P.W." since September, 1923, and he says he has acted on every piece of advice I have ever given in this feature! He also recommends listeners to tune-in the American amateur W 3 M D on 20 metres. He gets "more laughs to the minute" than from any other comedian, radio or otherwise.

A. W., writing from South Africa, also passes on some useful hints. For instance, he winds his H.F. chokes by winding on

MORE REAL NEATNESS



How many short-wave enthusiasts take as much trouble over storing their tools and small parts as C. H. H. (Cornwall), whose "stores" are shown here?

wire and cotton at the same time, removing the cotton after the winding has been tightened. Result: nice space-wound choke, usually on a fountain-pen barrel!

He has also evolved a rather neat scheme for plugging coils in through a hole in the front panel (as per my suggestion some time back), but he equips the coils with neat handles made from small circular pieces of wood and ebonite knobs. This is an excellent dodge, and greatly adds to the convenience of the method.

Duplex working, A. W.? Simply the ability to receive the incoming transmission while one's own transmission is switched on. There's no need for all the complicated band-pass circuits that you mention, providing simply that the wavelength on which reception is taking place isn't interfered with by the nearby transmitter.

SHORT-WAVE NEWS

THE following readers all wish to get into touch either with a local club or with individual short-wave enthusiasts somewhere in their vicinity. Will someone please take note of their various addresses? May they be swamped out with offers of co-operation:

J. W. Dunsire, 21, College Street, Buckhaven, Fife, Scotland.

K. R. Andrews, "Casimir," 125, Warren Road, Banstead, Surrey.

W. C. Barnes, 7, Surrey Road, Swindon, Wiltshire.

R. Parratt, Stapleford, nr. Hertford, Herts.

R. D. A. Williamson, 422, Barking Road, East Ham, E.6.

Club secretaries are asked to keep their eyes open, and to look at this page regularly! I seem to have quite a large ready-made membership for them.

Exchanges for Empire Listeners.

Wireless exchanges for Empire listeners continue to increase in numbers, the latest addition being an unusually large and ambitious one at Accra, Gold Coast. The

Secretary of State for the Colonies and the Governor of the Gold Coast gave the inaugural speeches from the London studio.

Two "sessions" a day are contemplated, the first being from 10 a.m. to 1 p.m. and the second from 7 p.m. onwards. Other interesting items will be put over as they occur at different times of day, and gramophone records will also be used fairly frequently.

It is hoped to extend the service to other Gold Coast towns in the near future.

A new book critic is announced for Empire listeners. Mr. Eric Gillett will begin his series of talks during this month, and he is the B.B.C.'s reply to a demand for a "simple" talker for overseas enthusiasts. They remark that on one occasion one of Mr. Chesterton's most brilliant

paradoxes was made even more paradoxical by a bout of atmospherics, with the result that it was quite impossible for the human brain to grasp his meaning at all!

Improved Reception from Springfield.

A station that has improved greatly of late is Springfield, W 1 X K, in the 31-metre band. Rumour has it that he has been playing with new aerials, and has now settled down to one that happens to suit this direction. Amos 'n' Andy fans will do well to watch W 1 X K between midnight and 1.30 a.m.

A note in the Cape Town Week-End Argus suggests that Johannesburg may be experimenting on about 24.6 metres, but they are doubtful whether it might have been a harmonic of his 49.2-metre transmission.

W. L. S.

THOSE SCHOOL BROADCASTS

Mary Somerville O.B.E. talks to Alan Hunter

SEVERAL recent events have tended to bring schools' broadcasting into the public eye. Miss Mary Somerville, Director of School Broadcasting at the B.B.C. since the death of J. C. Stobart, was awarded the O.B.E. in the Birthday Honours List. Sir John Reith spoke sternly to the Association of Education Committees on their neglect of broadcasting as one of the assets of the public service of education. And the headmaster of a public school more or less told Sir John that education could not be dripped out of a tap!

Really Interesting Talks.

I imagine the ordinary listener realises only in a vague way the extent and practice of the B.B.C.'s school broadcasting. Those with daytime leisure must have tuned, perhaps inadvertently, into morning and afternoon programmes to schools. And not a few, I gather, have found to their surprise that many of the talks were so divorced from any classroom savour that adults could listen to them not only with interest but with intellectual profit.

We read at various times mention of a mysterious body called the Central Council for School Broadcasting. It was formed on the recommendation of a public committee as long ago as 1928. It consists of representatives of the Board of Education, local authorities, and teachers. For many years Miss Somerville has been its secretary, thereby adding to her legitimate task of preparing the actual broadcasts.

In future she will be able to concentrate on the broadcasting side, thanks to the appointment of A. C. Cameron as secretary of the council. This distinguished Director of Education of the city of Oxford believes very strongly in what might be called mechanised forms of education, and he will form a valuable link between the B.B.C. and the various local educational authorities and teachers taking the talks.

A Busy Executive.

When I went along to see Mary Somerville in her pleasant office looking out on to Portland Place from the third floor of Broadcasting House I was determined to learn something of her all too little publicised organisation.

Let me say at once that I had a charming reception. Miss Somerville is a very busy executive, but she found time to tell me all I wanted to know. She told me first of all what a wide variety of schools the B.B.C. service aims to suit.

In the main they aim to serve children between the ages of eleven and fourteen in the State schools.

Schedules are drawn up to give these children a valuable link between their school days and their after-life. The motto of the council—and I think this strikingly shows the whole motive behind the service—is: "Supplement, not Supplant."

As Miss Somerville pointed out, although the schedules are drawn up with the object of appealing to State school children, there is nothing to prevent private and public schools from taking many of the talks and lectures. Nor is there reason to suppose that thousands of grown-ups do not regularly tune in to them.

I should emphasise that the Central Council co-opts teachers for various subject sub-committees, so that those whose work is to be supplemented by the radio actually do have a major say in what is broadcast.

This is the essence of the B.B.C.'s attitude towards School Broadcasting: to interpret educational needs in terms of good broadcasting. It is not enough, as Miss Somerville pointed out, that the talks should be educational. They must be good broadcasting as well. And that is where Miss Somerville's genius comes in, although naturally she is much too modest to say anything of the kind.



Miss Mary Somerville, O.B.E., who took on the task of Director of School Broadcasting some years ago. The broadcasts are mainly aimed to serve children between the ages of eleven and fourteen in the State schools, the whole motive being to supplement the ordinary education, not to supplant it in any way.

I asked her if she had any index as to how many schools were taking her talks. She told me that it was at the moment impossible

to compute the exact figures, because returns from schools were quite voluntary, and not all schools taking the service troubled to ask for them and to return them filled in.

So that from the returns actually available one could at best arrive at only a basic minimum. The latest figures are 3,323 schools. These can be looked upon as completely effective contacts, for it is not likely that any of them would take the trouble to fill in the returns unless they were intimately interested.

Time on the air varies according to the day of the week. I have been looking through some of the schedules and estimate

that School Broadcasting uses the National transmitters for between one and two hours a day, short twenty-minute talks in the mornings and slightly longer periods in the afternoons.

Many of these talks, as anyone can see who takes the trouble to look through the 1935-36 time-table, have a universal appeal. The talks on Round the Country-side, English Literature, Discovering England, and World History, all given by experts in their own fields, are of interest to children of all ages.

Handled in a Dynamic Manner.

Partly, this is because none of us ever can claim to have learnt all he or she needs to know while still at school. Very largely, though, the wide interest created by School Broadcasting is due to the dynamic way the various subjects are handled.

Let me take just one example: Illustrated History. One of the talks in that series is called Changes in Transport. That alone is indicative of the dynamic attitude. But it does more. For the talk comes to life—contemporary life—with ballads as sung in the good old coaching days, with newspaper cuttings telling of the first railway coaches.

Then the Travel talks. By no means are these simply lessons in geography. A man will tell how, crossing an equatorial swamp, his feet were scalded by the water heated almost to boiling point by the midday sun—graphic illustrations listeners cannot forget, as they undoubtedly would tend to forget dry-as-dust "facts."

"There is no doubt these and other talks have a very big adult appeal," emphasised Miss Somerville. "It is a misconception of the type of audience we appeal to when it is suggested that the service should be discontinued if more schools do not take advantage of it. I am perfectly sure that there would be a great outcry from grown-ups if these talks were stopped."

The Question of Sets.

Miss Somerville is an idealist, but a practical one. "It is impossible for a talk in our service to be too simple," she said, "or too good either. My aim is that there shall be no bad broadcasting in the school talks, and now I shall have more time to make sure of my aims."

I asked her how the schools were solving the problem of the right kind of set to use for receiving these talks. Miss Somerville revealed a keen technical sense of things when she said that the acoustics of large classrooms, with their expanses of bare walls and glass, made many otherwise good sets unsuitable.

As she pointed out, it was not always the most expensive sets that succeeded in the classroom. Some sets admirably suited to the home, with its plenitude of heavy

(Continued on page 25.)

BARRY KENT CALLING

News and Views from the "Big House"

Reducing Average Age.

A DECREE has been pronounced that the average age of broadcasters is to be reduced. This is meant to convey that in the selection of people for jobs of production, and so on, preference is to be given to candidates of twenty-five and thereabouts. This is a sound move. But why is it directed only to the "front-line troops"? Someone has worked out that the average age of the governors is well over sixty. I believe the average age of the squad of controllers is nearer fifty than forty. Here, it seems to me, there is equal need for youth.

The truth is that the war generation has a strangle-hold on the key jobs of the B.B.C. This is all wrong. The war is a generation away, and a fresh mentality is needed to-day. In my view B.B.C. senior staff should be changed much more frequently than they are.

That Mythical Fortnight.

Quite a stir was caused the other day at Broadcasting House by the currency of a rumour that a special meeting of the Board of Governors was being called to consider a serious constitutional difficulty that had arisen in connection with the expiry of the Charter. It was alleged that there was a fortnight at the beginning of 1937 when there would be a hiatus between the old B.B.C. and the new authority, whatever it may be. If this were to be the case, then there would be a fortnight of chaos in which all and sundry would try to reach the ears of British listeners.

But the alarm was a false one. There is no possibility of such a hiatus. Nevertheless, the fact that it was seriously investigated at the "Big House" is a sign of "nerves" there about the new Charter. The B.B.C. has very little idea what the Ullswater Committee will recommend.

The Prospects of Announcers.

An announcer friend of mine, whose voice is familiar to millions of listeners all over the world, gave me a most discouraging account the other day of the conditions of work and prospects of himself and his colleagues. He admitted that there was one good job in the business—that of chief announcer, carrying a salary of about £750 a year, and enough status and leisure to satisfy the aspirant for a profession.

There was, however, quite a different state of affairs to be faced by the rank and file of announcers. Their pay began at about £350 or £400, and struggled up laboriously to £500, where it was apt to stick for good. Work was hard. There was no recognition. Knocks were plentiful. Opportunities for transfer to other work were few and far between. Altogether an

uncomfortable picture. If these complaints are justified it is high time the matter was put right.

Lord Selsdon and the B.B.C.

I continue to hear Lord Selsdon's name associated with the future B.B.C. A Cabinet Minister told me that it was regarded as a foregone conclusion in Government circles that Lord Selsdon would be invited to take an important B.B.C. post before the end of 1936. My informant could not enlighten me as to what this post would be.

Wales and Scotland.

The Welsh-speaking staff, taken on for the new service in Welsh to the Principality,

WALFORD HYDEN LISTENS IN



Mr. Walford Hyden, the well-known composer and conductor who started the popular Café Collette broadcasts, with his wife and dog (Bruno), listening to a programme on a G.E.C. set. Mr. Hyden has recently recovered from a serious illness.

began their work in the B.B.C. with a short course of instruction and consultation in Scotland. It is apparent, therefore, that Sir John Reith is determined to carry out his promise to Mr. Lloyd George to make sure that Wales is as well treated as Scotland in the B.B.C. system.

"I Knew a Man."

This is the title of a new series of talks in which the lives and achievements of men and women who have died, within living memory, will be described by those who knew them well. H. G. Wells will talk about the great Huxley, Philip Noel

Baker about Nansen, Lord Snowden about Keir Hardie, Lord Lothian about Lord Milner, Miss Megan Lloyd George about Mrs. Pankhurst, and so on. This seems to me to have promise of special "human" interest.

Sir Thomas Beecham and the B.B.C.

I understand that Mr. Roger Eckersley, the B.B.C. Director of Entertainment, who has kept quietly and patiently in touch with Sir Thomas through all the difficulties of the last ten years, is about to make an important announcement concerning a permanent working arrangement between the B.B.C. and Sir Thomas.

Although details of the arrangement have still to be worked out, it is known that it will enable listeners to have the advantage of hearing much more of Sir Thomas Beecham's conducting in the future than has been possible in the past. Also, this will be done without in any way prejudicing the authority or position of Dr. Adrian Boult, the Director of Music.

HISTORY AS IT SHOULD BE TOLD

Our Broadcasting Critic hails "Armada" as an example of thrilling adventure.

BROADCASTING has its own peculiar way of presenting history. It is an attractive way, appealing not only to the historically-minded, but also to people who would never dream of reading those old documents (even if they had the chance) which tell of the big events of the past). "Armada" is the latest of a series of these history broadcasts. As with most stories much of their success depends on the telling. The author and producer both know how history should be told, how to transform what to some readers is dry-as-dust fact into narrative throbbing with vitality and dramatic feeling. "Armada" caught me in a responsive mood. I listened to it, not because I had to (which is often the case), but for the real enjoyment and interest it provided.

The Royal Air Force is at home in the air. Its band is equally so on it. Afternoon listening isn't a favourite pastime of mine, except when the broadcasts for schools are on. But for once in a way I did a spot of afternoon listening. The Central Band of the Royal Air Force was holding forth. It gave an excellent programme of music, including an unusually long selection of

Romberg's "The Desert Song." Some of this music might have been written expressly for military bands. It is very stirring.

A useful talk was that given by Mr. C. R. Benstead entitled "A Landsman at Sea." There was more than a suggestion of humour, too, that betrayed Mr. Benstead's own association with the sea.

Mr. Benstead is a writer, and was a cricketer. Perhaps he is still. I believe also that he was once a soldier. But to get back to the talk. It was full of useful information and hints indispensable to listeners intending to do a cruise and anxious not to drop bricks. Perhaps the talk was a wee bit too rapid. Long words had difficulty in getting over. It will be a pity if the second talk is spoilt by this easily-corrected fault.

"Rocking Horse Winner" is just one of those absurdly impossible stories that dreams are made of.

(Continued on page 26.)

Insist upon having

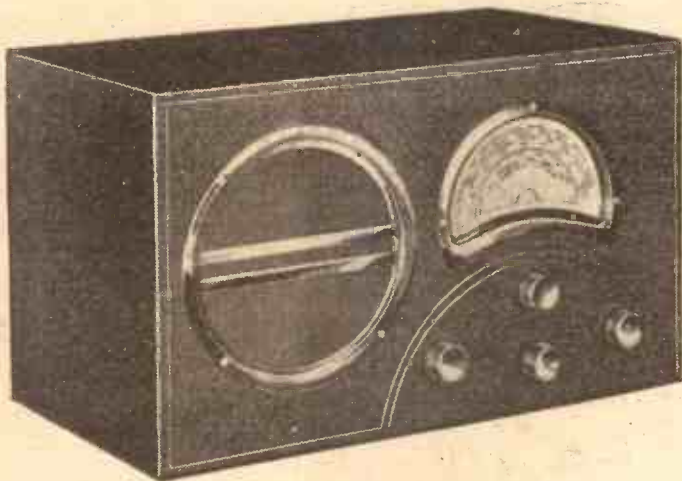
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RADIO AND ABYSSINIA

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

War between Italy and Abyssinia inevitably means that radio must play a very important part. A brief and very interesting outline of its applications to a campaign of this nature is given by our Technical Editor, who is able to write from first-hand experience of military and air force radio in East African territories.

IT is a curious fact that neither the majority of the newspapers nor the many amateur military strategists one hears talking in trams, trains and buses seem to pay much attention to the influence of radio on the expected Italian-Abyssinian campaign. A great deal has been said about Italy's highly organised air force, the Abyssinian's traditional skill with the rifle, guerilla tactics, mechanised infantry, and so on. But although, no doubt, most people realise that it will play its part, radio appears to be taken very much as a matter of course, even if it is considered at all, except as a convenient method of sending messages from one point to another.

A Most Powerful Ally.

And yet it is quite safe to assert that just as radio has been said to constitute one of the most potent instruments for establishing world peace, so it can also be the most powerful ally of a warring nation, particularly when the campaign takes place in a country like Abyssinia. In my opinion, it will prove to be the determining factor in any struggle which may occur in that region.

The Abyssinians are not well equipped from a radio point of view, and they would use it mainly for purposes of maintaining contact between the headquarters of their forces.

On the other hand, there is probably no other country having its fighting services better equipped with wireless than Italy; and that the Duce fully realises its value is clearly proved by the fact that he has called upon Marconi to act as his chief radio consultant.

I have had personal experience of the use of radio, in campaigns similar to that which may confront the Italian forces, while acting as wireless officer in the R.A.F. on the Sinai peninsula, in Egypt (during the trouble there in 1922, I think it was), and in the Sudan, Kenya and most other parts of East Africa. And, by the way, even if I haven't actually travelled through Abyssinia itself, I have at least seen it from the air.

Lines of Communication.

It is, therefore, not difficult for me to predict the manner in which the Italians would be able to employ wireless, and you can take it from me it would be in an extremely effective manner.

There is, first of all, the question of those unspectacular but extremely vital "lines of communication." Wireless

enables a general staff to "play" its forces in the field, however wide the front they cover, just as though they are chessmen. The greatest mobility can be maintained without fear that any section will get out of touch.

The movements of the opposing forces, almost minute by minute, can be followed at headquarters by the military experts, and orders in accordance with their decisions flashed hither and thither over mountain and valley, stream and lake, with no intervening wires to get broken by accident or design.

A message comes in, via a portable radio station, that a small detachment of troops, maybe fifty miles away, has taken up such and such a position. Then arrives a message, relayed from a reconnaissance aeroplane (on scout duty), that a body of the enemy is advancing in that area. At once orders are flashed back by radio

ITALIAN
WIRELESS



Italian soldiers erecting portable transmitting and receiving outfits during the recent extensive manoeuvres in Northern Italy.

FIELD
STATION

for the detachment to take up a new position, or for the movement of reinforcements from another point.

If anyone has the idea that it will be possible for the combatants to play a kind of hide-and-peek game among the Abyssinian ravines and mountains, they are very much mistaken. Aircraft fitted with wireless enable the most rugged country to be kept well and truly under observation, and four or five aeroplanes manned by skilled pilots and observers can keep watch over very large areas indeed. Their radio is also able to render the employment of bombing and machine-gunning from the air vastly more economical and effective. Guerilla warfare becomes a trying proposition for the "guerillas."

Bombing squadrons can be kept in readiness at widely separated strategic points, ready to roar off with their loads of death at any moment. In addition, there can always be one or two squadrons or smaller groups of machines in the air over areas where they may be required.

And this is the sort of thing that is likely to happen. A reconnaissance plane, flying very high in order to obtain the greatest distance of view over the country, spots a party of the enemy either camping or on the march. It at once radios the information to the base. Orders are given to the appropriate air force command, and within a short time bombing machines appear, to exterminate, or at least badly harass, that small enemy concentration, first with bombs and then, perhaps, with machine-gun fire.

Ceaseless Aircraft Patrol.

And, by the way, I really do not know which is more likely to disturb one's morale, bombs from something you can't hit back at in any way, or the terrifying spectacle of giant planes zooming down at you at two hundred or more miles an hour, spouting flames from machine-guns, every one of which seems to point straight at you!

With aircraft unceasingly patrolling the skies, and watching with all-seeing eyes every attempt to establish new camps, defence works, supply columns, artillery positions and so on, and immediately passing word back by wireless to headquarters, which in its turn arranges suitable counter-moves, an immense superiority can quickly be achieved.

And then there is artillery observation. Not the whole of Abyssinia is mountainous; there are miles and miles of more or less flat or at most gently undulating country. But, undoubtedly, much of any fighting must occur in the hilly regions, because the natives are hill and not trench fighters.

Without wireless and aeroplanes the effectiveness of artillery becomes restricted in mountainous areas, because of the difficulty of sighting targets. But with those two modern aids to warfare it is not necessary for the gunners to be able to see what they are shooting at.

"Spotting" for Artillery.

The enemy might be situated at the other side of a mountain, thinking themselves well protected, but so long as there are guns capable of shooting over that mountain (and it is surprising how neatly high-trajectory howitzers will lob shells over intervening obstacles) they might just as well be on a flat plain.

The "spotting" aeroplane flies in large circles over the target at a height of five or six thousand feet, or very much lower if there are no anti-aircraft guns in action against it, and when the observer has the objective well in view, he gives the battery word by radio to fire. A shell is sent over more or less by guesswork, but the aeroplane observer is at once able to report by a simple radio code what sort of correction to make.

(Continued on page 24.)



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EASILY the biggest surprise that the Berlin Radio Exhibition held for me came in London on the night after a Dutch air liner had landed me at Croydon. A telephone message reported that the exhibition buildings were in flames! Fortunately the fire does not seem to have been so serious as was at first reported, and the exhibition was able to carry on, minus one of the eight big halls.

An earlier surprise to my Radiolympian eyes had been the size of the show, which was reminiscent of both sections of the British Industries Fair. But what can you expect when an exhibition has the full backing of the State? Vast as the exhibition buildings are they were not too big for the regiments of visitors that swarmed through them. Regiments is the *mot juste*—I have never seen such a variety of uniforms in one building before. Thousands had been brought in at special rates from the provinces. But these enormous crowds are a mixed blessing. I wondered how much some of the visitors could have seen. Very little indeed, I should say.

THE TELEVISION CHASSIS



Manfred von Ardenne inspecting a Lorenz-Von Ardenne television receiver. A 4-stage superhet provides the vision signal and a 3-stage reaction sets the sound.

There is another point which is important before one begins to talk about exhibits. Radio is centralised in the Witzleben suburb. The exhibition buildings themselves form a square round pleasant gardens, in the centre of which rises the Witzleben television tower, 450 ft. high, with a restaurant half-way up. Berlin's Broadcasting House itself is only a stone's throw away, and there is ample room for expansion of the building.

Striking Contrast with London.

The contrast with London is therefore all the more striking.

Working television exhibits, which filled the whole of one hall, were the chief attraction to the public. I should say that there were about fifty receivers on show in

the darkened hall. Some sets were picking up the 180-line transmissions radiated from the Witzleben tower only a hundred yards away, others were reproducing by the intermediate film process. The chief firms exhibiting were Fernseh, Telefunken, Loewe, Lorenz, and Tekade.

The German Post Office had a series of sets showing the evolution of television

WHAT I SAW IN BERLIN

The German Radio Exhibition provided many surprises, apart from the fire which destroyed one of the eight buildings. Chief among the astonishing things was the evidence of tremendous advance in television demonstrated by the working of a large number of receivers. Here is a special article on the subject by L. Marstrand Gander ("Daily Telegraph" radio and television correspondent).

from 30-line to 180-line pictures. I thought the best definition was obtained by the Fernseh set, which showed a 320-line picture about 10 in. by 12 in. I watched a cabaret show and the sharpness of the outlines was remarkable—quite as good as, if not better than, a home cinema. But I thought that there was still a certain amount of flicker.

On the other hand, the Loewe set showing a 180-line picture with interlaced scanning seemed to have abolished flicker. All these sets used the cathode-ray tube in the orthodox way.

The Tekade mirror screw receivers were interesting but somewhat bulky. I was asked to say how many lines were being used in one Tekade receiver, and hazarded that there were 180. Actually there were only 90. My questioner, an optical enthusiast, was pleased.

No Direct Vision Pick Up.

Baron von Ardenne, one of the German pioneers of the cathode-ray tube in television, and associated with the Lorenz firm, showed me some of his receivers. He told me, incidentally, that in that hall in 1929 he tried to convert Mr. J. I. Baird to the cathode-ray! The Lorenz receiver uses 18 valves and costs £125.

The Karolus big screen television was interesting, and I should imagine has wonderful possibilities for advertising purposes, but not for cinema entertainment. The screen itself is about 6 ft. square, and consists of 10,000 electric lamp bulbs. Close-ups are brilliant and effective but the hundred component lines are fairly obvious.

An intermediate film van was shown at work in the grounds. I was disappointed to find no form of direct "pick up" television, either by a variation of the iconoscope or the Farnsworth tube. The 320-line Fernseh picture was, marvellous to relate, done by means of disc scanning.

Radiogramophones are not popular. In fact I can only remember seeing one, and that was not really a combined instrument but a portable gramophone mounted on a console. German manufacturers have paid great attention to dials, a popular arrangement being to have the set shaped something like a flat-fronted cash register, with a wide dial at the top where the "1s. 4d" usually shows itself. The station names are arranged in vertical columns and tuned by a slanting knife edge.

One set was tuned by means of a "tele-

phone" dial: another flashed up the name of the station in a special aperture—"Berlin," "London," etc. This last set was called "Olympia," but more I think as a tribute to the coming Olympic Games than as a salute to the British exhibition. The two-valve "People's Set" cost about £6, but the four and five-valve sets seemed to be in the region of £30. Valves have lost their pins, chiefly to reduce capacity for short-wave and television working.

My final reflection was that the general showmanship was magnificent, but that a propaganda motive does not make the path of technical progress easy.

In other words the Nazi State which organised the exhibition would be well satisfied if it resulted in the sale of a few million more "People's Sets," so that all might listen to the voice of the Leader. All the manufacturers make this two-valve receiver to the same specification, so that as far as the bulk of German wireless business is concerned the competitive factor, which makes for advancement, is straightway eliminated.

A HANDSOME SET



Single-knob tuning and exceptionally easy control characterise this Telefunken television viewer.

At the moment this does not apply to television, but the same situation will arise in time.

Television is the special pride of Dr. Goebbels, the propaganda minister. At the opening ceremony he proudly claimed that Germany was the birthplace of high definition television. Without entering into discussion of the truth of this claim, I can say without hesitation, that in spite of the "open air" treatment which it receives the German infant is no more flourishing than the British.

But that is not to say that the British infant would not benefit if it received similar open-air treatment. Released from the laboratory, it would rapidly develop into an extremely healthy child.

The HOME BROADCASTER

BUILD THIS HIGHLY-EFFICIENT MULTI-PURPOSE MICROPHONE AND AMPLIFIER UNIT AND INCREASE THE FUN AND AMUSEMENT OBTAINED FROM YOUR SET

Designed and described by A. S. CLARK



With the mike working at maximum, and with the volume control on the

"The Home Broadcaster" is a very good designation for the microphone-amplifier unit which I am going to talk on in this article, because it describes one of its most interesting uses. But actually it is a multi-purpose unit with so many applications that it would be quite impossible to think of a single good title which would cover them all.

Before going on to any details of its design or construction, I propose to outline the various purposes for which the unit may be used. First of all we will deal with the "Home Broadcaster" aspect.

The unit will enable you to simulate in your own home real broadcasting in such a way that even those used to radio can be taken in quite easily. The unit is used in a different room from the radio set, to which it is attached by two wires.

Easy Change Over.

Any old gramophone or gramophone motor mounted on a piece of wood and a pick-up enable you to play records, and you can fade out the record at any moment you like and bring in the microphone. This change-over is achieved without clicks and can be as rapid or as slow as you like.

When over to microphone you are not restricted simply to making announcements, but can produce your own plays or give musical items. The sensitivity of the microphone is adjustable in your own "studio" and will pick up anything you wish which takes place in the same room.

Warning Light.

A red light on the panel glows warningly in quite a professional manner the whole time the microphone or its "pre-amplifier" is switched on. And incidentally this same red light will prevent your leaving the amplifier switched on unintentionally. During the playing of records the amplifier may be turned off.

Before going on to other uses, a few words on the object of a "pre-amplifier" in con-

nection with the microphone work will not come amiss. If a simple mike is connected up to the pick-up terminals of a radio receiver quite passable results will be achieved so long as announcements are made fairly close to the mike itself.

But if it is desired to get whispers and other effects from the far side of the room over well, more amplification is needed. Of course, another L.F. stage could be added or used at the receiver, but complications and instability troubles are almost certain to occur.

A Worth-While Advantage.

They are completely avoided by a simple battery amplifier at the mike end of the leads. And this also has the advantage that any interference picked up on the leads themselves is less likely to cause trouble because the mike pulses will be considerably stronger in relation to them.

A pre-stage of this type is always advis-

radio set also at maximum, it is usually possible to hear a clock ticking on the opposite side of the room to the microphone. And if a watch is placed close to the mike it will be reproduced by sounds reminiscent of someone at work with a hammer. Even dogs barking out in the street will come through clearly.

Thus by hiding the mike unit in a room it should be possible to hear everything that is said, even if it is in a low voice.

This detectaphone feature introduces the use of the unit for party amusements. Using it in this way, the most puzzling thought-reading stunts can be devised with but little ingenuity.

Games in which one half of those present try to guess the order in which the other half speak with disguised voices into the mike can also be conducted, and produce real entertainment.

Another Use.

But we have not yet exhausted the possibilities of the Home Broadcaster. It makes an excellent one-way telephone which can be very valuable for linking two points during garden fêtes or outdoor sports meetings.

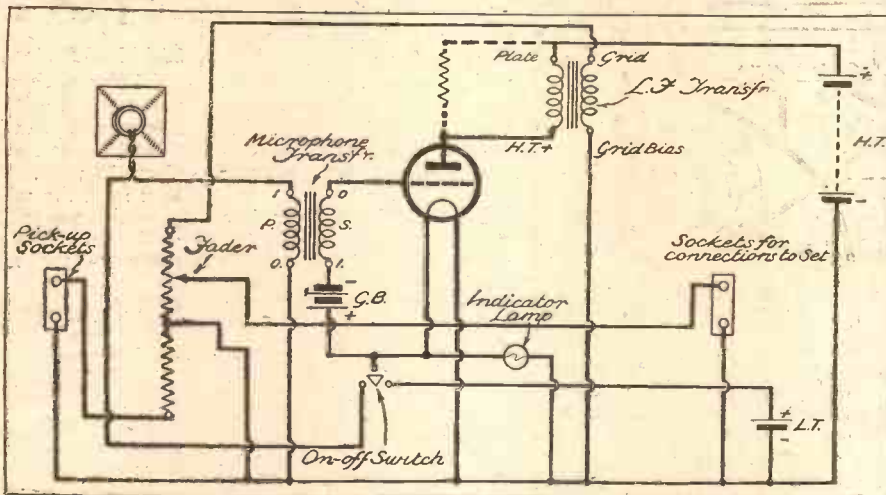
All that is needed is a couple of wires with a pair of radio

headphones at the far end. Sometimes a wire fence may prove effective in place of the two wires, and an earth return can also be tried for long distances.

And now let's have a look at the circuit diagram and see how all this is achieved. The unit is completely self-contained and

(Continued on next page.)

DETECTAPHONE—TELEPHONE—MICROPHONE



This is the circuit of the Home Broadcaster. It is an ingenious unit with a variety of uses and possibilities which are fully dealt with in the text.

able with home-recorder work when "extended scenes" are to be picked up. And the use of the "Home Recorder" as a pre-stage for home record-making is the second of its uses.

Third on the list we will put its use as a detectaphone. The sensitivity which is achieved with an ordinary type of commercial receiver is little short of remarkable.

THE HOME BROADCASTER

(Continued from previous page.)

can be added to any receiver which has pick-up terminals.

It consists essentially of a single-valve battery amplifier, but it does not have to handle anything in the nature of strong inputs, a low H.T. voltage is possible and consequently it is very economical in operation. As you will see, the microphone

feeds the L.F. valve via a microphone transformer.

Since a strong input to this valve is not required, the two volts of the L.T. accumulator are ample for energising the microphone circuit. (Normally $4\frac{1}{2}$ volts are recommended for this purpose.) The use of the L.T. in this way avoids the necessity of a separate mike battery.

The current in the mike circuit is automatically cut off by the L.T. switch, which is of the three-pole type for convenience of wiring and straightforwardness of design, although a two-point switch could be made to do the job. The valve is of the L. or L.F. type, and with the 60 volts H.T. used in the original unit only needs about one volt G.B. This is obtained by wiring G.B. + to L.T. + and using a three-volt tap on the G.B. battery. Should you decide to use more H.T.—say 100 or 120 volts—the connections may remain the same, G.B. being increased in the ordinary way by moving to the next negative socket on the battery.

The indicator lamp is fed in parallel with the filament so that it is always on when the filament is switched on. And now for the output arrangements.

The "Fader" Control.

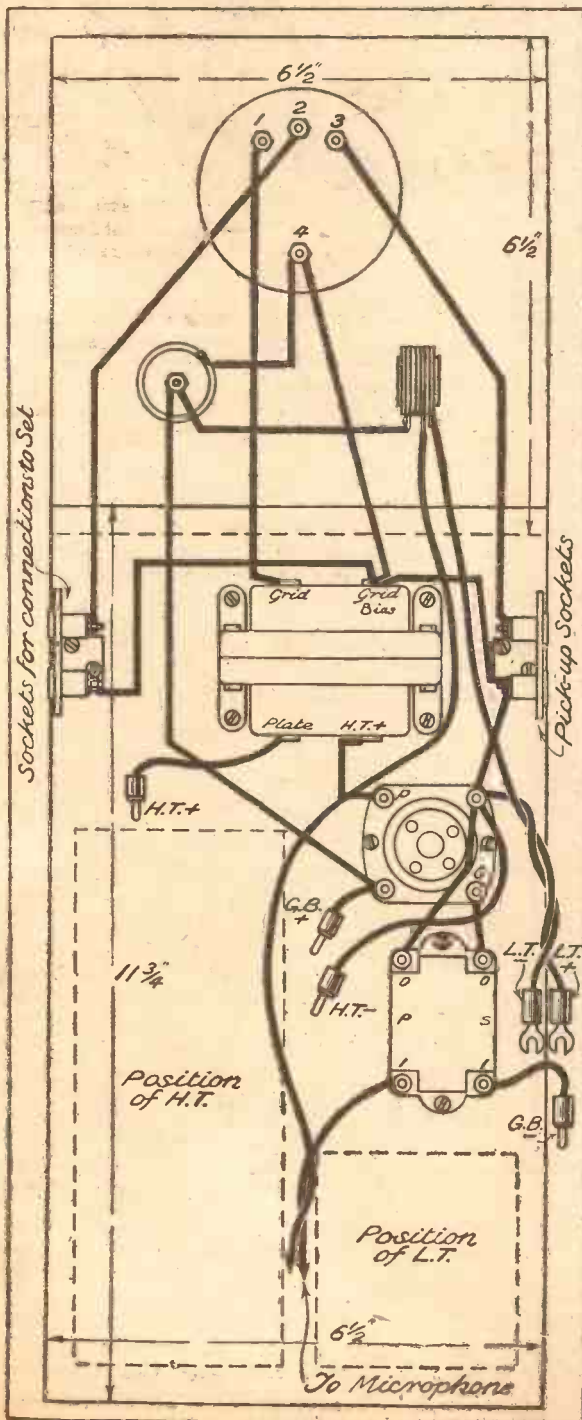
For this purpose a fader is used, which is simply an ordinary potentiometer with a fixed centre tap provided on the resistance element. The input from the pick-up is joined across one half and the secondary of the L.F. transformer across the other.

Thus, when the slider is on one half (1 and 4 on the fader) volume can be regulated from minimum to maximum on microphone, while between 3 and 4 volume is varied similarly on pick-up. The zero position is in the centre, silence always being obtained, therefore, as the unit is charged from mike to pick-up.

The dotted resistance is a suggestion if you should find any slight tendency to harsh reproduction. Its value is a matter for trial and anything around 10,000 to 30,000 or so ohms may do. Experimentation with resistances across the secondary of the microphone transformer is also worth while when aiming at the highest quality reproduction.

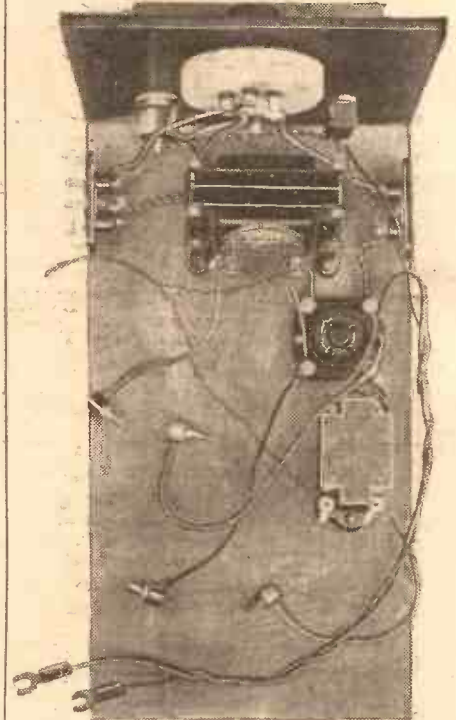
And while talking about reproduction, it must be appreciated that the frequency response of an inexpensive

THE FULL WIRING DETAILS



There are few components and little wiring in the unit, and this layout diagram clearly shows the whole construction.

A SIMPLE DESIGN



This photograph will help you when wiring from the diagram on this page.

mike such as I have chosen for this outfit cannot possibly be made the straight-line affair of a more costly instrument of the "professional" type. For those who wish to work with the latter type of microphone and who may prefer to have the microphone separate from the amplifier, I recommend the T.M.C. "Vari Dep" microphone. This is made by the Telephone Manufacturing Co., Ltd., of Hollingsworth Works, West Dulwich, S.E.21, and costs £9 7s. 6d. complete with 19 1/2 inch stand and microphone transformer.

Slight Modification Necessary.

Of course, if you use one of these mikes you must use its own microphone transformer, and you will have slightly to modify the wiring to insert a mike dry-battery of about 12 volts. To do this disconnect the lead from the mike which goes to the on-off switch and take it instead to the positive of the mike battery, the negative of this going to the switch point. The mike battery will thus be automatically switched off with the filament. Probably you will find that less than the full voltage of the mike battery can be used.

With the possibilities of a different mike transformer, a bigger H.T. battery and an extra battery, you may want to use a different size cabinet from the original. The dimensions on the wiring diagram should therefore be taken merely as a guide to the actual size of the original instrument.

I advise you to collect all the components, dry batteries and L.T. together before you cut your panel and baseboard or make the cabinet. You will thus be able to arrange its size to suit your particular case. (The L.T. I used was a particularly small Exide model which I happened to have on hand. It is called the D.T.G.)

And that brings us to the practical

(Continued on page 18.)



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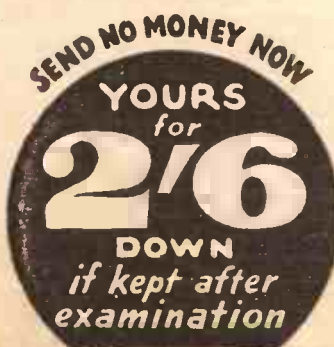
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PLEASE FILL IN ALL PARTICULARS ASKED.

THE HOME BROADCASTER

(Continued from page 16.)

constructional details. The photograph in the heading of this article will give you a good idea of the general design. The positions of the three holes for the panel components are not critical but should be approximately as shown, and it is a good scheme to paste a paper dial around the fader to mark the zero and maximum positions for pick-up and mike volume. You can then mark the intermediate positions which give the best volumes with the volume control on the receiver set to maximum.

Hinged Back to Cabinet.

The back of the cabinet is hinged so that access is provided to the batteries, thus permitting easy removal of the accumulator for charging purposes. Two holes are required in either side of the cabinet to provide access to the sockets.

The ordinary plugs provided with these are quite suitable since the connections will seldom have to be removed. Longer plugs, such as those seen in the heading photograph, can be employed if they are available and permit of easier removal.

Beyond these few remarks, the construction does not cause for further comment, but a few words on the use of the unit will be welcome. The long pick-up leads do not in any way introduce instability in the normal receiver, but if they prove liable to pick up hum or interference from mains wiring, a length of twin lead-covered bell-wire should be used for them, the lead casing being connected to earth.

It is of course hopeless to attempt to use the mike in the same room as the loudspeaker because "singing round the ring" is bound to start.

Incidentally, if you use a gramophone motor mounted without a lid to keep in the direct sounds of the pick-up, you should place this on the opposite side of the room from the Home Broadcaster. Otherwise, should you fade out the music in the middle of the record, and bring in the mike for an announcement, the music will still be heard on the set. The reason for this is that the mike is sufficiently sensitive to pick up the mechanical sounds coming from the pick-up itself.

Alternative Parts.

Finally, although the makes of components I used myself are given in the small list of parts required, there is no reason why others should not be utilised. In some cases, such as the red light and the fader, I do not know of any alternatives, but where the L.F. transformer and valve holder are concerned you can adopt your own choice, but it is advisable to keep to a

reasonably good L.F. transformer if you want good quality.

Incidentally you will notice that the primary of the transformer is not wired up according to the markings on the transformer. There is no special significance in this, it was done merely for convenience of wiring and has no detrimental effects on results.

I do not think there are any other points

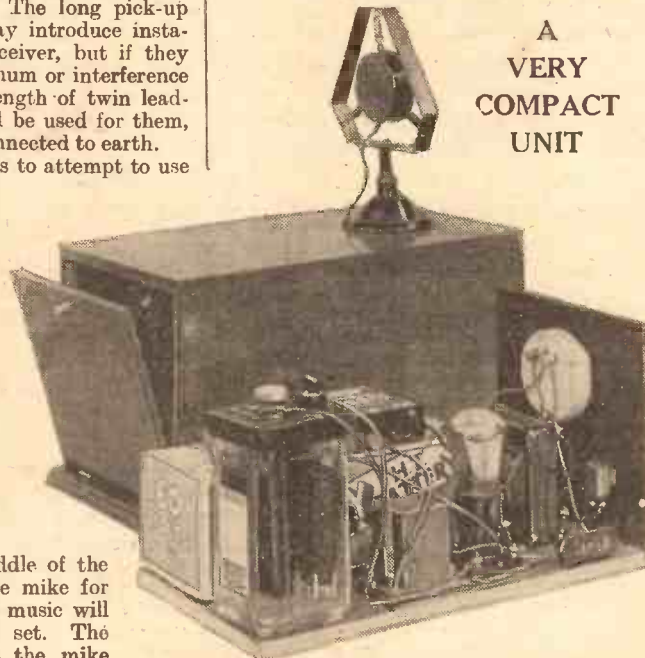
ALL THE COMPONENTS

- 1 Microphone, Electradix.
- 1 Microphone transformer, Electradix 100/1 shrouded.
- 1 Valve holder, Benjamin "Vibrader."
- 1 "Dissolver" (1 meg.), Magnum.
- 1 L.F. transformer, Ferranti A.F.4.
- 1 3-pt. on-off switch, Bulgin S.87.
- 1 Indicator light, Bulgin D.9.
- 1 .06 2-volt bulb for above, Bulgin.
- 2 Twin socket strips and plugs, Bulgin P.30.
- 1 L.T. accumulator, Exide, D.T.G.
- 1 H.T. battery, Ever Ready.
- 1 4-volt G.B. battery.
- 1 Cabinet, Peto-Scott.
- 4 Wander plugs, Clix.
- 2 Accumulator spades, Clix.
- 1 L. or L.F. type valve, Cossor.
- Flex, screws, etc.

that I ought to deal with because the whole job is so simple. You will see from the photograph on this page how neatly the batteries "fit in" with the layout, the small G.B. battery resting upon the top of the H.T. battery.

You will also notice that the flexible lead from the mike is taken through a hole in the top of the cabinet to its connecting

A VERY COMPACT UNIT



Here the complete unit, with batteries connected, is seen removed from its cabinet. Note the hinged back on the cabinet.

points in the unit. These leads are clearly shown in the wiring diagram. By the way there is one thing you must not do with this unit and that is to attempt to run it from the same L.T. or H.T. battery as you use for your set.

And that concludes my description, and I feel sure you will find the many uses of this multi-unit will repay you for the time and slight expense involved.

NOTES ON TELEVISION

By L. H. Thomas.

SO the 30-line transmissions are departing at last! When I heard the first rumours that they were to be stopped I hardly knew whether I was surprised or not. We all realised that there was little or no connection between these transmissions and the coming television that is promised, but I, personally, had an idea that they would at least be continued for long enough to bridge the gap.

They have had faithful adherents through all the years that they have flickered their way through, and I know that there will be sighs of disappointment at their passing. Grude as they have been, they possessed a certain attraction, particularly if one became a regular follower of them.

No News of Progress.

Now it's good-bye to all that, and there's nothing at present to say "Hullo" to!

There seems to be no definite news of plans or progress, except that the two contracting companies are expected to release full technical details to the radio manufacturers very shortly.

Considering that I know several amateurs who have received good pictures on the isolated occasions on which they have caught one of the stations transmitting, I regard this news with mixed feelings.

One important matter that is coming up for review very shortly is the whole question of the nomenclature of the cathode-ray tube. After all, there is every reason to suppose that the C.R. tube will shortly be in fairly general use amongst the public.

Home constructors making their first acquaintance with the cathode-ray tube will be wondering what is the real difference between an "anode" and an "accelerator"; between a "control cylinder" and a "focusing shield"; and whether the "screen" is another electrode or the thing on the end of the tube!

Some standardised terminology will, we hope, be decided upon before television is really let loose. Similarly, of course, some standardisation must be applied to the base-connections to which the leads from the various electrodes are brought out.

A Flexible Time Base.

I have recently seen a demonstration of an amazingly complete and flexible cathode-ray equipment. Instantly convertible for either hard or gas-focused tubes, this gear, which was fairly compact, was also adjustable for the usual linear time-base for frequency measurement; for a 50-cycle time base from the mains, with the "return-stroke" wiped out; or for a complete double time base for television.

True, there was a formidable panel full of knobs, and another that resembled a miniature telephone exchange; but the demonstration served to show the many uses of the C.R. tube.

After all the C.R. tube can be regarded as a rather finicky and expensive valve. It has to be modulated and biased, and it needs anode volts—plenty of them. It is not a magic gadget and needs no supernatural gear.



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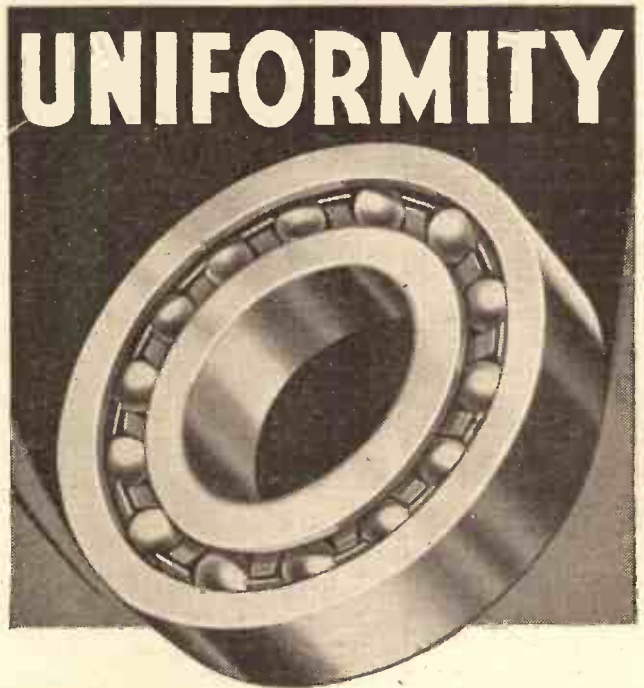
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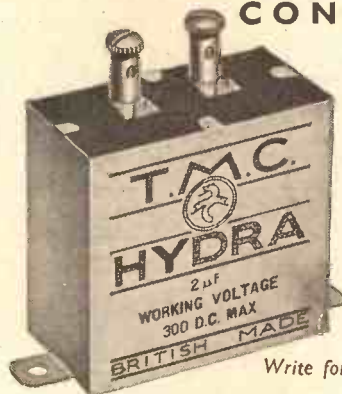
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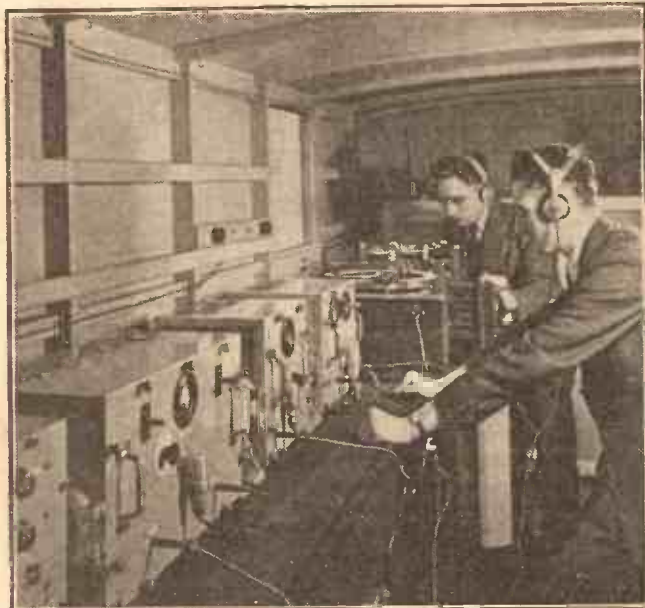
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MAKING A RECORD.—Engineers at work inside the spacious van. The record cutter can be seen at the far end of the bench.

THE B.B.C.'s RECORDING VAN

Special news and "actuality" records are going to play an increasing part in our broadcast programmes, and it is expected that extensive use will be made of the new mobile units that are being installed by the B.B.C.

than over here, actual mobile recording has its uses—especially in following the Leader when he is being vociferously cheered.

Mr. H. L. Fletcher, who is the programme chief of the recorder van, puts the function of the B.B.C.'s mobile unit in these words: "It is designed to supply impressions from the many aspects of everyday life.

"These are used in many ways, such as in special features and in actuality programmes. Sometimes, too, these recorded impressions serve as illustrations in the news bulletins.

"An even more valuable function of the unit is the recording of events serving us with programme material but occurring at times unsuitable for physical or direction radiation. The van can secure material beyond the reach of the studio and even of the outside broadcast microphone. At the same time, it can bring home a story that, in a condensed and possibly rearranged form,

tour of the Maida Vale recorders, we have to provide two separate disc-recording outfits as used in the studio recording. A channel means a continuously available recording—not merely limited to the playing through of one four-minute record. These two recorders can be run either in series or parallel—normally in series, of course. Then, with these recorders, we have to provide facilities for running out microphones to the various points from which we want to catch the sounds.

Controlled from the Mixer.

"Between the distant microphones, which may be anything up to 400 yards away, we have to insert a mixing unit. This type of mixer has been developed by experimental use of the van. Its success, I think you'll agree, fully justifies the experimental form we adopted.

"The idea is this. Up to four microphones are run out on 50-yard reels of cable, with the mixer probably 200 yards away from the van itself. The programme chief at the central mixer position can then feed the recording apparatus with sound from any microphone position.

"The engineers running the turntables need not therefore be in sight of the microphones. All they have to do is to start cutting their discs when given the cue from the man in charge of the mixer.

"He, by the way, is in touch by telephone with all the microphone points, as well as with the man in the van. So, you see, the van can be tucked nicely out of the way in some quiet corner while all the tumult and the shouting can be directed by the distant control at the mixer.

Moving-coil Microphones.

"If we had included this mixer inside the van it would often be very inconvenient. The van would then have to draw up closer to the scene of action—and that is by no means always easy.

"What is the mixer for? Simply to control the input from the microphones to the recorder amplifiers. The operator of the mixer can fade the microphones in and out just as he pleases. There is no amplification between the microphones and the mixer. We use the latest type of moving-coils, working, as you know, without any polarising current.

"As a matter of fact, we use moving-coils for most 'O.B.' work these days. They are small and robust, they don't blast, and they provide excellent quality."

(Continued on page 26.)

WHILE the B.B.C.'s mobile recording unit—a large van fitted with full apparatus for disc recording—was resting for a moment or two at its Maida Vale base, I asked a senior engineer to take me along for an explanation of its secrets.

He agreed. We went along from the Big House in the staff "bus"—which runs regularly to the Maida Vale studios.

"The first point you must make clear to your readers," said this informative engineering friend of mine, "is that the present mobile recorder unit is in the nature of an experiment. Not exactly a lash-up, you understand, because naturally to be any use at all the recording apparatus has to be fairly substantially fixed, if not permanently.

"We thought it best to build the first van on a service experimental basis, so to speak, rather than attempt to foresee all the technical facilities needed in practice. As a matter of fact, this policy has been amply justified, as I'll show you when we get there.

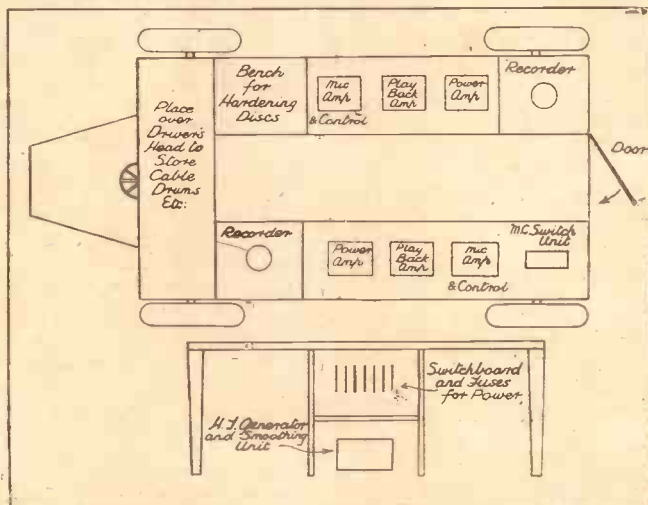
Two Vans Being Built.

"We have now had enough experience to know exactly what sort of apparatus is needed for the work the recording van is intended to do. The result is that we now have two new vans under construction, incorporating the necessary modifications revealed by actual tests."

I could see the B.B.C. intended to make the most of its wandering recorder. Which, by-the way, is only mobile in the sense that the whole box of tricks can be taken anywhere in the country at a moment's notice. It is not mobile in the sense that recording can be done while the van is moving.

I am not trying to belittle the B.B.C.'s van when I recall that in Germany, where radio is used so much more for propaganda

THE LAYOUT OF THE VARIOUS UNITS



The recording apparatus and its associated amplifiers are duplicated, one outfit being arranged on either side of the van.

provides much more interesting reception than a broadcast of the whole show—which might be good only in parts."

Exactly how does the van go about getting these impressions? That was the question I then put to the engineering department. "One complete channel of disc recording is carried," he told me. "This means, as you gathered from your

SWITCHES *and* SWITCHING

THE choice and connection of a switch would not, on first thoughts, appear to present any difficulty, but it is surprising to find how often mistakes are made in this direction. A few years ago there was only one general type of switch used for wireless purposes, this being of the two-point push-pull variety, but to-day

NO SAFEGUARD

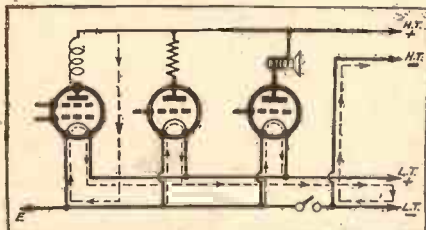


Fig. 1: The switch here breaks the L.T. circuit but does not protect the valves.

there are at least a dozen different patterns in common use.

The first distinction between two general types of switch might be drawn by referring to the ordinary push-pull and quick-make-break patterns. The former is suitable for switching on a battery receiver for wave-changing, and for use in the pick-up circuit, but the latter must be employed where mains supply voltages are concerned, and in all cases where voltages in excess of about 150 are employed.

The Q.M.B. Type.

The so-called Q.M.B. switch is specially made for dealing with high voltages, and will generally handle currents up to .5 ampere quite safely. This type of switch, as the name implies, has spring-loaded contacts which "break" and "make" very rapidly, so avoiding "arcing."

VALVES ARE SAFE

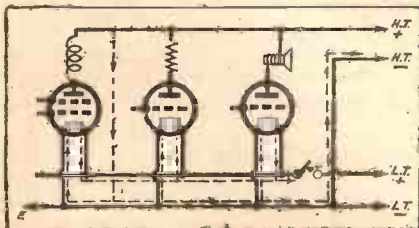


Fig. 2: A better method of L.T. Switching than that shown in Fig. 1.

Additionally the contacts when in the "open" position are widely spaced so that there is very little capacity between them.

Q.M.B. switches are, generally speaking, somewhat more reliable than those of the

In this interesting article John Wayne describes a number of switching problems and their solutions, and corrects some common mistakes.

ordinary push-pull type, and for this reason they are coming into wider use for all purposes. Besides, there is something rather reassuring about the "click" of a Q.M.B. switch, which gives a feeling of certainty.

Apart from the points mentioned above, the choice of the correct type of switch and the method of using it are just the same whether the actual component to be used is of the Q.M.B. type or not. Both patterns of switch can be bought in the single or multiple-pole variety, and can be of the on-off or change-over type.

Battery Operated Sets.

The most general use of a switch is for connecting and disconnecting the power supply to the receiver, and the choice and use of a switch for this purpose will first be considered. In the first place we will assume

The method of switch connection shown in Fig. 2 is appreciably better because a short-circuit of the kind above mentioned could not damage the valves, although it

THREE-POINT CONTROL

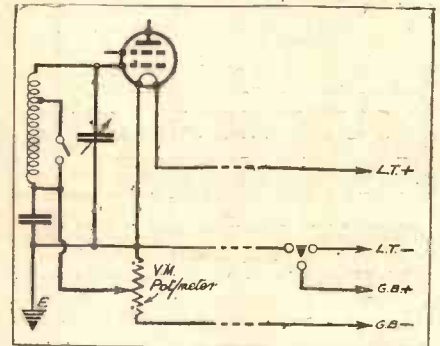


Fig. 4: A three-point switch must be used for battery variable-mu valves.

would damage the H.T. battery if the short were maintained, and if a fuse were not provided.

Many constructors make a mistake in fitting a potentiometer by using the switching system shown in Fig. 1, and connecting the "earth" end of the potentiometer to the "filament" side of the switch, as shown in Fig. 3. They consider that by connecting in this manner the H.T. circuit through the potentiometer must be broken.

Runs Down H.T.

The error in this deduction can be seen by following the dotted lines in the figure which

TWO MORE CASES WHERE MISTAKES MAY OCCUR

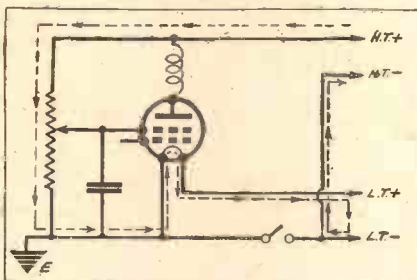


Fig. 3: Here the H.T. drain through the potentiometer is not affected by the on-off switch.

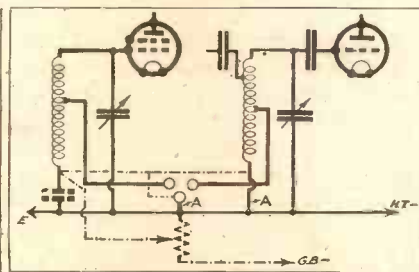


Fig. 5: The dotted lines show the rearrangement necessary when variable-mu control is used. The leads marked "A" must be removed in this case.

that the set is battery operated and that it is of the popular S.G.-Det.-Pen. kind in which the screening grid of the first valve is supplied from a separate H.T. tapping.

On first considering the matter it would appear that it would be just the same whether the switch were connected as shown in Fig. 1 or as in Fig. 2. In one case the switch breaks the common H.T. negative—L.T. negative lead, and in the other it breaks the L.T. positive circuit only.

A Point to Note.

On reflection, however, it will be seen that if a short-circuit took place between the H.T. positive circuit (for example, the anode connector of the S.G. valve) and earth while the set was switched off, due to the fact that the full voltage of both the high and low-tension supplies in series would be connected across them, as shown in dotted lines. This is an important consideration in an experimental set, or in any receiver which is built on a metal chassis.

show how the H.T. circuit is completed through the potentiometer, L.T. accumulator and valve filaments.

Another snag may occur when a variable-
(Continued on page 25.)

A GOOD IDEA

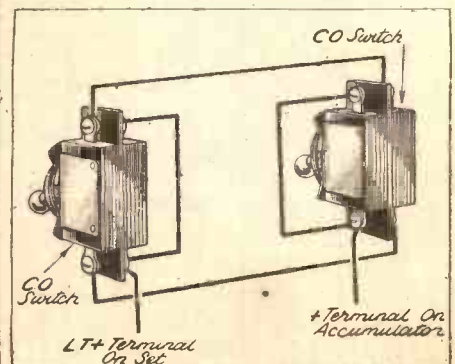


Fig. 6: Remote-control L.T. switching is carried out as shown above.

RADIOTORIAL

The Editor will be pleased to consider articles and photographs dealing with all radio subjects, but cannot accept responsibility for manuscripts or photos. Every care will be taken to return M.S.S. not accepted for publication. A stamped, addressed envelope must be sent with every article.

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

All inquiries concerning advertising rates, etc., to be addressed to the Advertisement Offices, John Carpenter House, John Carpenter Street, London, E.C.4.

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

QUESTIONS AND ANSWERS

WAVETRAP TO REMOVE LONG-WAVE INTERFERENCE.

W. M. (Edgbaston).—"I know that wave-traps are a bit out-of-date, and seldom used for long waves nowadays. But I want to try one on a set that is awkwardly situated, and gets Droitwich all over the tuning.

"If you will give me particulars of a coil, I can make it myself, as I am a 'P.W.' constructor of long standing (1925). I have any amount of bits and pieces, and if you will give me a rough idea of a good arrangement I will soon knock up the necessary.

The simplest and most effective arrangement for your purpose would be a modification of the "Brookmans Rejector"—you remember that famous

method that was all the rage when high power caught the simpler sets without sufficient selectivity?

Use a former of about 3 1/2 ins. diameter, and wind on about 100 turns of wire; 26 gauge D.C.C. is good, but a different gauge or a different insulation will make but little difference, if it is more convenient, provided of course that there is no extreme difference.

In addition to the coil you will need two condensers of .001 mfd. maximum capacity, one fixed and one variable. A pre-set is indicated for the variable, and another may be used instead of a fixed .001-mfd. if required, providing it is of good make with sound internal contact.

The connections are as for the old "Brookmans" arrangement; viz., set's aerial terminal to one end of coil, and to one side of the .001-mfd. variable; other end of coil to one side of the other .001-mfd. condenser; and finally, aerial lead to the two remaining condenser terminals. In use, the set is tuned to a station near the Droitwich wavelength, and then the variable condenser on the trap is adjusted until the interference is rejected.

CUTTING OUT THE AERIAL CONDENSER.

H. S. S. (Leeds).—"I put the .0001-mfd. condenser in the aerial lead-in, as you said,

and it has been very successful on wavelengths between 200 and 600 metres. But I have not got it right for long waves yet.

"Your advice was 'on long waves the aerial selectivity condenser can be cut out with a shorting-switch (any on-off type will do) in the usual way.'

"I am afraid I do not understand this bit. How does the switch cut it out? Please give full wiring, or a sketch, as at present I have to undo the condenser when I change to the long wavelengths."

To cut out a condenser, all you need do is to wire an ordinary make-and-break switch "across" it, leaving all other wiring as before. That is to say, fit the condenser terminals with two short leads, joining one side of the condenser to one side of the new switch, and the other side of the condenser to the other terminal of the switch.

If the switch is turned to the "off" position, it makes no difference to the condenser, because in the "off" position its two sides are separated. But if now you turn the switch "on," it joins one side of the condenser to its other side, and so offers a short cut to currents that now pass across the switch contacts instead of through the condenser.

Coils, chokes, resistances, etc., can be cut out in the same way by opening and closing a contact across them—in fact, this is the principle of the ordinary wavechange switch.

The only snags to watch for are bad connection and, in certain instances, undesirable self-capacity of the switch concerned.

EFFECT OF POOR EARTHING ON SHORT WAVES.

N. G. (Eastbourne).—"I should like to begin on short-wave reception this year, as I have enough parts on hand to make a two-valver, with L.F. transformer coupling. There are, however, just a couple of doubts left in my mind.

"The first concerns the short-wave aerial, which will sometimes have to be in use at the same time as my other set—a battery four-valver—is in action.

"I can arrange for a 20-ft. separation at the nearest point (lead-in) with a 25-ft. length of short-wave aerial, at right angles to the other one. Or, alternatively, for a loft aerial of nearly the same length.

"One of these arrangements will, I think, be satisfactory. But it is really the earth that is worrying me.

"If I have a lead 12 ft. long I can use the same earth as the other set. But to get a different earth altogether means a very long lead, say 25 ft., unless I am lucky and find that when the set is built it works all right on a drainpipe earth, the pipe for this passing just outside the window of my bedroom, where the short-wave set will be placed.

"Do you think that with an unproved aerial, and with this doubt about the earth, that I stand a fair chance of short-wave success?"

You certainly stand a good chance, and we should go ahead with confidence if we were placed in a similar position.

One of the two aeriels described should prove perfectly satisfactory, and it is not everyone who has the option of choosing between two possible arrangements.

And there is no need to worry about the earthing of a short-waver, you can always fall back on a capacity earth if necessary, and very often a short-wave set works well with no earth-lead at all.

THE BUILT-IN L.-S. TRANSFORMER.

E. L. McP. (Paris).—"Mine is an international set—mostly British parts, but American transformer, French condensers, and one Dutch valve, the others being British, as is the loudspeaker.

"Following the usual practice, this loudspeaker has its transformer attached to the framework—well and truly attached—so that I do not feel disposed to try to shift it. And yet I rather think it ought to be shifted.

"The reason is that the lead has to go out of doors, or rather out of one window, and down to the next floor, where it enters my other window. I cannot get permission to take this connection from set to loudspeaker through the floor and ceiling.

(Continued on next page.)

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RADIOTORIAL QUESTIONS & ANSWERS

(Continued from previous page.)

"I therefore wish the loudspeaker had its transformer separate, so this could be near the set, and the long leads would then be carrying no mains current, but only the low-frequency. As that is impossible, what would you advise me to do?"

There are two courses open that should solve the problem. One way would be to get another form of output filter—such as a good output choke with two large condensers—and arrange these at the set end, thus diverting the H.T. from the loudspeaker transformer windings.

With a good choke and two 4-mfd. condensers there should be no loss of quality at all, and you would have complete filtering.

Alternatively, you could use really trouble-proof leads for the present arrangement. A good lead-covered cable, properly installed by an electrician, would be weather-proof, leak-proof, and permanent in every way. This would probably be just as good as the other method, so it is simply a question of which method is more convenient to you.

THE LINK BETWEEN

By G. T. KELSEY.

It seems rather curious in these enlightened days that anybody should be a wireless hater—in fact, judging by the way in which the licence figures continue to grow, one might have cause to doubt whether such a person existed.

Anyway, it was with a view to discovering if, and why, people had cause to hate radio that K.B. recently hit upon the bright idea of advertising in the personal columns of the leading national newspapers for any such people to come forward.

And they came forward—about eighty out of a total of something in excess of seven million listeners! What a striking testimony to the general popularity of broadcast entertainment that such a widely advertised appeal should have had such a very poor response!

But even if there are only eighty "haters" out of such an enormous total, there is something to be learned from hearing their views. And not only did K.B. realise that, but they invited them to attend a luncheon—at which it was my good fortune to be present—in order that they might have ample opportunity for airing their grievances.

Well, it was certainly a most entertaining luncheon, and I think what was perhaps the most striking outcome of it was that not a single one of these self-confessed "haters" had a word to say against modern sets. Their grievances were of a different nature altogether.

Some of them objected to radio because of the general nuisance which is committed by the type of listener—fortunately rare—that will persist at all hours of the day and night in "entertaining" the whole of the street in which he lives. Others had some caustic observations to offer concerning programmes.

Why He Hated Radio.

But the most amusing "wireless hater" of the lot, I think, was Mr. W. C. Putt, of Hillingdon, Middlesex, whose reasons were tersely summarised in the following clever list.

- (1). *I want an all-mains set.*
- (2). *I can't afford an all-mains set.*
- (3). *I haven't got a set at all.*
- (4). *I'm as jealous as blazes of all my neighbours who have sets.*
- (5). *I hate being envious of anybody, and I have no other cause for envy, being young, in regular work, have a charming wife, an angel from heaven as a daughter of five months, and good health. Therefore, as wireless is my one fly in the ointment—I hate it!*

Thanks to Messrs. K.B., Mr. Putt is no longer a wireless hater, and when I congratulated him upon his good fortune in becoming the owner of a K.B. set, I was left with the impression that there could surely be no greater champion of broadcast entertainment than he then was!

Anyway, I think it was all very enterprising on the part of K.B., and I feel that any firm that goes to so much trouble to determine the likes and dislikes of its customers—the listening public—is deserving of success. No wonder K.B. sets are so very popular.

More Catalogue News.

Following up the promise I made last week, I have now had an opportunity of going through a few more catalogues, and the three which are mentioned below are all available through the medium of "P.W.'s" postcard literature service.

First of all, a word or two about Ferranti catalogue activities. The Ferranti booklet on audio transformers is one of the most comprehensive treatises on the subject of transformer-coupled low-frequency stages that I have yet seen in free literature form. And yet it is not above the heads of ordinary constructors.

It is a difficult subject to deal with at the best of times, but Ferranti's seem to have the happy knack of telling the story without delving too deeply into technician's jargon. Anyway, it's a jolly good effort, and one that I strongly advise you to get. (364).

Another Excellent Valve Book.

Almost all of the valve catalogues this season are outstandingly good, and the one which I have just been reading concerning the famous Marconi range is no exception. The fact that it contains full technical details of every valve in their range alone makes it well worth having. But that is by no means the only attractive thing about it.

The new Marconi valve catalogue contains a lot of useful information, and the circuits that are given in it are exceptionally useful to all who are of an experimental turn of mind. I openly confess that I have "earmarked" the one that was sent to me for my own private file, and if that doesn't tell you anything—well, what will? Incidentally, although it is quite a thick booklet, it is free for the asking. (385).

Telling Figures.

"Recently, investigations have been made at Baden-Baden, in Germany, where an attempt has been made to suppress interference as thoroughly as possible on a voluntary basis. Special facilities were provided to encourage owners of interfering apparatus to have the cause investigated and suitable corrective devices installed, and with a few exceptions it was found that condenser units only were quite adequate. This will be appreciated from the fact that 7,727 condensers were used, while only 300 other devices such as chokes, or combinations of chokes and condensers, were found necessary."

That illuminating piece of information is taken from the T.C.C. condenser catalogue, which concludes by saying that a fully descriptive leaflet is available on application.

I have taken the trouble to get the leaflet in question, and I feel that all I need to say concerning it is that if you are troubled with any sort of man-made static interference, this leaflet will help you a great deal. It is very well done, and shows in diagrammatic form how the trouble in most cases can be overcome. Incidentally, if you apply for this leaflet through our postcard service, I am arranging to include with it the general T.C.C. condenser catalogue, for it is a very useful one to have by you. (366).

AN HISTORIC ATTAINMENT!



Read this message from Mr. G. V. Dowding, Associate I.E.E., Technical Editor of "Popular Wireless."

"In my opinion your new 'Stentorian Senior' marks a very definite step forward in sound reproduction. Knowing something of the intricacies and problems involved in the technique of Loud Speakers design, I find it amazing that such sensitivity and balance of response have been achieved.

"You are to be congratulated on what is one of the most noteworthy radio developments of the year, and the Public is indeed fortunate in having the opportunity to acquire this latest W.B. advance at a reasonable price. You are certainly setting a hot pace in Loud Speaker design!

"As a technician I have gained great pleasure in running up and down the frequency scale of this new 'Stentorian,' noting the width of the audio spectrum which it encompasses and the absence of interfering resonances; and as a listener to the Broadcast Programme I have appreciated its wonderfully 'naturalistic' rendition of speech and musical items."

G. V. Dowding



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WHERE CONSTRUCTORS GO WRONG

(Continued from page 4.)

movement of the tuning knob will soon familiarise you with the peculiar sound. Just before the set begins to oscillate the signals received from a station, which is not quite in tune but which you are approaching as regards wavelength, will sound hissy and you will know that something is about to happen if you tune to a still lower wavelength. By reducing the reaction slightly you can, with safety, tune the receiver to a lower wavelength.

It would not be at all a bad idea for you, after reading this article, to experiment going down the waveband. It is, in my opinion, essential to the correct operation of any set with reaction that you recognise when oscillation is about to occur. It has been particularly important for me to master this ability to foresee, or rather forestall, oscillation, and therefore be able to forestall it by suitably reducing the reaction; this has been because when demonstrating my receivers I have had to receive scores of stations. Nothing produces a worse impression than continually making a set oscillate, and, since this is a matter of carelessness, or lack of knowledge, there is no excuse for anyone else making the set a source of discordant sounds.

How are you to know when you have reached the critical reaction point? In other words, how are you to know that you have got the absolute maximum of benefit from reaction? Well, perhaps the obvious way to do it is to keep on increasing reaction until the set oscillates, and then reduce the reaction till the set stops oscillating. As a matter of fact, although this is good enough for the beginner, it is rather like learning how near to a cliff edge you can walk by falling off the cliff a few times. After a little practice you should be able to develop almost an instinctive knowledge as to when a set is going to oscillate.

A reason why it is not advisable to make the set oscillate in order to convince yourself that you have reached the maximum reaction point is that in most sets you will have to reduce the reaction quite considerably once the set has begun to oscillate; you will find that having gone just over the oscillation point, you cannot, by a slight reduction of reaction, restore the set to the critical reaction point previous to oscillation.

The Need For Retuning.

You will probably find that you have to go back much more than this slight adjustment, and therefore you are pretty much in the same position as before in that you have to go forward cautiously again until you are near the oscillation point. This effect of going back a considerable distance is sometimes known as reaction hysteresis. It is a disadvantage, but only to those who do not know how to work reaction properly.

A far more serious fault in reaction is being unable to approach gradually the oscillation point. The fact that when you do get to the oscillation point you have to go back a long way on the reaction condenser is not a very serious matter if the operator is experienced.

Reaction cannot simply be applied to a given station to which the set is tuned without having to retune the main tuning condenser in almost every case. If, for example, you are receiving a station at weak strength, if you increase the reaction you will have to retune, in most cases, the main tuning control. This retuning may only be extremely slight, but in most cases it will definitely be necessary.

Here is a common fault of the whole system, and is one which stumps the completely non-technical operator. He or she will increase reaction, and probably miss all its benefits by not slightly retuning the main tuning control. Actually, the correct procedure is to increase the reaction in small steps, at the same time slightly retuning the main tuning control. If you keep on doing this, you will soon reach a point where you can tell that the set is going to oscillate and you therefore stop.

There are two reasons, either or both of which may necessitate the retuning. One reason is that the reaction condenser itself slightly alters the tuning of the circuit to which the reaction is applied; as the reaction is increased a slight readjustment of the tuning circuit may become necessary. The other reason is that your original tuning-point was not exactly at its best, and that after reaction has been applied a more-accurate setting reveals itself by greatly enhanced signal strength.

When the receiver has variable- μ volume control, a change in the grid bias of the variable- μ H.F. valve will vary the effect of any reaction adjustment. Sometimes a reduction of grid bias, i.e., an increase of volume, will cause the set to oscillate; in another case the set will become more stable and more reaction will be required. This is a matter which interests all users of the S.T.600, since this set employs a variable- μ H.F. amplifying valve. Increasing volume by means of the variable- μ potentiometer throws a greater load on the following tuned circuits, i.e., the ones which we are assuming reaction to be applied to. In other words, the circuit behaves as though the losses in it were greater calling for more reaction.

The effect, however, is apt to be mixed with an opposite effect which is tied up with inherent reaction, which has nothing to do with the intentional

reaction, but which is due to stray and undesired coupling between the two tuned circuits, one of which is in the grid circuit of the high-frequency amplifying valve and the other of which is in its anode circuit.

This inherent reaction effect will produce all the effects of reaction, and in a bad case even self-oscillation whenever the two tuned circuits are tuned to the same wavelength, especially towards the bottom ends of the dials. This inherent reaction effect will be greatest when the H.F. valve is giving greatest amplification, i.e., when the volume control is up.

If there is a certain amount of inherent reaction it is obvious that less deliberate reaction will be required to produce self-oscillation. The effect of the volume control on the amount of reaction required will be governed largely by the amount of stray and undesirable couplings in the set.

The Various "S.T." Sets.

The fact that when two tuned circuits, one in the grid circuit and one in the anode circuit, are both tuned to the same wavelength inherent reaction effects are obtained, should be fully understood and remembered by every constructor.

This is particularly important in such sets as the S.T.300, S.T.400 and S.T.500, and when adjusting the front trimmer on the S.T.600. In all these sets there are two tuned circuits, and when the two circuits are approximately tuned to a desired station the constructor may feel that the set is not going to oscillate. He proceeds to add a little more reaction to, say, the anode circuit, and this will increase signal strength and selectivity.

If, however, he slightly retunes the first tuned circuit he will find the set may burst into self-oscillation. The rule, therefore, is never to apply critical reaction to one circuit till you are certain that the other circuit is accurately tuned. As the two tuned circuits have a knack of affecting each other to some slight extent it is desirable, when reaction is applied, to titivate both the tuned circuits to give louder signals, and then to apply a little more reaction, and to repeat the process until you hear the warning change in signals which indicates that oscillation is about to occur.

Now if after all these detailed instructions you do not become an absolute expert at reaction manipulation the fault is surely yours.

RADIO AND ABYSSINIA

(Continued from page 12.)

After a number of rounds, followed by accurate details of where each landed, the guns will receive the O.K. from the plane that they are "registered," after which they can fire away knowing that they are laid true on their target.

Modern field-radio outfits are so compact, and so easily portable, that it is possible to equip every army entity with at least a receiving station, and that is all the smaller artillery units need have. Even the lightest of Italy's mountain batteries carry radio, and every time a halt is made during either a forward or a retiring movement the radio is at once brought into action.

This is of immense value. Each unit also carries with it a detailed map of the country over which it is moving, and at any time a roving reconnaissance aeroplane may radio information concerning likely targets, and this is passed on by the command concerned to batteries within that area.

Directional Transmission and Reception.

During the Great War there used to be attempts by the one side or the other to jam the opposing radio by transmitting powerful interfering signals, but this is not now an effective counter-measure. By means of special wavechanging codes, directional aerials and so on, jamming is easily eluded.

The Italian forces are equipped with short-wave apparatus of a highly directional nature, and I believe they are using ultra-short and even micro waves for short links.

A very fair estimate of the power of a nation's fighting forces can be gained by its radio, and in this respect there is no doubt that Italy is extremely strong.

SWITCHES AND SWITCHING

(Continued from page 21.)

mu potentiometer is fitted, for this necessitates the use of a three-point on-off switch wired as shown in Fig. 4. If a two-point switch were used, the potentiometer being connected between the earth line and a negative G.B. tapping, the bias battery would constantly be drained by the passage of current through the accumulator, valve filaments and potentiometer.

There is a simple switching mistake which is frequently made when using a three-point shorting switch for wavechanging with a pair of coils. When the first valve is of the ordinary S.G. or H.F. pentode type the switch serves perfectly well when wired as shown in Fig. 5, but if a variable-mu control is fitted things are very different, as can be seen.

A Suggested Remedy.

All is well when the coils are being used for long-wave reception, but as soon as the switch knob is pulled out the variable-mu control is short-circuited, and the bias battery endangered. But it is possible to obtain satisfactory results by joining the earth terminals of both coils together and to one terminal of the three-point switch—see "dot-dash" lines in Fig. 5.

A switching problem that often defies the constructor, but which is perfectly simple of solution, is that of switching the set on or off from either of two points. The connections are actually the same as those used for switching on a stair light from either upstairs or downstairs, and the actual connections for two single-pole-change-over switches are given in Fig. 6.

This method of switching is not recommended for a battery set if either of the switches is situated at a fair distance from the accumulator.

THOSE SCHOOL BROADCASTS

(Continued from page 9.)

drappings, proved useless in schools. That is why a special committee produced its list of recommended school sets.

The criterion must be clear reproduction at good volume. A separate loudspeaker had been found almost invariably better than a built-in one. An undistorted output of between two and three watts was needed for the larger classrooms, assuming even then that the set was tuned to either Droitwich or a nearby medium-wave National.

Schools were in general recommended to tune to Droitwich, since that station had an almost nation-wide range and would not be disturbed for many years to come, whereas the medium-wavers might easily be scrapped to make way for new stations.

After my talk with Miss Somerville I am more than ever convinced of the value of the service she is rendering to education. She has, if I may say so, the right idea. She has the broadcasting sense, and by that sense more than any other she moulds her plans. Now that she has been relieved of the Central Council secretaryship I am sure we shall see even greater developments in her work.

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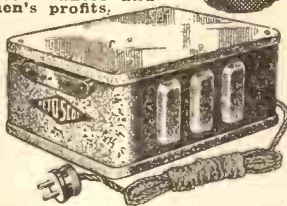
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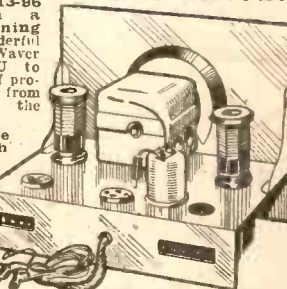
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THE B.B.C.'s RECORDING VAN

(Continued from page 20.)

And then the van itself arrived at Maida Vale from a morning's hard work. We stepped inside and the engineer in charge went on with his interesting story—I hope you find it so, anyway.

"The only big difference between this arrangement and the recorders you have seen inside the building," said the engineer, "is in the power supply. The whole unit has to work from accumulators. When everything is running at full blast the unit will run for five hours with its fully charged batteries. Then they must be re-charged or a fresh lot put in.

"Actually, we have three lots of batteries for the job. One lot supplies the turntable motors. Another feeds the filaments of the amplifier valves. And the third lot drives a D.C. motor, which itself works a D.C. high-tension generator giving an output of 150 milliamperes at 400 volts.

The Flickering Neon Lamp.

"Each recorder, I should explain, has its own high-tension generator, so that virtually we have a standby in case of a breakdown. The amplifiers for the recorders, as well as the monitoring meters, are perfectly standard—much the same as those you see for the fixed recorders.

"You will note the turntables are mounted on gymbals—hand-operated levelling devices ensuring a dead level position for the recording. These gymbals will take up the camber of the road, for example. As an added precaution all four wheels of the van are jacked up when it comes to

rest. People can then climb in and out without setting up the usual vibration.

"One of the little problems this van propounded to us was a method for keeping the speed of the turntables constant during a recording. As you know, we normally use a stroboscope working off the standard 50-cycle supply—where was that to come from for the van, though?

"We dodged the problem rather neatly, I think. We took a tuning-fork as our standard. This has a fixed and definite frequency, of course, and by the aid of a cunning device I will not bore you with now we make a small neon light 'waggle' at a definite frequency. This variation corresponds, you gather, to the variation of the 50-cycle supply normally used.

Checking the Speed "Drift."

"Round the periphery of the cutting discs or turntables are perforated holes giving us a stroboscopic indication for either 60 or 78 r.p.m. when used with the neon light effect. The neon light, 'wagging' at its definite frequency, is reflected on to these perforations. It is then just as easy to watch the 'drift' of the stroboscopic effect as in the normal fixed recorder."

I was then allowed to sketch out the disposition of the two recorders with their associated apparatus as fitted up inside the van. No space is wasted, as you can see. In the new vans, which I understand will be ready some time next March, the amplifiers will be still more compactly arranged, one above the other in a rack. Other modifications will give the operators more elbow room.

And that's the story of the mobile recording unit, told in a technical way for the first time, I believe. A. H.

HISTORY AS IT SHOULD BE TOLD

(Continued from page 10.)

It all ends with the lamentable demise of poor Paul, the spotter of winners, a mental wreck. In the case of the dreamer, however, the end isn't usually so tragic. He generally wakes up, or is awakened by the alarm-clock or a disturbed wife. Had the story been more feasible I would have liked this broadcast. The action moved along quite smoothly, scene following scene with perfect naturalness. Paul (played by Henry Hepworth) and his accomplice Bassett, the gardener (J. Denton Thompson), were the central figures. Indeed, they were objects of envy for the simple way they amassed fabulous sums of money on the Turf. Theirs was the system if you like. When in the throes of some mental affliction, occasioned by I know not what unless it was that the possession of so much wealth had turned his brain, Paul did some very fine acting. But it was all so stupid and impossible that one was inclined to dismiss "Rocking Horse Winner" as a trifle.

I listened to the Prom. concert on Schubert night. But it was Elisabeth Schumann I particularly wanted to hear.

My determination to hear Elisabeth Schumann meant that I had to leave "Bertie" as the B.B.C. offered this as an alternative to a Prom. concert that evening. But "Bertie" was on again the following evening.

A Very Successful Burlesque.

I listened to this second broadcast, and I really was amused at this exposing of "the corruption of Society and the cleanliness of the suburbs." Also, I was strangely affected by the potency of Michael Sayer's music. I listened to the whole of "Bertie" with much enjoyment. The music so caught my fancy that I saw virtue in the libretto which aimed at burlesquing "the hollowness of this gay masquerade of Mayfair."

Patrick Waddington hasn't an equal in his own line. It isn't a line I can say I like, but it is found in all musical comedies and it has to be played. He sings and acts well. In "Bertie" he had an able opposite number in Elsie Eaves who played "Lettice." They did ample justice to Michael Sayer's music, especially that captivating number "I'm so in love," which I thought was one of the best things musical comedy has given us for a long time. The chorists work in "Bertie" was a bit sketchy, I thought, and the three bloods were below standard in their song, though their spoken parts were first-rate.

I heard a woman announcer in the Scottish programmes the other day. Does this mean that the B.B.C. has changed its policy, or is this lady acting in a stop-gap capacity? G. B.

OUR READERS' OPINIONS

(Continued from page 5.)

billiard balls when they touch in passing each other have part of their forward movement converted into either a clockwise or anti-clockwise spin. Moreover, two clockwise spinners repel each other at contact, whereas a clockwise and an anti-clockwise one are quite content to lie and spin together.

The birth of spinners would give rise to areas of low-pressure, and the surrounding bumping ether would tend to keep a group of clockwise and anti-clockwise spinners together. So must have begun the evolution of matter and motion with its sex and magnetic phenomena—opposite spinners naturally harmonising and the groupings becoming even bigger and more complex.

In concluding I should like to ask R. L. J. if he has any theory to explain why the current induced in a wire cutting a magnetic field reverses with the cutting direction? And it would be interesting to have your readers' opinions on whether gravitation may not be ether pressure.

Yours truly,
G. F. Lamb.

3, Clumber Street, Hull.

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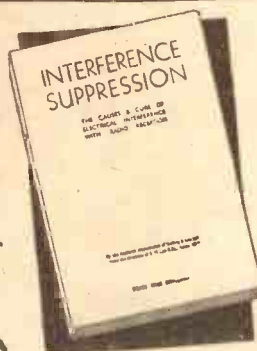
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TECHNICAL JOTTINGS

Items of interest to every enthusiast.
By Dr. J. H. T. ROBERTS, F.Inst.P.

WHEN using a set with Class B output you may sometimes find yourself in a difficulty with regard to the loudspeaker to be used with the set. We have all heard a good deal about matching up the loudspeaker to the output of the set and whilst this is important enough with other types of output, it becomes extremely important with Class B, because the efficiency of the Class B system depends very much upon proper matching. Where a pentode valve or an ordinary power valve is used for the output stage the matching is not nearly so important.

Now if you are using a set with Class B output and you want to use a balanced-armature speaker, you will find yourself up against the difficulty that the impedance of the balanced armature speaker will vary enormously with the frequency. A moving-coil speaker of a good make will not vary to anything like the same extent and so, if for any reason you change over from a moving-coil speaker to a balanced-armature type, you may find a pronounced difference.

Constant Load.

Another point about the Class B valve is that it needs a reasonably constant load, and this has a bearing on the performance of the speaker already in use. For example, supposing you want to connect a balanced-armature speaker as an extension speaker, the one incorporated in the set itself being a moving-coil. If matters are not properly arranged to cater for the balanced-armature instrument the output from the moving-coil speaker will be reduced to perhaps only a fraction of its normal value.

These difficulties can be got over to a certain extent by connecting a condenser across the balanced-armature speaker; this condenser will not have much effect upon the lower audio-frequencies, or even upon those in the middle of the register, but it will reduce the impedance of the speaker so far as the higher audio-frequencies are concerned.

Moving-iron Speaker with Class B.

It is a good plan to put a variable resistance in series with the extension speaker, as this resistance, when properly adjusted, will tend to reduce the effect of this condenser on the original moving-coil speaker in the set. You will find in actual practice that it is best to adjust this variable resistance so as to give it as high a resistance value as possible consistent with the proper volume of the moving-iron speaker.

One end of the condenser is connected to one terminal of the moving-iron speaker, whilst the other side of the condenser can be connected either to the other terminal of the extension speaker direct, or to the end of the above-mentioned resistance which is remote from the extension speaker; in other words the variable resistance can be in series in the condenser-speaker circuit or it can be outside it.

A Handy Valve Screen.

The stability of a set is often very materially affected by screening the S.G. or H.F. pentode valves. There are various ways in which this can be done, but sometimes the assembly of the set is so compact that it is difficult to find room for a rigid screen cover.

In this connection, the Colvern people have lately brought out a very useful little device in the shape of a woven flexible copper wire "mantle," as it were, which fits over the valve like a glove and has a flexible lead which can be connected to earth. To look at the cover it reminds you for all the world of one of those large flexible incandescent gas mantles, except that, of course, it is copper coloured. It takes up practically no extra room and there are no holes to drill. You just stretch it over the valve and attach the lead to earth.

I daresay many of you saw these at the Radio Show. They certainly appear to be a very convenient little article, and should do a good deal towards overcoming the instability and other troubles which are often due to unshielded high-frequency valve stages.

Piezo Microphone.

Another interesting little device, though not one which will appeal to such a large number of radio users as the one I have just mentioned, is the piezo astatic crystal microphone. This includes suitable damping by means of which it is claimed that the frequency response throughout the useful range is maintained very uniform. There is no background noise and the results are said to be "as clear as crystal." With a piezo microphone there is no "button current," field current, or polarising voltage, and owing to its high impedance it can be connected direct to grid, thus saving the cost of an input transformer.

Piezo-electricity is a Practical Proposition.

When piezo-electricity was first investigated some 15 or 20 years ago people thought that it was just a kind of scientific curiosity and that it would never be applied to any practical use, but such great improvements have been made in piezo-electric crystals of various kinds that now piezo microphones and piezo reproducers are taking their places with those of the electro-magnetic type as really practical propositions.

The Aerial To-day.

The much greater power of transmitting stations during the last few years, and also the increased sensitivity of receiving sets, have combined to minimise more and more the importance of the receiving aerial. Those of you who were in the radio game ten years ago will remember how we all had to go in for a full-size outdoor aerial, not a single wire, if you please, but a twin aerial, with elaborate spreaders and all the rest

(Continued on next page.)

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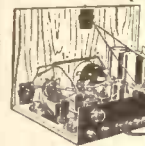
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TECHNICAL JOTTINGS

(Continued from previous page.)

of it. Those days have long gone by, and it is now a most unusual sight to see a twin receiving aerial.

I think the majority of sets now have no outside aerial at all, but just a wire run up to the roof of the house inside or around the walls of a room. A large number of portable sets and superheterodyne receivers, of course, have only a frame aerial, either adjacent to the set or mounted inside the cabinet.

Aerial-capacity Effects.

If you are using an indoor aerial, however, it is very important to have this properly insulated, otherwise you will lose a large amount of the incoming energy. You can use a cable with heavy rubber covering which will act as a fairly efficient electrical insulator. But what you want to remember here is that there is not only the question of insulation to be considered, but also that of capacity effects.

NEXT WEEK

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Synchronous Gramophone Motors.

Several readers have asked me from time to time where they could get the synchronous turntable, which I mentioned in these Notes some time ago, for replacing an ordinary spring-driven gramophone motor and converting it into an electrically driven one.

The best-known machine of this type is the Simpson Electric Turntable, although I believe there are others on the market now. I seemed to have lost sight of the Simpson turntable, and rather thought it was no longer being manufactured, but at the Radio Show this time I saw it again on one of the stands, and those of you who want to get one may be interested to know that it is now being marketed by Messrs. Kingsway Radio Ltd., of 3, Dane Street, High Holborn, W.C.1. The price is £2 2s. It is made in two turntable sizes, 10 inches and 12 inches, and is available for A.C. mains of 100/150

volts or 200/250 volts 50 cycles. No attention is required, and the current consumption is only 5 watts. Since the turntable runs synchronously with the A.C., it runs at an absolutely constant speed, and so there is no speed regulator, and you cannot get it running too fast or too slow, which is such a common fault with gramophones.

Using a Variable-mu.

When using a variable-mu valve in one of the H.F. stages you will sometimes find that the volume-control resistance, even when moved throughout the full range, does not have sufficient effect. It may be that the total resistance is too high or that the resistance is not "graded." You can get over this by connecting a fixed resistance across the terminals of the volume-control resistance, which will have the effect of reducing the resistance range over which it works.

You will easily understand this if you just work out the resultant resistance of the combination when the resistance of the volume control is at a maximum and also at one or two other positions. A convenient value for the fixed resistance will be anything from 500 to 2,000 ohms. Any ordinary fixed resistance of suitable value can simply be soldered across the leads from the terminals of the volume control.

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The cabinet model Stentorian type 368. It retails complete at three guineas.

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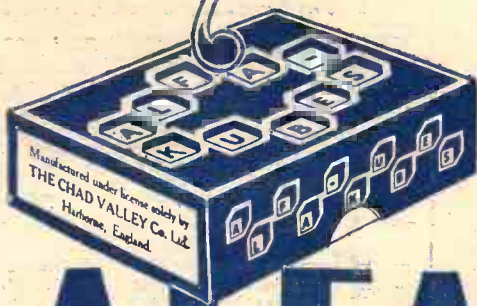
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