YOUR CHANCE TO WIN A B.T.S. "ADABAND" (SEE PAGE 716)

Popular Wireless & Television Times

B.B.C. TO INSTALL WORLD'S LARGEST CINEMA ORGAN

EVERY WEDNESDAY PRICE 3D

No. 717.
Vol. XXVIII.
Feb. 29th, 1936.

Also This Week:

TEST REVIEW OF AN EKCO A.C. SET

BELOW 15 METRES
By W. L. S.

RANDOM RADIO REFLECTIONS
By Victor King

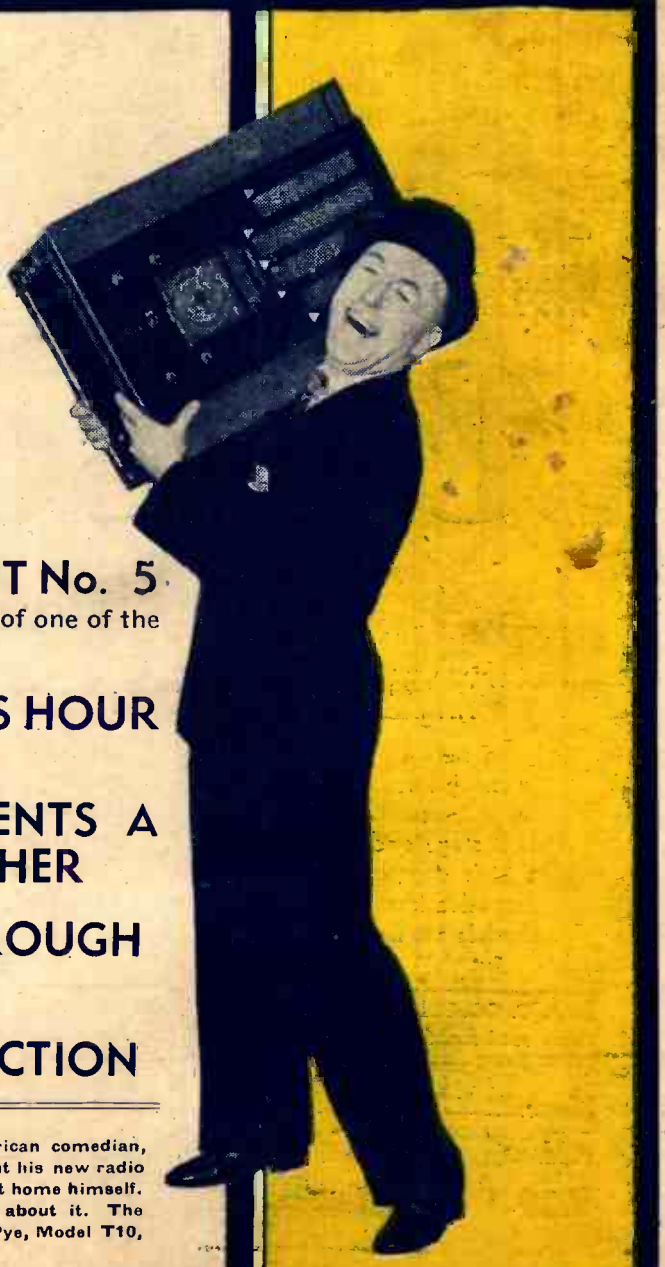
"P.W." CIRCUIT SPOTLIGHT No. 5
K. D. Rogers discloses full technical details of one of the latest all-wave mains receivers

ALL ABOUT HENRY HALL'S HOUR
By Kenneth Baily

LOUIS MANSFIELD PRESENTS A RADIO MYSTERY CIPHER

LEARNING FRENCH THROUGH YOUR RADIO

SPECIAL BEGINNERS' SECTION



Will Mahoney, the famous American comedian, evidently feels so enthusiastic about his new radio set that he has decided to carry it home himself. He certainly looks very pleased about it. The receiver, incidentally, is the new Pye, Model T10, All-waver.

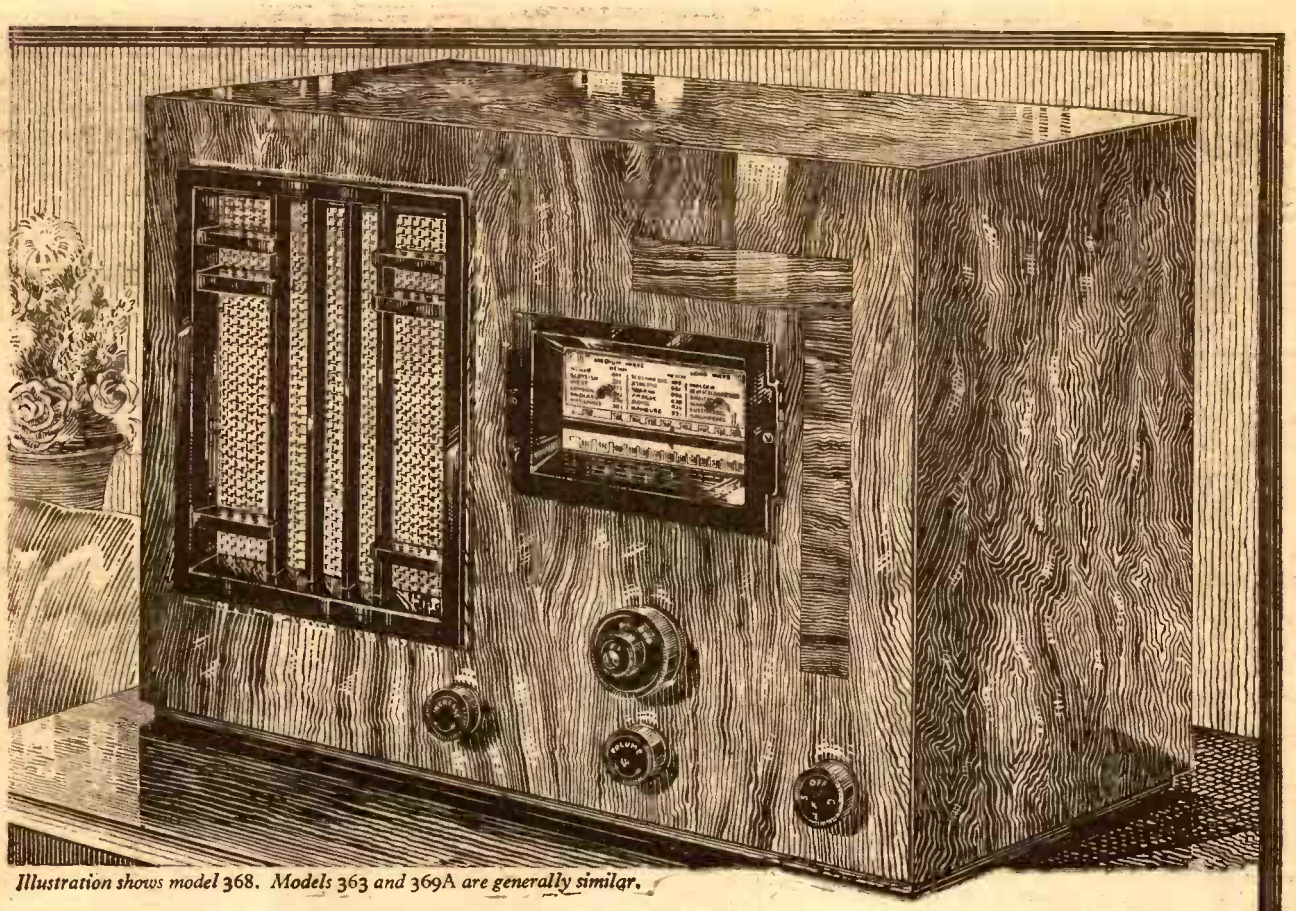


Illustration shows model 368. Models 363 and 369A are generally similar.

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MANAGING EDITOR : G. V. DOWDING. ASST. EDITORS: A. J. RANDALL, K. D. ROGERS.

B.B.C. BUSY
EXIT "X's"
NEW LONG-WAVER

RADIO NOTES & NEWS

STUDIO "ECHO"
IN PALESTINE
ON TEN METRES

Everest Radio

FURTHER news about the wireless equipment to be used on the Mount Everest Expedition makes it clear that radio is to play a very important part in the attempt.

Two short-wave transmitters (C.W.), keeping the base camp in constant touch with the outside world, may easily be heard by W. L. S. & Co. But on the actual climb the advance parties, as already stated in "P.W.," will intercommunicate by means of little 5-metre "transceivers," light enough to carry anywhere.

The leader, Mr. Hugh Ruttledge, will direct the final dash for the summit from a peak below, and he hopes to be able to watch the progress of the parties through powerful glasses, and advise them by means of the radio link.

Busy Time Ahead

THIS is going to be a stop-not year for the B.B.C. if all its plans for 1936 come to fruition. Having completed the structural work at the Alexandra Palace, there are the television transmitters to be installed ready for tests in March and programmes in June.

New Regional stations are to be opened in Northern Ireland, North Scotland and at Newcastle: while North Wales is to have a 5-kilowatter and the West Regional is to be re-christened Welsh Regional, the West being served by other means.

Studios are springing up everywhere, headquarters' accommodation is being extended, and the Empire station gets bigger and bigger.

Wirelessly speaking, the skies are blue, the glass is high, and we are sailing before the wind, my hearties, with a yo, heave ho!

Mastering the Atmospheric?

ONE of the most interesting attempts ever made to overcome atmospherics is that of Major Edwin H. Armstrong, Professor of Electrical Engineering at Columbia University, U.S.A.

Some months ago I mentioned the famous professor's attempt as one that would bear watching. It now appears that for over a year he has had receivers scattered about New York State, listening to his experimental radio station situated on the top of a humble little shack known as the Empire State Building. This is a skyscraper right among the clouds, and yet Major Armstrong has got an X-free programme through to a receiver 85 miles away whilst a thunderstorm was in full cry. The major's programme was recorded perfectly, without a blemish, though another phonograph recorder, simultaneously receiving from W E A F (which was twenty-five times as powerful), showed crashes, bangs, splutters, slams, clicks and back-fires, mixed up with an electrical hullabaloo that relegated W E A F to a fitful whisper.

Mark my words: the major's invention is a major invention!

COMING SOON
An Amazing New Set
By JOHN SCOTT-TAGGART, M.I.E.E., F.Inst.P, Fel.I.R.E.
LOOK OUT FOR IT!

Freak Aerials

ONE of these days we must hold an inquiry to find which "P.W." reader can claim the strangest aerial. There is one in a Brixton basement which is not only placed entirely below ground level, but is earthed at both ends.

A Leicester reader once told me that his father managed a gasworks and, after experimenting, he had achieved a fine aerial consisting of one of the gasometers connected to the set by a short wire!

Another queer one was that of a chap who looked after a race track—greyhounds or something—and, being forbidden by the authorities to erect a pole, discovered that the galvanised iron fence around the track was an absolute winner, though it was earthed all round!

The foregoing are some of the more remarkable that come to my mind, but there are plenty of others, I'll wager, that delight their eccentric owners—though they would be the death of a Technical Hound.

Society Doings

PLYMOUTH Radio and Television Society recently held its first meeting at the Co-operative Chambers, Drake Circus, Plymouth.

* * *

Newport, Mon., struck the right note with a bang when the Newport and District Short-Wave Society was inaugurated last month (Jan.). It welcomes all short-wave enthusiasts, plans monthly meetings for lectures and discussions. The Hon. Sec. invites inquiries at 2, Palmyra Place, Newport, Mon.

* * *

Derby Wireless Club, claiming to be the oldest in Britain, celebrated its silver jubilee with a debit balance on the year's working, but is carrying on for another year, undaunted.

Asking for It

WHEN it was announced that the dear old Hilversum long-waver would have to share 1,875 metres with a new Roumanian station, there were many indignant protests in advance.

The said rival has now appeared with 150 kw. (against Hilversum's 100) bang on the same wavelength, and calling himself "Radio-Romania."

We must admit, however, that he is a courteous interloper; for instead of just barging in, take it or leave it, he is *asking for reports*. Anyone who has heard the gentleman in question, and wishes to

(*Continued on next page.*)

BILLY MERSON LISTENS-IN

Billy Merson, the well-known comedian, listening to a programme on one of the H.M.V. "Superhet Four-Forty-One" receivers during an interval in a recording session at the His Master's Voice studios.

NEW B.B.C. STATION NEAR PENZANCE ?

send his compliments or vituperation, should write as follows :

The Station Director, " Radio-Romania," General Berthelot, Street 60, Bucharest.

The Ghostly Announcer

WHAT'S all this about a ghostly radio announcer ? As far as I can understand it, the claim is made that certain listeners have heard a second voice repeating news read out by the announcer. And the possibility of this being an echo effect is ruled out by the contention that the second voice is that of a woman—or should I say a ghostess ?

Various psychic experts have volunteered to look into the matter, but there is no mystery about it to some of us. The matrimonial state has long since accustomed us to the idea of a woman always having the last word !

In the South-West

A PENZANCE reader has written to tell me some exciting news about B.B.C. activities in his part of the world. Unfortunately he uses a pen that appears to have belonged to one of the original Pirates of Penzance—it writes as though it began life as a cutlass—so I am not sure whether he informs me that he had a *talk* with somebody named Trenowin, or whether he went for a *walk* to a place of that name.

However that may be, he heard of or saw a couple of tall B.B.C. masts, and came away with the firm belief that Penzance is soon going to get a radio station.

When I tried to check this up with the higher authorities, all I could get was a guarded admission that experiments were being carried out in Cornwall, with a view to improving the service in south-western England. Let's hope they do, or "There's twenty thousand Cornishmen will know the reason why."

More Rivalry

THE news that when television starts up in London the co-operation of the big stores will be invited intrigues me mightily.

The public will be admitted to viewing rooms, and will file through in front of the screens, to see what the programmes are like before they buy apparatus for their own homes.

Picture it for yourselves. Elegant damsels, throwing open the doors of lifts, will stare contemptuously at the multitude and announce : " *Going Up. Going Up. Fishin', Shootin', Hahbadashary, Woollen Underwah and Television. This Way.*"

Passing full many a counter of counter attractions, we shall come at last to the great fulfilment—the Vision, for which we waited.

Let us hope that it will prove an irresistible eyeful, for many a male will find it difficult to resist the rival visions—the young thing on BUTTONS ; the piece of fluff on GLOVES ; and the sweeping beauty on CARPET SWEEPERS !

Approach to Southampton

YOU recall that a very hot direction-finding apparatus was installed not long ago at one entrance to the port of Southampton ? Well, the pilots of the air appear to have been jealous of the pilots of the sea, for there is now to be similar radio guidance for air traffic.

Southampton will be one of the first municipal airports to have such apparatus of its own, and work is to begin shortly at Eastleigh. The cost of the venture will be in the neighbourhood of £2,500, and the Air Ministry will airily pay the majority of this, I understand.

BROADCASTING BREVITIES

Listeners will be interested to know that the radio programme for 1935 which headed the fan-mail at Broadcasting House was Charles Brewer's Christmas Party. This programme brought forth more than six hundred letters of appreciation.

* * *

The B.B.C. announces that several new singers are to join Henry Hall's band. One of them is Bert Yarlett, known as Canada's Romantic Tenor, who will be on the air regularly after March 16th. Bert Yarlett has come direct to London from the Royal York Hotel, Toronto, and previously he appeared in several well-known films. He also sang in New York with the Hollywood Collegians, and is well known on the American radio.

* * *

A second new singer is Elizabeth Scott. Miss Scott is an artist who for three or four years past has sung at the Trocadero Restaurant, where she has been known as Elizabeth. She is a singer of rhythm numbers and has recently broadcast.

Personalities

MR. H. L. KIRKE, head of the B.B.C.'s Research Department, Engineering Division, has gone to Bombay in connection with India's broadcasting problems.

* * *

MR. ALAN DRYLAND, B.Sc.—who was awarded the M.B.E. in the New Year Honours List—deserves more than a meed of praise for the smooth running of his charge, the London station, during recent events.

* * *

MR. E. W. M. RICHARDSON, Belfast's Director of Talks, has been to Dublin, conferring with the Irish Free State's Broadcasting Director, concerning possibilities of better co-operation.

Delay in the Holy Land ?

ALTHOUGH it was feared, some time ago, that North Regional's programme would have a kind of unwanted harp accompaniment due to the new Jerusalem station sharing its wavelength, there has been no trouble so far. And now comes a report that, instead of an any-minute start, the opening ceremony of the Palestine station may not take place until next May.

Jerusalem, we may be sure, is not unduly worried, for what is Time to a place like that ?

Radio Station on Uninhabited Island

ARRANGEMENTS are being made to erect a wireless station in one of the Phoenix Islands, six hundred miles north of Fiji.

There is nobody whatever in the vicinity to listen to radio. Moreover, the island is uninhabited, and there is a constant succession of X's down Phoenix way, any one of which might pardonably be mistaken for a ton of coal delivered by a steam-roller down a galvanised iron shoot !

However, the circumstances warrant exceptional measures, for Phoenix happens to be the ideal spot from which the next total eclipse of the sun will be visible, in 1937.

The scientists who watch this kind of thing cannot do without their radio, and this explains why Phoenix is to be favoured with wireless facilities.

Opportunity for Set-Builders

SEARCHERS of the short waves who live down Swindon way should fix an interrogative and covetous eye upon a perpetual trophy for the best S.W. receiver of home construction. This trophy has been offered by the Chairman of the new Swindon and District Short-Wave Society, and it is to be competed for every six months.

The Society is seeking larger premises, hopes to acquire a transmitter of its own, and welcomes recruits. If you don't believe me, ask the Hon. Sec., Mr. W. Barnes, 7, Surrey Road, Swindon.

Was it a Crime ?

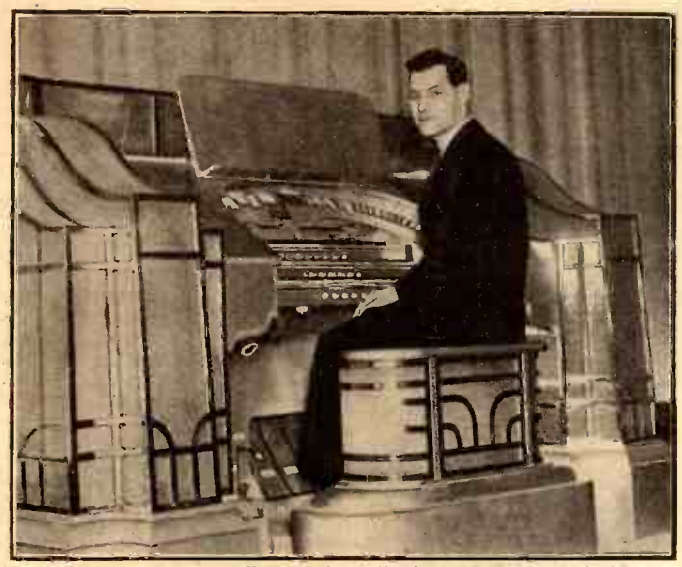
FOR sheer fascination nine and ten-metre reception must be hard to beat. I heard the other day of a chap who tuned in for the first time on that wave-band and heard an indubitably American voice say : " . . . blue suit, lying on the sidewalk in Virginia Road. All cars investigate."

Just that. No idea of the city or even the State from which the police were calling. And no hint as to whether or not the blue suit had somebody inside it, dead or alive.

That's the queer thing about radio. You never know what next is going to land on your aerial, especially if you get off the beaten track of long and medium waves.

ARIEL.

B.B.C. To Install World's Largest Cinema Organ



The B.B.C. Director of Variety believes that cinema-organ music is the most popular item on the radio. Here is Reginald New at the console of the Reigate New Cinema organ.

Alan Hunter reveals the B.B.C.'s plans for equipping St. George's Hall with a great £10,000 Compton organ. Also he gives details of new programme features which listeners are to hear during the forthcoming months

BECAUSE he believes that cinema-organ music is the most popular item on the radio, Eric Maschwitz has gained permission from the B.B.C. to have the largest "unit orchestra" organ in the world installed in St. George's Hall.

This startling fact was revealed by the Director of Variety when he was "in the pillory" at the latest Council Chamber gathering of the radio scribes in Broadcasting House.

It will be a Compton organ, costing something in the region of £10,000. The exact cost is not known, but Mr. Maschwitz was safe in saying the figure would materially exceed the cost of the Concert Hall organ, which was installed at something like £6,000.

"St. George's Hall is ideal for an organ of this size and type," asserted Mr. Maschwitz. "Its acoustics are just right, and there will be no trouble of interference with neighbouring buildings. The organ chambers will probably be fitted at the side of the circle, with the console either on the stage or down in the pit."

First Choice of Listeners

Asked why such a costly step was being taken when there were so many excellent organs available from outside sources, Mr. Maschwitz had a "perfect alibi."

"We have evidence from various quarters that listeners would greatly appreciate more cinema-organ music in the main evening programmes. But if we rely on outside organs of this type, we find ourselves faced with the fact that the cinemas are fully occupied with the screening of films. Therefore, to meet this big demand, we are forced to install our own organ.

"Furthermore, with an organ on the spot, as it were, illimitable scope will be presented to the programme builders to combine organ music and all the effects possible on the modern unit orchestra system with solo turns, such as violin and piano—even sopranos."

The Director of Variety was rash enough to say which he considered were the four most appreciated types of programme broadcast by the B.B.C. I wonder if you agree with him? Here they are:

First, cinema-organ music; second, popular dance music as played by the accordion band; three, variety shows of all kinds; four, either "In Town To-night" or the more embracing feature of "Saturday Magazine."

More Concert-Party Broadcasts

During the summer, Mr. Maschwitz said, the programmes under his direction—all variety entertainment, that is—will be modified in keeping with the lighter attitude adopted by listeners.

He vigorously denied that programmes would be inferior in kind to those offered during the winter months. He dismissed the contention that summertime radio fare is below standard as quite wrong. "The programmes do *not* go to pot!" he asserted.

"At the same time, I think it idle to deny that there is a difference; on the contrary, I think it is essential that there should be. In the summer months people have a much higher 'resistance' to listening than when a cosy fireside induces them to stay at home on cold winter nights.

"Our forthcoming programmes will reflect this change in listener habits. It is true that during the summer many of our star artists are snapped up by concert-party work, but this year we hope to overcome that difficulty by more relaying from seaside resorts.

"Harry Pepper is working now on a scheme for a much more extensive use of concert-party material, particularly for the Southern listeners. In the past the North has had more of a show than the South in this type of thing, mainly because we have been up against 'O.B.' difficulties. But I understand that the Post Office lines are now greatly improved between London and the places we are likely to want."

* * *

Several entirely new features will be introduced at the beginning of the summer, revealed Mr. Maschwitz. And that fact alone backs up his contention that the forthcoming programmes will not "simply fade away."

"We shall stop the 'Saturday Magazine' feature as part of a set policy," he explained. "By temporarily withdrawing such features we feel that we can prolong their useful life very considerably. The 100th edition of the 'Magazine' will see the withdrawal of this extremely popular item, but it will come back again in the autumn.

"Music halls will not fall away this year, partly because we are not trying to do so many as in previous years. Nevertheless, variety acts not strictly coming within the category of music hall will naturally become scarce between June and September—when the concert parties are in full swing."

Some New Summer Features

Starting April 19th, I hear, will be a "Believe It Or Not" feature, rather reminiscent of Ripley's weird and wonderful newspaper collection. Exactly how the oddities of life are to be portrayed by sound effects alone is not clear; but as a novelty the idea has points, presumably. Anyway, Charles Brewer will be in charge, so we can be certain it will not be a "flop."

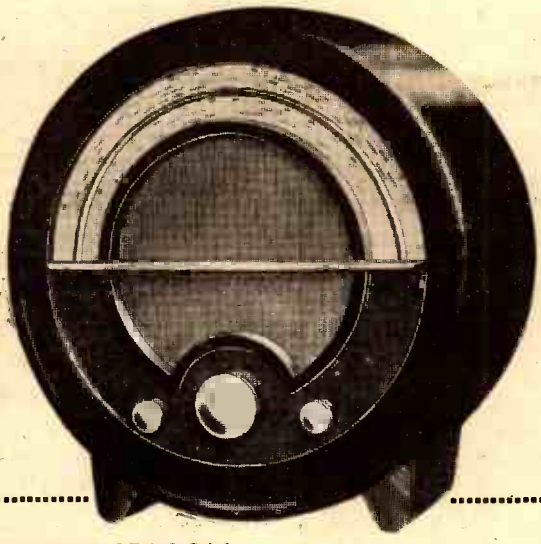
Sydney Howard, the famous film and stage comedian, will bring an amusing series of six broadcasts to the listening public under the generic title of "Howard on Handicraft."

The "Rocky Mountaineers" are dispersing for a time, but in their place Eric Maschwitz has found a South African combination capable of some very tuneful "hillbilly" music—Joe Marais being in charge.

In March, too, the very amusing skit, "America Calling," will be revived by Eddie Pola. Apparently the Americans simply rave over these programmes—N.B.C. taking every one, to the huge merriment of its subscribers.

When Gracie Fields lands in England from South Africa on March 30th, she will

(*Continued on page* 726)



SETS OF THE SEASON

THE FAMOUS EKCO "AC76"

Reviewed by Michael Butler

FROM the listener's point of view the value of any set these days must be assessed in relation to the way in which it is capable of dealing with the present difficult broadcasting conditions. That, I know, is a very obvious statement of fact; but because of the almost insuperable difficulties with which the set designer is faced, there are comparatively few receivers which can be said completely to fill the bill.

Practically all modern sets of any standing at all are good, of course, for that is one of the outcomes of the healthy competition which has prevailed in the industry during the last few years. But just occasionally one comes across a particular design that is just that little bit better than the average—a set that has got that little something else that some others haven't got.

Such a set, in my opinion, is the Ekco Model AC76 all-electric superhet. It isn't that it will get appreciably more stations than any other good set of equivalent design—not that numbers of stations interest me particularly. It is the way in which it *gets* the stations that has impressed me in this instance, for that in my estimation is of much greater consequence.

Personally, I would far sooner have a set that will receive a limited number of stations really well than one that will bring in every station in Europe regardless of quality of reproduction and freedom from interference. And I am convinced that the majority of listeners share my views.

But unfortunately that is where the set manufacturer comes up against it. If he had merely to design a receiver for one particular set of conditions, then his task would be very straightforward. Alas, any design that a manufacturer places on the market has to be suitable not merely for one set of circumstances, but for practically every type of reception conditions imaginable. His sets will be bought and used in all parts of the country, and what may be ideal in one case may be totally unsuitable in another.

There is, too, the listener's angle to be taken into consideration, for although I believe it to be a fact that practically everybody these days is primarily interested in quality of reproduction, there are many listeners who like occasionally to be able to hear anything and everything that is on the air. That means a high degree of sensitivity, and extreme sensitivity and perfect quality do not always go hand in hand; in fact, on the contrary.

These, and many other important factors, have all to be taken into consideration by the manufacturer whose sets are intended for the community at large, and in general he has to arrive at a sort of compromise as the best way of pleasing the largest number of listeners.

Station Pre-Selection

But that is hardly true of the Ekco AC76, for thanks to their ingenious and exclusive scheme of station pre-selection and automatic noise suppression, the set can instantly be adjusted to suit every individual requirement.

If you want a limited number of stations absolutely free from interference and with an amazingly high degree of fidelity, then it is merely necessary to adjust a little knob on the side of the cabinet *and the set automatically does the rest!* Any station that falls below this pre-determined standard is automatically rejected as the instrument is tuned and, moreover, in between the stations that are accepted as being quality perfect, the set is absolutely noiseless! It seems almost uncanny in use, and the absence of "fireworks" between stations is a great boon.

But the tremendous advantage of station pre-selection does not end there, for with the knob in another position the set—again quite automatically—will pre-select many more stations than with the knob in the first-mentioned position, but it will still reject all programmes that fall short of this second pre-determined standard.

Three Sets in One

Only when this little control knob is in the last of its three positions will the set receive anything and everything that is available.

To all intents and purposes, therefore, this instrument may be regarded almost as three sets in one, and thanks to the versatility resulting from the pre-selector device, I cannot visualise the case of a single listener whose requirements would not be met in this design. Far from being the compromise which so many sets have to be in order not to limit their appeal to the listening public, the AC76 gives a peak performance no matter what the listening requirements may be. You do not have mentally to cherish a listening ideal and then in practice to put up with the nearest that you can get to it. By the movement of a simple knob, which is clearly marked, you simply adjust the set to suit yourself entirely.

The Ekco AC76 is unique not only because of the incorporation of this ingenious feature but on account of its design generally. True to old-established Ekco traditions, it does not follow the crowd in any shape or form, but it strikes an entirely original note.

The cabinet itself, which is one of Ekco's famous mouldings, is completely circular—in some respects perhaps a daring experiment, but one that has succeeded beyond measure mainly because of the extreme care that has been exercised in the design. If you refer to the photograph on this page you will, I think, agree that the result is both dignified and pleasing.

The chassis, which is also unorthodox in that it is built around the speaker, consists of a four-valve (excluding rectifier) seven-stage superhet arrangement for operation on A.C. mains.

Simplicity of operation—which is a factor of great importance to most listeners these days—is another salient feature of the AC76 design. This has been achieved not merely by the reduction to the absolute minimum of the number of controls, but by the use of a really sensible dial—a dial, in fact, which extends half-way round the cabinet and upon which every worthwhile station appears by name.

Excluding the pre-selector control, which only requires adjustment very occasionally, the AC76 has three controls. These consist of the main tuning knob, a combined volume control and on-off switch and a three-position wavechange-gramophone switch.

The general performance of the set in the tests which I conducted was of a very high order indeed, and the quality of reproduction was definitely in keeping with 1936 standards.

In the class to which this set belongs, I have not the slightest hesitation in saying that I regard it as an instrument distinctly above the average, and one, in consequence of its excellence, that is destined to become universally popular. It is magnificent value at only 11 guineas.

TECHNICAL SPECIFICATION

DESCRIPTION. — Five-valve (including rectifier), seven-stage superhet consolette, for operation on A.C. mains.

CIRCUIT ARRANGEMENT. — Standard four-valve arrangement, comprising combined detector oscillator, intermediate frequency amplifier, second detector and A.V.C., and pentode output. Set is provided with delayed automatic volume control, and an outstanding feature of the set is the station pre-selector and automatic noise suppressor scheme incorporated. This enables all stations below a pre-determined level to be automatically rejected as the set is tuned.

CONTROLS.—Four in all, consisting of main tuning knob, combined volume control and on-off switch, wavechange-gramophone switch on the front, and noise suppressor and station pre-selector on the side. Tuning scale is calibrated in station names and wavelengths, and travelling indicator is illuminated. Note: Provision is made at the rear for connection of a pick-up and an external speaker.

CASH PRICE AND H.P. TERMS.—11 guineas, or 13 monthly payments of £1.

MAKERS.—E. K. Cole, Ltd., Ekco Works, Southend-on-Sea, Essex.

LEARNING HOW TO BROADCAST

The first school for broadcasters in the North has recently been opened at Manchester by Clifford Bean, veteran radio artist.

Clifford Bean has been right through the mill of broadcasting. Way back in 1925 he produced one of Leslie Baily's first radio shows—a programme commemorating the first birthday of 2 L S, the Leeds station. Since then he has broadcast as an actor at Leeds, Manchester, Cardiff and London, something like 1,500 times.

The first school of broadcasting was opened in Bond Street, London, two years ago by Bertram Fryer, an ex-B.B.C. producer. The popular radio star, Alma Vane, next opened one at Birmingham, and Manchester is the third centre to set up one of these institutions, which, it seems, are springing up wherever there are B.B.C. studios ever open to absorb local—but proficient—talent.

ON THE SHORT WAVES

BELOW 15 METRES

W. L. S. gives some practical hints on receiving stations on the lower limit of the short-wave band, including American police-car transmissions.

ONE of the interesting things about short-wave radio is that the "lower limit" never stands still. I can remember the days when short-wave sets were advertised as having a range from 80 to 200 metres. Even nowadays there are many that will not go below 16 metres, although that seems pretty short in comparison with 80.

But conditions happen to be such that the band of wavelengths between 16 and 5 metres is one of the most interesting of all, and nobody who wants to be "in the swim" can afford to miss out one single slice of the available space.

Many readers write and ask me what is happening below 15 metres, and whether it is worth their while to make a receiver specially for those wavelengths. I want to try to answer both questions.

It will be better to take the second one first. If your present receiver is a *good* one—that is, if it shows no signs of "tailing off" when you get down below the 19-metre band, then it should be good for the ultra-short waves. My own standard receiver works quite well on 5 metres, although I have another one specially built for that wavelength.

Smooth Oscillation Needed

If, however, you can produce smooth oscillation on the 16-metre band, and receive W 3 X A L at good strength without having to chase the reaction control all over the shop, then all you need is a smaller coil to get you down to 10 metres or below.

Two well-known makes of short-wave coils will tune down to 13 metres, the smallest coil having four turns for the grid circuit. If you wind a similar coil on the same diameter former, with a 3-turn grid winding, you will find that the bottom limit is just about 10 metres. If you reduce the grid coil to 2½ turns you will get down to about 8·5 metres, and the 10-metre band will come about one-third of the way up your ·0001 tuning condenser.

If you try this and can't make the detector oscillate, there are several things that you can try—a larger reaction condenser, more H.T. on the detector, or a layout that gives you shorter wiring between the coil and its tuning condenser. The latter is probably the most important of all.

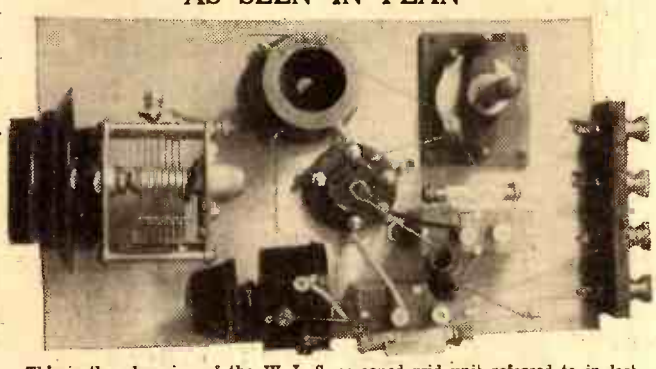
Some makes of valve oscillate more freely than others, and even two valves of the same make and type may show marked differences in their behaviour down there. If you can try different valves, do—it's worth while. Most of the "H.L." class, however, perform well down there; if yours doesn't, it's probably your layout that's at fault, rather than the valve.

A Point To Watch

Another point to watch is the grid condenser. If it is of the "postage-stamp" type, supported in the actual wiring, then you can't improve upon things. If it is of the older type in a bakelite case, don't screw it flat down on the baseboard, particularly if the latter is metal-covered. Support it on two short ebonite insulators so that it is at least ¼ in. above the baseboard.

With regard to what is happening down there—well, there's more than I could possibly tell you about on one page.

AS SEEN IN PLAN



This is the plan view of the W. L. S. screened-grid unit referred to in last week's article.

Pittsburgh, W 8 X K, runs a transmission on 13·92 metres and although its schedule is published as "Noon to 2 p.m. daily," the station has actually been heard on the air at all sorts of other times.

Between 15 and 11 metres there are several long-distance commercial telephone stations, and between 11 and 10 metres is the amateur 10-metre band, which nowadays is fairly crammed with interesting transmissions.

North And South Americans

You don't really need to know the Morse code to log plenty of DX on the 10-metre band, although you will naturally derive far more enjoyment from it if you *do*.

From noon until about 7 p.m. the band is usually full of North Americans. Occasionally one strikes a day when they do not come through, and then the South Americans come through. I listened one afternoon recently and found what I thought was a "dead band." Within 10 minutes, however, a strongish carrier-wave had appeared, and it turned out to be the Peruvian station O A 4 B, in Lima, from whom I received excellent telephony for the next half-hour.

He was working with North Americans, who were quite inaudible here. Later on, during the same afternoon, they suddenly appeared, and I logged 34 telephony transmissions from the U.S.A., including one from a 6th district man in California.

Telephony from W 9 B H T, W 8 A G U, W 3 A U C and W 2 H F S has been heard at real loudspeaker strength on my straight two-valver. When I was working with the latter I hung the headphones on their hook and listened to every word from the other side of the room!

Just below the 10-metre band the American police cars may be heard working with the fixed control stations. The latter come in at the same strength as the high-powered broadcasting stations, although I believe they all use less than a kilowatt.

Cars Easily Understandable

The cars themselves, using 50 or 100 watts, are easily understandable when conditions are good, and you may hear "Car Z.P.427" reporting a smash-and-grab raid on 35th Street, or a case of "stolen Ford Sedan making getaway down 1st Avenue."

I have a shrewd suspicion that police broadcasts will be made in code as soon as they find the publicity that they are gaining!

In the early morning an occasional Australian may be heard on 10 metres. At the time of writing the peak occurs at about 8.45 a.m., but they come in at any time between 8 and 10 a.m. The best stations heard are V K 2 L Z, V K 4 E I and V K 3 B Q. The latter, by the way, was one of the first Australian stations ever heard in this country, 'way back in 1924.

South Africans Z S 1 H, Z T 6 K and Z U 6 P have also been heard in the mornings, and Southern Rhodesia is represented by Z E 1 J N and Z E 1 J U. Two Indian stations, V U 2 B L and V U 2 L J, have been heard, and several Japanese amateurs are active on the band, although, at present, they are very seldom heard over here.

Yes, there's plenty doing below 15 metres. Just see that you don't miss the fun.

ON THE SHORT WAVES.—*Page 2.*

WHAT READERS ARE SAYING

READERS seem to be doing an awful lot of "saying" this week, and replies must be somewhat *staccato*. Those whose letters call for more than a brief answer will have to wait, I'm afraid.

A. E. B. (Harringay) reports quite good results from a "home-brewed" set using a screened-grid detector with 24 volts on the anode and 36 on the screen! Have we gone back to the days of the "Dynatron"? When he uses a higher voltage on the anode (either from batteries or a mains unit) he can't get good results.

Use Higher Voltage on Anode

I suggest, A. E. B., that you put your higher voltage on the anode and leave it there at all costs, carefully adjusting the *screen* voltage until the set begins to behave. With certain tetrode and pentode valves I use less than 16 volts on the screen. In one case I used a 16-volt grid-bias battery and settled down with 13½ volts as the best setting.

R. L. (Wylye, Wilts.) started short waves at the beginning of last year, and has since received over 800 stations, learnt French from 40-metre amateur phone, and is getting on with his Morse. Not a bad year's work! He wants me to publish an up-to-date list of amateur prefixes, and another reader wants the "R" scale and "QSA" code. I hope to publish all these very shortly.

J. G. (Liverpool) accuses me of having put him in a quandary by describing my "hot-stuff" one-valver, using an indirectly-heated triode, just as he was going to build the "Pentode" single-valver described by Mr. D. Glover in an earlier issue! He wants to combine the best ideas out of both articles, and asks whether he can do so by using an A.C. pentode as detector.

Certainly, J. G. You can use either an H.F. or an output type. If you choose the former you'll have to play about with the screen voltage; if the latter, with the voltage on the priming-grid. In either case you will not find operation at all difficult.

Suspect the Output Choke

W. J. B. (Dublin) is rather perturbed because he removed his headphones from a four-valve short-waver he was using, intending to hitch on the loudspeaker in their place, but before he could do so he heard music apparently issuing from the blank terminals at the back of the set! I suggest that if he repeats his experiment and puts his ear to the output choke he will find the solution of the mystery!

G. E. T. (Manchester) has tried to convert an old three-valve battery set into a short-waver, without much success. He has removed half the plates from the tuning condenser. Everything in his diagram appears to be in order, but he is using an old dual-range coil about which I have sundry doubts, and I think that's where his trouble lies.

G. E. T.'s scheme has started quite an interesting train of thought. I wonder how many readers have old-fashioned battery sets that have been out of commission since they have invested in modern all-mains broadcast receivers? Many of them can be converted quite easily into passably good short-wavers.

A "V.A.C." Club Suggestion

R. D. E. (Great Gransden) tells me that he is now the Editor of the amateur section of the British S.W.L. Review (see Short-Wave News). He suggests that a "V.A.C. (Verified All Continents) Club" would be a better idea than one in which the number of *countries* heard was made to count. He also suggests that a nice certificate might be issued, perhaps with a gold seal for each complete set of six "veri's" from the six continents. Speech and music only would be allowed to count. I will talk to the Editor on the subject, R. D. E.

R. D. E. has just started up with a new converter using a heptode frequency-changer. Bearing in mind what he used to do with the old Autodyne, I imagine that things will start really to hum very shortly.

KEEN ENTHUSIASTS

Members of the Southall branch of the Anglo-American Radio and Television Society just about to elect their first Committee.

New stations mentioned by R. D. E. are Zeesen, D Z H, on 20·6 metres, Polski Radio, S P B, on 22 metres, and H I·1 A (Santo Domingo), just below 48 metres.

C. W. L. (S.E.4) mentions a priceless article in a provincial paper. It describes a two-valve short-waver with two fixed coils wound on mustard tins! These are claimed to provide "a means of producing at home something equivalent to a modern iron-cored coil." The wiring, he says, is a morass, and his friend who called his attention to the article reports "no results." Strange!

Next week I am going to make a real effort to find out "What Readers are *Wanting*," in the shape of a little ballot for the most popular type of receiver. Will those readers who are always fond of saying "please" do a little thinking during the week, so that they can be reasonably sure, when they look at this page, of what they want?

I am hoping to give constructional details of several different types of sets in a rather unusual way, with the minimum of "talk" about them; but first of all I *must* know what you really prefer.

SHORT-WAVE NEWS

MR. F. A. BEANE, of Ridgewell, Essex, asks me to mention the "British Short-Wave League," which is a matter that is in the air at the moment. The formation of an organisation with this title is being considered by several enthusiastic short-wave listeners, with the object of providing means whereby one listener can share with others his "DX" activities and tuning tips.

Society Activities

A booklet, called the "British S.W.L. Review," will be produced at intervals to circulate news collected by the various members. Will anyone who is at all interested please write to: "British Short-Wave League, Ridgewell, Essex?"

The Tottenham Short-Wave Club, after some months of inactivity, has now started up again, and the secretary, Mr. L. Woodhouse, of 57, Pembury Road, Tottenham, asks me to make the news public. Arrangements have been made for a full season and new members will be welcomed.

A short-wave society has been formed in Cardiff, under the title of "The Cardiff Transmitters' Society." Members, however, need not be holders of transmitting licences, and plenty of receiving work will be done. Meetings will be held at Barry's Hotel, Cardiff, on Thursdays, at 8 p.m., and the secretary is Mr. H. H. Phillips, 132, Clare Road, Cardiff.

So much for the social side of things. As far as reception is concerned, there is not much to report beyond a general maintenance of good conditions, particularly on the 19-, 25- and 31-metre bands. The latter has been especially good, with W 2 X A F coming over at "local station" strength night after night.

Readers have called my attention to the fact that many short-wave stations do not adhere in the slightest degree to their published schedules of transmissions. W 2 X A D, for instance, is listed as "daily, 7.30 to 8.30 p.m.," with somewhat longer hours on Sundays. I often hear him on weekdays between 4.30 and 6.30 p.m.

A Good Transmission

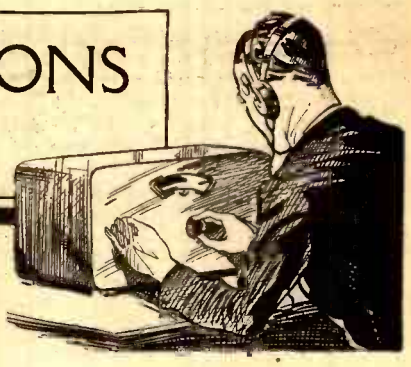
W 3 X A L, on 16·87 metres, is an amazingly good transmission when conditions for the shorter waves really *are* good. On days when the 10-metre band is "live," this station probably beats even W 2 X A F for strength and reliability. Perhaps we shall see more use made of the 16-metre band during the next year or so, when propagation is likely to be specially good down there.

The elusive V P D at Suva, Fiji, is being heard again in the early mornings. His wavelength is 22·94 metres, and he transmits from 5.30 to 6.30 a.m.

W.L.S.

RANDOM RADIO REFLECTIONS

By VICTOR KING



The meditations of our nimble-minded contributor this week dodge about from interference and superhets to ghost photography, and back again to interference. And he gives another instance of the skill of Professor Varrinace for dropping "bricks"

ELECTRICAL INTERFERENCE

THESE modern and very sensitive mains superhet sets are the very dickens for picking up electrical interference. I've just been trying to do something with one that has recently been installed by one of my less indigent relations.

I should think the darned thing opens up its detector grid to every static, stray atmospheric, or other electrical disturbance, natural and man-made, within a hundred miles or more. There really isn't anything that can be done about it in so far as the general condition is concerned.

I may be speaking off my beat, but it is my view that no mains super is really complete without a highly selective "front door." Preferably this should comprise an H.F. stage *and* bandpassing. That, however, means a more expensive specification. But it means much greater freedom from extraneous noises, and I reckon that's worth paying for.

I can't stand a set that hums and crackles. I'd rather not have one at all. I like my hum level to be down to almost inaudibility, when the set is going all out during a programme pause and you've your ear right against the loudspeaker.

This is easily possible under almost any conditions providing there is plenty of smoothing in the set (that costs money, too). But, of course, there is a limit to what can be done in the way of suppressing electrical interference.

But even so, with the right design of set, suppressors on the mains and with one of those screened aerial leads, etc., the crackle level can be lowered even if in the worst cases it cannot be entirely washed out.

* * *

AN AMAZING PHOTO

I WAS turning out a lot of old papers the other day when, from a mass of dusty notebooks and what-not a piece of photographic printing paper fell out. Once there was a picture on it, but now it is brown all over as it had never been fixed. But there's a story attached to it.

Some five years or more ago an acquaintance suddenly sprang a stunt on me. I was at his house and he produced a quite ordinary camera and asked me to pop round to the chemist's and buy some plates and some printing paper. This I did, and after obeying his request to examine the camera and its accessories I loaded a plate into a dark slide.

He then took a photo of me or tried to, for when we developed the plate there was nothing on it at all. However, he asked me to place this blank plate in a printing frame (quite an ordinary one) together with a piece of printing paper, which I was to take out of the packet I had purchased, and which had never left my hands. I was then to expose the plate and paper to the sun, which was brightly shining through the open window.

He went out of the room while I did all this, and I can tell you I rather thought I was humouring someone who had had a drop too much of the sun himself!

After the printing frame had been exposed for about five minutes he popped into the room again and asked me to open it and examine the paper. I did. As I expected, there was nothing on it. The dark, blank plate had successfully shielded the rays of the sun from the sensitised surface. He's "nuts," I thought.

"Try once again," he smiled, and left the room. Well, it didn't cost anything (I'd used his money to buy the plates and paper), and so I closed the frame and again laid it on the window ledge. But it hadn't been there thirty seconds before he was back again.

"Open it," he said. I did. And this time, to my intense astonishment, there was a somewhat smudgy face clearly printed on the hitherto white paper!

And the frame with the still blank plate and the paper had never been out of my sight! Five minutes of exposure—nothing. Another go of less than thirty seconds—a face! Shades of Pepper's Ghost; what had we here! Spectres in broad daylight!

"Do you believe in ghosts?" asked my acquaintance.

"How did you do it on me like that?" I came back at him.

And this is what he told me. The wooden back of the printing frame was of ply-wood, and carefully sandwiched in between its layers was a thin metal stencil of a face. In the next room he had a powerful short-wave transmitter. When this was set going current was induced in the metal stencil, and that caused "brush" radiations to be set up from it which affected the sensitised surface of the photographic printing paper.

We had to part then, for he had an appointment with a dentist. He promised on some future occasion to demonstrate the effect with an unconcealed stencil. But our ways divided for some reason or other and we never met again.

One of these days I must try that stunt myself—but I said that years ago, and I've still to prove whether——

ONE OF RADIO'S ENEMIES

Victor King is not fond of this sort of thing, judging from his remarks about interference. And a lightning flash such as this can create radio static over hundreds of miles for users of sensitive sets.

A SLIGHT MISTAKE

THE following extract from "All You Should Know About Radio," by our old friend Professor Varriance, contains at least one mistake. Can you spot it? If not, turn to page 730.

"When very large or very small electrical potentials are being dealt with, it is convenient to use other terms rather than to employ fractional subdivisions or long strings of numbers. Therefore, Kilovolt is used to denote one thousand volts, and Millivolt a millionth of a volt. A similar practice is applied to all the other electrical units. Thus we have Microhm for a thousandth part of an Ohm, and Megacycle to denote a thousand cycles, and so on."

* * *

DOES STEAM CAUSE CRACKLING?

A FEW weeks ago I asked readers to help me in connection with the question of interference from steam discharges. Whether, in fact, as I believed had been maintained, the blowing off of steam from railway locos, by creating static charges, could cause crackling to occur in near-at-hand radio sets.

Well, I have had a letter from Mr. H. D. Wilson, who lives in Battle Bridge Road, Paddington, in which he kindly volunteers information on the subject. As you will observe, he is placed in a particularly good spot for making observations and, for all practical purposes, it would seem that his experiences conclusively prove that there is nothing in this steam-crackle business at all.

However, it may happen that other readers will yet add a postscript to the matter. In the meantime, thank you very much, Mr. Wilson. This is what he says:

(*Continued on page* 728.)

ABOUT THESE PROGRAMMES

Higham Burlac has some trenchant observations to make concerning our radio entertainment

SOME time ago the B.B.C. fee'd a dustman, scavenger, or garbage-collector to tell six millions or more of us what he had from time to time found in his dustbins. Vastly edifying! Since then the B.B.C., pursuing their researches into the Foundations of Fortunes, made available the spoken word of a fag-end hunter and a dustbin-delver. And for this the pioneer inventors drank the midnight beer! For this Marconi was born!

"Dust and Garbage"

Without a shadow of doubt there is some gentleman at Broadcasting House who would expound, in a self-satisfied style, the theory of Dust and Garbage and why the nation ought to hear these submerged industrialists describing, "more in Southwark than in anger," their greatest *coups*. Nevertheless, could he but detach himself from his official *ego*, which knows that the B.B.C. are never wrong, he might feel that such items are not in the best of taste, and, which is worse, are footling to the *n*th degree. (*Next week: "The Night Life of the Sewers." A carbolic drama of pulsating putrefaction.*)

The Commodore Grand Orchestra is an unfailing success. Its playing is a tonic, and although I cannot judge its performance from the music-master's standpoint, I will admit that it reminds me, by its vitality and self-confident execution, of the Berlin State Orchestra. Long may it keep the B.B.C.'s favour.

Surprise Item: *Salut d'Amour*, played by Mister Higgins on his home-made triangle, which he has been playing for eighty years, as his father before him.

"Most interesting, Mr. Higgins. I suppose that you have performed before some interesting people."

"Yes—(*loses his place in the script written, O.K.'d, revised, censored, photostatted and notarially attested by the B.B.C.*) —er hum—I 'ave—er—*have* perr-formed before 'Arris the Sossidge King, General Tom Fum, General Boone, and . . . ."

"Could you give us a performance now, Mr. Higgins?" (*In a plain van, Mr. Higgins?*)

"Certingly! I'll play Mr. Beet-oven's fif symphony." (*Faded out in favour of Lizzie Jergles, who has been shaving gooseberries for eighty years.*)

This item is followed by a talk entitled, "Four-dimensional differentials, with *q* as an operating (counter-clockwise) factor." Hurrah for uplift!

Those Film Producers

So much for satire—for the time being. Now for a little thanksgiving exercise. As you and I know to our cost, film producers do the most unconscionable things to the plots and casts of stories, at the alleged dictates of the box-office. I saw a slushy love-interest introduced into the film of that very confirmed bachelor book, "The First Men in the Moon." Kipling's "The Light That Failed" was ruined for me by the extraneous love-interest which was smuggled into the film, plus the American notion of what British Army topees look like.

These perdoocers are capable of introducing a couple of performing seals into a

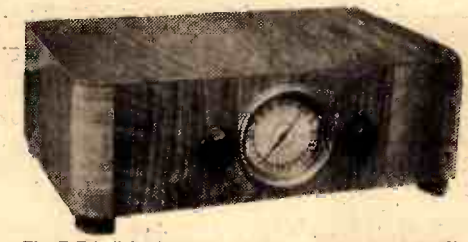
(*Continued on page* 729.)

"POPULAR WIRELESS" COMPETITION No. 5

A SHORT-WAVE SUPERHET CONVERTER

—the B.T.S. wavelength-calibrated "Adaband"—

TO BE GIVEN FREE FOR THE BEST "SIGNATURE SONG" TITLE



The B.T.S. "Adaband" unit, seen above, will immediately transform any broadcast set into a short-wave superhet, covering wavelengths of 13 to 75 metres in two steps. The wavechange switch not only controls the waveband on which you want to listen, but also transfers the aerial to the short-wave converter or to the broadcast set according to whether you require short-wave or broadcast programmes. The design of the "Adaband" is such that the broadcast receiver can be placed on top of it to form a compact and convenient all-wave outfit.

Don't miss this! It is the fifth of our new Novelty Competitions, and a really snappy idea. We all know the "signature numbers" used by the various dance bands—Henry Hall's famous "Here's to the Next Time," Ambrose's "When Day is Done," and so on. Well, what you have to do here is to take a well-known name, either a radio personality (but not one using a "signature" tune already!) a film star, or some public figure, if you like—**then think of a "signature song" title for that person.**

Remember, that it must be a **real** song title, and should, of course, be as apt as possible. Here's a sample one: "MR. BALDWIN—Smoke Rings." It's as easy as that!

It does not matter about the words of the song itself, as long as the title fits, and efforts can be either humorous or serious.

Below we give a few suggestions for names, and also some other sample efforts to guide you.

Have a shot at this amusing contest. There is **nothing to pay,** while the prize is one that will be of the utmost value to any listener, enabling him to convert his ordinary receiver into a loud-speaker short-wave set by the simple turn of a switch.

Having thought of a name and title, write them in the proper spaces of the Free Entry Form here. Then complete it with your name and address, and post it promptly to:

"POPULAR WIRELESS" SIGNATURES,
1, Tallis House,
John Carpenter Street, London, E.C.4 (Comp.).

The Closing Date is SATURDAY, March 7th, 1936.

The Prize of a **B.T.S. "ADABAND" CONVERTER** will be awarded to the reader whose entry is the most apt and effective received, and the Editor's decision will be final. Any number of entries may be made, but each must be written IN INK on a separate form as provided here.

No responsibility taken for loss or delay in the post or otherwise. No one connected in any way with POPULAR WIRELESS or its proprietors may compete.

SOME EXAMPLES TO HELP YOU:

Do not actually use any of these efforts, of course—they are simply samples to show you how it's done. But you can use the titles against different names, if you wish.

SYDNEY KYTE	**"High and Dry."**
HARRY TATE	**"Sugar Foot Stomp."**
MR. CHURCHILL	**"Put On Your Old Grey Bonnet."**
NELSON ELMS	**"Trees."**
FRED HARTLEY	**"Clarinet Marmalade."**
NEVILLE CHAMBERLAIN ..	**"You've Got Me in the Palm of Your Hand."**

Here, too, are some well-known names from which you may like to choose. Other famous people may be used instead if you wish. Or any of the names in the examples above. The whole thing is to choose **any name,** and give it a "signature" title!

Greta Garbo; Norma Shearer; Mr. Lansbury; Henry Hall; Stainless Stephen; Ronald Colman; Gracie Fields; Sir John Reith; Mr. Baldwin; John Watt; Leonard Henry; Sir Thomas Beecham; Mr. Maxton; Harry Lauder; Mabel Constanduros; Mussolini.

"P.W." SIGNATURE SONGS

Name Chosen.....

Title of Song .....

.....

I agree to accept the Editor's decision as final and binding.

NAME .....

ADDRESS .....

.....

If I win the prize I should like a BATTERY/MAINS model of the "ADABAND" (strike out type not applicable).

"P.W." CIRCUIT SPOTLIGHT

No. 5

THE PYE "EMPIRE" ALL-WAVE RECEIVER

By K. D. ROGERS

THE circuit of the special Pye all-wave console receiver is the largest that we have considered so far in this series. It has ten valves, including the rectifier, and incorporates ten tuned stages.

The first valve is the usual H.F. amplifier, a most important feature, not only on medium and long, but on short waves, for a high degree of selectivity is essential on the short waves.

The aerial is inductively coupled to the grid of this valve on the long, short, and what is termed the ultra-short (13 to 33 metres) wavebands. On the medium waves the aerial is taken to a tap on the coil L6. In series with the aerial in a wavetrap circuit tuned to a frequency of 465 kc. (the frequency of the intermediate amplifier) in order to eliminate any interference from the shipping bands and from any other signals that may obtrude on the wavelength region of 645 metres.

The coupling of the H.F. valve to the octode mixer V2 is carried out in this way. On the long and medium wavebands the anode coil L16 is inductively coupled to the tuned grid long-wave coil L17, and the tuned medium-wave coil L15. On the ultra and "ordinary" short waves the anode coils L9 and L12 are coupled inductively to the corresponding tuned grid coils L11 and L14, and also by means of the windings L10 and L13 respectively. The latter windings are used to provide a level sensitivity characteristic providing additional coupling at the higher frequency end of the bands.

A Balanced Circuit

Passing on to the octode frequency changer, we find that a new balanced circuit suitable specially for short waves is employed. This is designed to give maximum sensitivity over all the wavebands covered. Just look at the circuit. You will see that there is a special coupling arrangement for coupling in the cathode circuit as well as allowing the valve to operate in the normal way as an electronic mixer. The cathode injection method is arranged to come into action as additional coupling when the set is used on the ultra-short waves, the coil L20 then greatly assisting the oscillator-mixer coupling.

Padding condensers are used on all wavebands except the ultra-shorts on which band the coils are arranged to give accurate tracking. Two-tuned-circuit air-cored transformers are used for the intermediate frequency couplings between V2 and V3, and between V3 and V4, and between V4 and V6. The coupling between the primary and secondary windings of the first two I.F. transformers is variable mechanically so that variable selectivity is available. As stated before, the frequency to which the intermediates are tuned is 465 kc.

The I.F. amplifiers are of the multi-mu pentode type, and A.V.C. is applied to all the first three valves of the set, as we shall see.

After the intermediate valve V3 the circuit becomes quite unusual. There is a double-diode V5, but this valve is used solely for the provision of A.V.C., the two diodes being employed to provide different A.V.C. feeds to the first three valves of the set. The diodes are coupled to the anode circuit of the second I.F. valve, V4, and they are loaded by the resistances R26 and R46 in the case of one, and by R28 in the case of the other. The first diode provides the A.V.C. for the two H.F. valves, V1 and V3, and the other diode applies bias to the octode frequency changer V2.

The reason why two diodes are used, giving the valve V2 a separate A.V.C. supply, is to isolate the bias of this valve from that of the amplifying valves. Normally, if common A.V.C. were applied to the three valves any change in the characteristic of V2 would be inclined to upset the bias of V1 and V3. Thus when grid current flows in V2 this would reduce not only its own negative bias but also the bias of V1 and V3, thereby reducing the sensitivity of the set. As the bias control is arranged in the Pye receiver the fluctuations of bias in the grid of V2 have no effect on that applied to V1 and V3.

The Tuning Indicator

As we have been dealing with the A.V.C. it is only right here to consider the tuning indicator. This owes its variation in brilliance to the A.V.C., for when a strong signal is received the A.V.C. bias is increased on the grids of V2 and V3, as we have seen, and the anode currents of those valves drop.

That anode current flows through one winding of a special L.F. choke system which has a core common between three windings. The strength of the magnetic field of that core is dependent on the strength of the anode currents of V2 and V3. Thus when the currents drop the magnetisation also drops. This has the result of increasing the impedance of the choke windings L28 and L30.

These, it will be seen, are in parallel with one another, but in series with the supply of current for illuminating the light, which is an ordinary 2-volt, 1-amp. flashlight bulb run from the A.C. low-tension supply.

When no signals are tuned in the lamp is at its brightest. When the stations are powerfully received the lamp either goes out or is lit very dimly, and intermediate strengths of stations have proportionate results. So the degree of tuning obviously has the same effect, and the nearer the set to the correct tuning point on any station the dimmer the lamp glows.

This is because the chokes affect the A.C. current flowing through the lamp. When the impedance of the chokes increases, the amount of current flowing decreases and the lamp becomes less bright; and when the impedance of the chokes decreases, more current flows through the lamp. Thus it is easily understood how the signal strength affects the degree of brilliance of the tuning indicator lamp.

The second detector is an H.F. pentode operating as a diode, while a negative bias is applied so that the valve will not rectify until the suppressing or muting bias is removed. The muting bias is variable manually so that the operation of the valve V6 is controllable, and it can be rendered insensitive to any station below a fixed predetermined strength.

Avoiding Sideband Screech

The bias is obtained from the potentiometer R40, which is in the common H.T. return to the receiver. When the set is accurately tuned to a station the muting bias is removed by means of a specially arranged compensating circuit, so designed that sideband screech is avoided. The final I.F. transformer L33, L44, has an extra secondary winding L35. This feeds into a very selective transformer circuit L36, L37, tuned to the intermediate frequency. A W6 Westector effects rectification, causing a direct current to flow in the circuit L37, W6, R29; and across this resistance R29 a potential is developed. This potential is arranged to be in opposition to the muting bias of V6 and is applied to the grid of that valve.

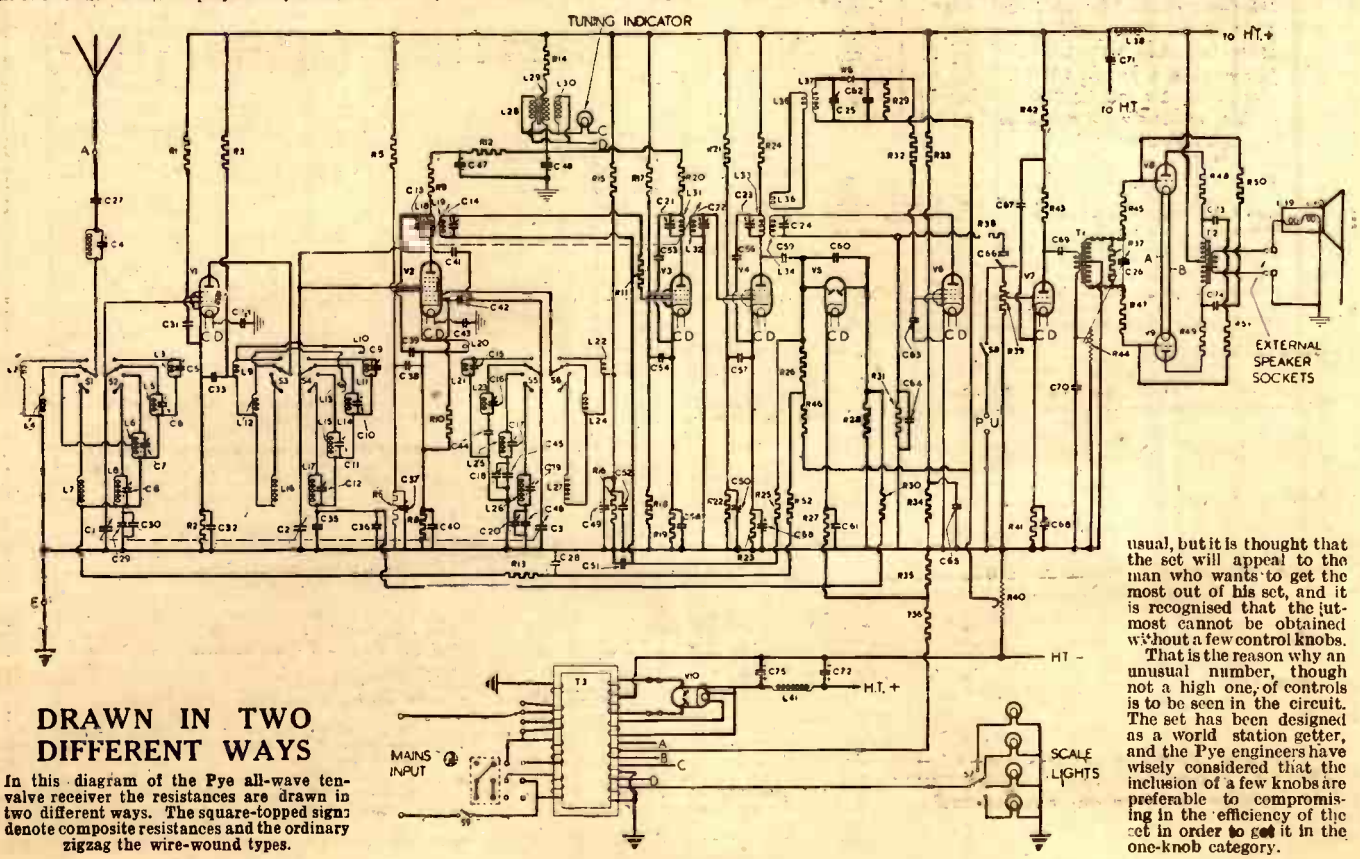
The rest of the circuit is more normal. Resistance-capacity coupling is used between V6 and the first L.F. valve V7, and this valve is fed through a parallel-fed push-pull transformer to the output triodes V8 and V9.

A tone control circuit is used in conjunction with this push-pull transformer, comprised of the variable condenser C26 and the variable resistance R44. Adjustment of this control progressively attenuates the low notes when the control is moved in one direction, while rotation in the other attenuates the high notes.

In the midway position the condenser C26 is at minimum capacity and R44 at minimum resistance. Rotating the control clockwise increases the capacity of the condenser, thus decreasing the high note reproduction. The resistance remains at minimum. Rotating from the midway point in an anti-clockwise direction increases the value of the resistance, so decreasing the total effective capacity of the coupling condensers C69, C70 and consequently decreasing the bass response. The capacity of the variable condenser C26 remains at minimum.

The Pye receiver has been specially designed with a view to suitability in the tropics, for it incorporates special condensers, and all vulnerable parts have been suitably treated. There are more controls on it than usual, but it is thought that the set will appeal to the man who wants to get the most out of his set, and it is recognised that the utmost cannot be obtained without a few control knobs.

That is the reason why an unusual number, though not a high one, of controls is to be seen in the circuit. The set has been designed as a world station getter, and the Pye engineers have wisely considered that the inclusion of a few knobs are preferable to compromising in the efficiency of the set in order to get it in the one-knob category.



DRAWN IN TWO DIFFERENT WAYS

In this diagram of the Pye all-wave ten-valve receiver the resistances are drawn in two different ways. The square-topped signs denote composite resistances and the ordinary zigzag the wire-wound types.

FROM OUR READERS

My Surprise Visit From FRANKIE WILSON

A reader describes how he came to meet the ex-trumpeter of Henry Hall's dance band in unexpected circumstances

—o—

Dear Sir,—Being keenly interested in dance music, I had purchased a journal devoted to its interests for some years, and when I fell out of work advertised back numbers for sale.

A knock came at the door one evening, revealing a gentleman in answer to the advertisement.

"My name is the same as yours," he said. "Frank Wilson." And knowing various band personalities, I was amazed when he admitted to being Henry Hall's "ace" trumpeter.

The ensuing visit to the B.B.C. to hear and see a broadcast of the band was only second in excitement to the arrangements made with "Frankie" over a humble cup of tea.—Yours faithfully, F. W. WILSON.

18, Hermitage St., Paddington, W.2.

ABOUT THOSE DANCE BANDS

Dear Sir,—I would like to take advantage of your excellent paper to answer your correspondent, T. E. Preston, on the subject of "Are our dance bands right?"

He commences by saying "Dance bands should stick to their own game"; by this I suppose he means stick to their own type of music. Well, don't they? If not, what is their own type of music? If it is not the type of music they are playing now, what should they be playing? And what determines the type they should play? Perhaps T. E. Preston meant, not "Why don't dance bands stick to their own type of music?" but "Why don't dance bands stick to the type of music he likes?"

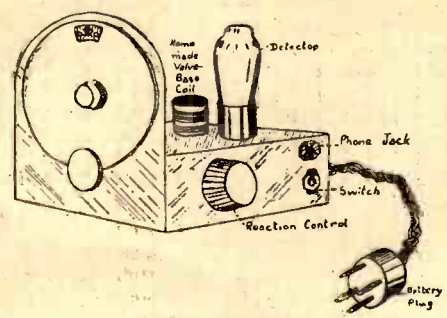
Then he refers to "modern arrangements of old-time favourites," and says "They," meaning the dance bands, "mutilate the original tune until it is completely submerged in a horrible din." He then kindly explains the reason for this "horrible din." It is "caused," he says, "by each player trying to outdo the other in a display of fantastic noises." Now isn't that a little too ridiculous? T. E. Preston must have very little knowledge of dance music and a very good imagination if that is his idea of dance bands, which it must be unless he admits it is just nonsense and a string of idle words.

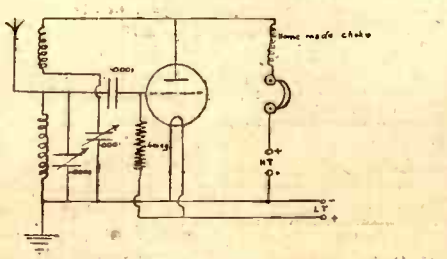
The next sentence I can hardly understand. He says, "The very fact that they keep on doing this sort of thing proves that they are at a loss to know how to find pleasing melodies." Does he mean there is a shortage of "pleasing melodies"? Of course, that all depends upon what he terms pleasing melodies, but I am sure dance bands are not forced to play arrangements of "old-time favourites" through a shortage of them. Now the question arises: Do they play a lot of these arrangements? Well, I listen to every dance band I can, on records, radio, and stage, and I have not found so yet.

If T. E. Preston has a radiogram I advise him to use it for both records and radio and conduct a survey of high-class dance bands. The same applies to anyone who shares his views of this type of music, and I am sure their attitude towards it would alter.—Yours faithfully, W. BREWIN.

13, Ing Rd., Leeds, 9.

IT BRINGS 'EM IN!





A sketch and circuit diagram, sent in by Mr. R. Wright, of his single-valve short-waver.

ANOTHER OPINION

Dear Sir,—I do not agree with George Styles (too much vocalism). My opinion is every man to his own job, and Henry Hall and the B.B.C. Dance Orchestra know their work and do it well; also, if there is room for improvement Henry Hall will attend to same, owing to having the ability and interest in his work. I like the tune being sung, and enjoy the words, which are interesting and make a real change from the musical side.—JAMES HOUSTOUN.

89, Kilbowie Road, Clydebank, Dumbartonshire.

FOREIGN SINGERS ON THE RADIO

Dear Sir,—I enjoyed the letter headed "Crooners Not Wanted," but there are worse offenders at times. What about the French singers so often featured in the variety programmes, who sing in broken English? There is neither music in their songs nor attractiveness. Why not keep to their own language or, better still, be left out of the programmes, and a really good turn, for a change, put in their place.—W. L. ASHBY.

41, Dads Lane, Kings Heath, Birmingham 13.

Each week a prize of one guinea is awarded to the reader who, in the opinion of the Editor, sends in the best letter on any radio topic. Why not have a try for it? Send in your letter and you may—

WIN A GUINEA

Every reader must have something to relate which would interest others—some reception experience, a novel idea, an opinion about programmes, and so on. Try your luck. The winner of the guinea this week is Mr. W. Brewin.

A SUGGESTION

I consider your French lessons are most efficient. I have a Linguaphone Set, but your system is so practical that I feel sure it should go a long way to please the public. May I suggest you follow out the same method for Spanish, which I feel sure is a coming language.—F. T. BRILL. 39, Windsor Road, Wanstead, E.11.

SUCCESSFUL ONE-VALVERS

Dear Sir,—I have been an interested reader of "P.W." ever since I started it, which was about two years ago.

On reading Mr. Lancefield's account in "From Our Readers," I felt sure that the performance of my set (details given below) was at least equal to, if not better than, that of Mr. Lancefield's.

I am only 16 years old, and last Easter holidays, on May 1st, 1935, I received on my one-valver, which I constructed myself, eight American stations: W Q V, strength R6; South America, P R B A, R7; Pittsburg, W 8 X K (25 m.), R4; Pittsburg, W 8 X K (19 m.), R4; Bound Brook (N.J.), W 3 X A L, R4; Schenectady, W 2 X A F, R6; Chicago (III), W 8 X A L, R4; Boston, W 1 X A L, R2.

The set was a conventional short-wave one-valver.

—R. WRIGHT. St. Aaron's, Caerleon, Mon.

Mr. Lancefield's results were obtained on the medium waveband.—Ed.

FROM A JUNIOR READER

Dear Sir,—Waking up one night last week at about 4 a.m. I switched on the one-valver which I keep beside my bed and, tuning carefully, came across some dance music on about 260 metres. I thought at first that it must be one of the early German transmissions, but I could not imagine any German station so degrading itself as to broadcast "hot" jazz at four o'clock in the morning! My suspicions were justified, for shortly afterwards I heard an announcer with a strong American accent say something about the National Broadcasting Company of America, and I discovered that I had been listening to W H A M, Cleveland (260·7 metres). Encouraged by this, I tried farther up the dial, and succeeded in logging W B Z, Boston (302·8 metres). By this time it was about 4.30 and the Americans were beginning to fade out.

The receiver is a standard 0-v-0. Reception on phones with outdoor aerial. I am fourteen years old, and built the one-valver myself.—C. R. WILLIAMS. "Wessington," Cranford Ave., Weymouth.

FROM A WOMAN READER

Dear Sir,—My husband, week by week, dotes on your formal "technical stuff," while I thoroughly enjoy your informal radio chats and articles in the lighter vein. In our mutual interest in readers' letters we meet on common ground, and as you may well imagine some lively arguments ensue!

What of our much-maligned dance-bands of to-day? Their supporters certainly seem in the minority in print—although I am convinced that the majority of listeners are for them; and what active abuse the stronger sex generally hurls at them!

Mr. Preston, of Birmingham, for instance, in his letter of February 8th, veritably reaches boiling-point himself in his indignation at the "rubbish called hot music," which he fervently hopes will soon reach white heat and so inevitably burn itself out.

For my own part, I find that dance-band programmes constantly relieve the tedium of domestic duties. These programmes are, on the whole, amusing and entertaining, and the arrangement of some numbers positively ingenious!

In conclusion, I would add that, next to their exacting critics, our dance-band players are the most hard-working members of the community.—(Mrs.) DOROTHY M. HICKINBOTTOM.

73, Woodcote Road, Erdington, Birmingham.

THOSE "FAT STOCK" PRICES

Dear Sir,—May I begin my epic by grumbling at your excellent little journal!

We *all* like it at our house, and look forward to the day of the week which is POPULAR WIRELESS day, but do you think you could possibly add a little page of games and competitions for the kiddies?

Now to get down to that everlasting grouse—the programmes.

Why, oh why, must we listen to "fat stock" and "racing" every night?

There are dozens of other things more important than these in our country which are never mentioned.

Racing, which encourages gambling, especially among those who can ill-afford it, is mentioned many evenings, but films—a subject which is educational, entertaining and enormously popular—is mentioned once a fortnight.

It is laughable if it were not tragic.—SHIRLEY CARTWRIGHT.

124, Barnsley Road, Hemsworth, Nr. Pontefract.

HENRY HALL'S HOUR is really . . .

Here is Henry, in evening dress this time, at the microphone with Will Hay.

A FORTNIGHT . . . of Work

says Kenneth Baily, in this breezy and descriptive article, picturing behind-the-microphone scenes at Broadcasting House

CLAD in a comfortable-looking tweed suit, sporty pullover, and in his shirt sleeves, Henry Hall rushes into his studio.

Pandemonium greets him. The "boys" of the B.B.C. Dance Orchestra are tuning up. Violins moan, saxophones howl, the drummer trips up over his xylophone. One sits casually on the piano, another is arranging his coat carefully on a coat-hanger. Most are in their shirt sleeves. They are shouting to each other, laughing.

A red light on the studio wall begins popping in and out with great agitation.

Immediately the clamour stops. In a flash that red light has swept orderliness over the room; the boys sit in their places, instruments ready, silent. Henry Hall stands with baton raised.

The red light stops popping, glares steadily, and three things happen at once:

The hands of the studio clock jerk to eleven precisely; Henry Hall's baton cuts the air and music fills the studio; and in millions of homes the loudspeakers say: "Henry Hall's Hour!"

So, every other Saturday night, begins one of the B.B.C.'s most popular programmes—as far as the listener is concerned it begins then.

Two Weeks of Preparation

Actually, it began only a day after the last "Hour" ended, a fortnight before!

"Two weeks' work = 60 minutes."

That is the formula which brings you "Henry Hall's Hour."

Or, as Henry Hall himself put it to me: "On the Monday after my 'Hour' I plan out the programme for my next 'Hour,' a fortnight hence."

With his legs swinging, he sat on a table in the middle of the dance orchestra's studio in the B.B.C. building at Maida Vale, and amazed me with the story of the preparation behind these programmes.

"Much of my time on those Mondays is spent devising the novelty for the 'Hour,'" he said. "You'll have noticed that we have a novel 'production number' of music and words, lasting ten minutes in each programme. This has got to be decided first, because each fortnight it is something entirely new. It has to be *created*. Music has to be arranged and often composed for it. Consequently, somebody has got to go 'all out' to get it ready for rehearsing a few days before the 'Hour.'"

The somebodies who go "all out" are Henry Hall's arrangers. A gallant team of very clever young men whose names you rarely hear and whose photographs never appear in the newspapers.

They are Ronny Munroe, Ray Sonin, Phillip Cardew, and Benny Frankel.

Fixing the New Numbers

"On the Tuesday I go into conference with my arrangers," continued Henry Hall. "I tell them my idea for the novelty. We talk, and as we talk it becomes evident which of them will tackle the arranging and composing of the music for it. Sometimes two of them collaborate. But my idea is bound to be the *forte* of one or other of them. It will appeal particularly to him and he will do it. The others then do special arrangements and orchestrations of dance tunes, song hits, and popular ballads for the 'Hour.'"

Nobody is more willing than Henry Hall himself to acknowledge the hard work which these men put in towards making the "Hour" a success, fortnight by fortnight.

"Let me impress upon you that it *is* hard work!" he said, leaning forward and thrusting his baton between my fourth and fifth ribs to get the point home! "In my orchestra there are seventeen players; the Glee Club which I use for the 'Hours' numbers twenty. Therefore, I want thirty-seven copies of each special arrangement and orchestration which we shall play during that hour. And *all* the stuff is specially arranged. Much of it, too, you must understand, has to be arranged to suit individual members of the band, so that of the seventeen there are probably fourteen different arrangements of each piece. That is the job before the arrangers every other Tuesday.

"These men are all clever musicians. They have had a thorough musical training, know the classics, and often compose not only new light music but classical music as well. They are not on the B.B.C. staff. You could call them 'free-lances.' Besides their own composition they do work for film companies, stage shows, and other bands."

Some of the orchestrations in "Henry Hall's Hour," and to a greater degree in his day-by-day programmes, are by members of the dance orchestra.

Bert Read, his pianist, does many; Burton Gillis, Henry Hall's right-hand man, who conducts the orchestra in his absence, does some; and others are done by Andy Hodgkiss, Teddy Wise, and George Dickinson.

"The boys in the band can orchestrate for an individual," Henry Hall explained. "They know the styles of members of the band, and can provide orchestrations to suit them. I am very grateful to them for the hard work they put in often unknown to the public."

But "Henry Hall's Hour" is not just an affair of music. It is a *business* on its own.

George Hodges, Henry Hall's manager, is the man who does the business. Small, pale, dark-haired, he it is whom you hear announcing the numbers played by the dance orchestra. Henry Hall only announces the beginning and end of his programmes.

Engaging the Artists

During the fortnight between each "Hour" Hodges supervises three secretaries, who sort the mail which the last "Hour" brought in. They need three! From these hundreds of listeners' appreciations and criticisms he can guide Henry Hall as to what the people like in the programme.

He has to engage each member of the Glee Club separately. The Club is not a professional unit on its own, singers being recruited afresh for it every fortnight. He does the negotiating for any famous star who may appear in the "Hour." All sorts of difficulties arise. The star may be at the other end of the country, or stage or screen engagements may not allow him to broadcast. It has not been unknown for

(*Continued on page* 731.)

RADIO MYSTERY CIPHERS

By Louis C. S. Mansfield

HERE IS ANOTHER OF OUR SPECIAL "P.W." CIPHER PUZZLES. TRY YOUR HAND AT IT AND SEE IF YOU CAN WIN THE TEN-SHILLINGS PRIZE

IT often happens that the writer of a cipher message attempts to foil the efforts of the cryptanalyst by carefully excluding words containing the letter E and also such common words as THE, AND, etc.

When discussing this subject a fortnight ago (see POPULAR WIRELESS issue of Feb. 15th), we pointed out that though this state of affairs may be manifest it is an extremely hard matter to suppress BIGRAMS or combinations of two letters without destroying the sense of the whole message.

You Will Need This Frequency List

(The following is the order of the frequency with which the commonest letters and words generally occur.)

COMMONEST letters: E, T, A, O, N, I, R, S.

INITIAL letters: T, A, O, M, H, W, C.

FINAL letters: E, S, D, N, T, R, Y.

Two-letter words: OF, TO, IN, IT, IS, BY, BE.

Three-letter words: THE, AND, FOR, ARE, BUT.

Other words: THAT, WITH, HAVE, FROM, THESE, THOSE, THERE.

(The above Frequency List represents the average of actual counting of tens of thousands of words and sentences. The order is, however, not to be regarded as absolutely rigid, for it is liable to vary according to the text being dealt with.)

The commonest bigram in English is TH, closely followed by HE. AN, ER, ON, and RE come next in the frequency list.

The identification of these two-letter combinations is of material assistance, not only in cases where the frequency of ordinary letters has been suppressed, but also in cases where the writer has strung all his words together into one long line, or where he has broken up his message into groups of, say, five letters.

When attempting to identify the commonly occurring bigrams the work must be proceeded with methodically. It is no good to just glance over the cryptogram and then to select one combination here and another one there.

Such a method, apart from being very slip-shod, is apt to lead us into error.

Suppose we are dealing with a cipher of which the following groups are the commencement: HGFIH BDI YRSK. . . .

We consider the first two letters as the first bigram and then pass through the message letter for letter combining each symbol with the one which occurs immediately in front of it and also with the one immediately after it. When we come to the end of one word and the beginning of the next we consider the final symbol of the first word and the initial symbol of the next as forming one bigram. This we do, also, with the ends and beginnings of lines. The reason for this will be explained later.

In the above example the bigrams would be: HG, GF, FI, IH, HB, BD, DI, IY, YR, SK, etc.

In this way we proceed throughout the complete message, noting the number of times each combination occurs. This method of procedure ensures that our bigram count is absolutely accurate.

The reason for considering the last symbol of one group and the initial one of the next as forming one bigram is to prevent our being thrown off the track if the writer has made use of some strange method of grouping in order to throw us astray and also on account of the fact that many words ending in T are often followed by words beginning with H.

Phrases such as THAT HAVE, BUT HIS, etc., illustrate this well.

SOLUTION TO LAST WEEK'S PROBLEM—CIPHER No. 3

SECRET TESTS ARE TO BE CARRIED OUT NEXT THURSDAY WITH THE NEW WIRELESS CONTROLLED FLYING BOMB. OUR AGENT WILL BE PRESENT AND WILL SEND FULL REPORTS.

"P.W." CIPHER No. 4

The peoples of the earth, feeling concerned at the terrific slaughter of lives caused by the methods of modern warfare, have met in solemn conclave to consider ways and means of ensuring that warfare shall become a lost art.

The following is a copy of a radio-telegram sent to his government by the representative of one of the nations concerned:

AUNJL AZF WHOQTH FVH IQJOHTHJIH FQ-XNE BNTC NJ GBAQTFNJF LFHA OQTSNTX GJ FVH GJFHTHLFL QO AHNIH. QZFUGJH QO FVH IQBAUHFH AUNJ OQUUQSL WE AQLF.

For the first correct solution of this code message opened after the closing date we will pay TEN SHILLINGS. Your attempt may be sent in a sealed envelope if you wish. All attempts must reach us on or before TUESDAY, March 3rd. The Editor's decision is final.

Write your translation on the back of a postcard, add your name and address, and post to: "P.W." Cipher No. 4, 1, Tallis House, John Carpenter Street, London, E.C.4 (Comp.).

"The Following Have Arrived . . ."

Some details of newcomers to the radio component market.

By K. D. ROGERS.

LET me apologise at the outset of this article for the fact that the battery-set user is not going to find a great deal in it to interest him directly, though he will, I think, want to know about some of the things that I am going to mention.

He may not use a mains set, but if he has the mains in his house he will be interested in one of the ideas that I am going to discuss; while at the end of the article readers will find some details that will be of value to both battery and mains set users.

With that off my chest, let me start by drawing attention to the diversity of the mains with which householders have to deal. Not only are there the D.C. and A.C. varieties, but there are the two and three connection types of power plugs to contend with. In one house you will find that the mains wiring is brought to the various tapping points by means of a two-socket switch, and in order to connect with it one has to have a two-socket plug. Another house, perhaps even next door, will have three socket power points installed throughout.

I will say nothing at the moment about the variations in size of the actual plugs, for even they are not standardised in the size and spacing of the sockets, but the fact that some houses have two- and others three-point power connections is very upsetting to set constructor and set manufacturer alike. What usually happens with a set design is that it is fitted with an ordinary two-point plug for insertion in the mains, and in the case of the commercial receiver, if one has "three-point mains," one has either to fit it into the three-point socket—if it will go—or change the plug to a three-point one, and take the earth point to the chassis of the set, or else to use a three-point plug instead of the two-point one fitted by the maker and to neglect the earth pin—using only two of the contacts.

The home constructor is in a happier position. For now that A. F. Bulgin & Co. have placed on the market a three-point plug together with a three-point socket for use at the chassis end of the set, he can use either two- or three-point plugs to suit the mains wiring. The new connector is fitted with standard 3-amp. pins and sockets for the mains, and with an extra pin and socket for the earth connection. This latter socket, in the case of the connector that is attached to the set itself, is used for a connection to the chassis or earth line of the set, and a three-way cable is used so that this earth pin and socket may be connected to the earthed socket in the actual power plug on the wall.

This type of connection has long been wanted, and it was with satisfaction that I received the news from Bulgin that the want had been satisfied. It ensures safety in mains connections by ensuring that the chassis of the design is properly earthed, though naturally the designer of the set in question has to take care in the case of a D.C. or Universal set that the chassis is not in any way connected to the live portion of the mains, such as the heater wiring.

And now for a few details of interest to battery as well as mains set users and constructors.

MAINS CONNECTORS

A group of the new Bulgin mains plugs. The top one is fixed to a metal bracket ready for chassis-mounting. The bottom one is a three-point plug and special socket.

I want to introduce to you some new Erie resistances.

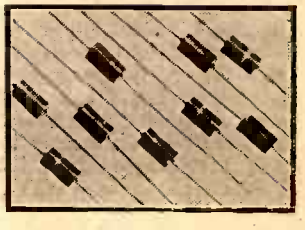
You are so familiar already with the ordinary one-watt type which can be obtained for the low cost of one shilling that Erie as resistance manufacturers need no introduction. But where you want a resistance that is to carry an extremely small current, or perhaps none at all, you may like to reduce your costs even more by using the new Erie ½-watt types, or even the ¼-watt type illustrated in the photograph below.

These resistances can be obtained in all the usual values, and are not only extremely reliable but also unusually small, enabling them to be tucked away in odd corners of a set design with the greatest facility.

The construction is different from that of the usual class of Erie resistors, as it embodies a headed cap snaged over the resistance element. The cap does not make direct contact with the carbon rod, however, for the rod is put through the usual process of liquid copper spraying before assembly, and in consequence the cap and the metal spray make contact together, enabling a very low noise level to be obtained.

As regards the mechanical strength of the small resistances, they have been subjected to test strains of up to 10 pounds in the case of the ½-watt type, the strain being applied at one of the wire ends, the other end being fixed. The ¼-watt type has to withstand a standard breaking strain test of 12 pounds. The new resistances are known as types 3N and 4N respectively for the ½- and ¼-watt types.

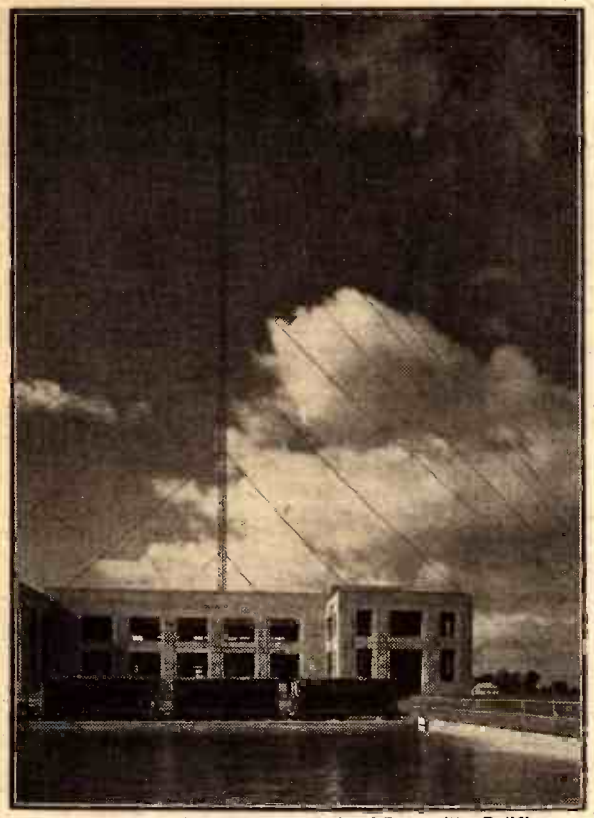
ERIE RESISTORS



The latest additions to the Erie resistor range are these ¼-watt resistors, which are extremely compact and handy to use.

The NATIONAL TRANSMITTER

When the giant transmitting station at Droitwich was erected to operate on the colossal power of 150 kilowatts broadcasting history was made. This station, one of the most wonderful and most efficient in the world, serves an enormous multitude of English-speaking peoples, not only in these Islands but in other parts of the world. In this article, and others to follow, our distinguished contributor gives you an extremely interesting account of the erection and operation of the Droitwich station. When you switch on to the National programme, perhaps you have never realised what a vast amount of work lies behind the excellent transmissions which it sends you.



A general view of the Droitwich National Transmitter Building.

THE Droitwich Station, which sends you your National programme with such regularity, is one of the broadcasting wonders of the world. How it was first conceived and how the technical problems which arose in connection with the design and erection of this giant station—many of them previously unexplored—were investigated and finally solved, makes a fascinating story, and this is the story that Sir Noel Ashbridge, the Controller of Engineering of the B.B.C., and his collaborators have set out in a recent communication to the Institution of Electrical Engineers.

Their description is truly vast in extent, but it is so chock-full of interesting matter that the Editor has asked me to give you, in the comparatively short space at disposal, a condensed account of it. I will do my best, but I want you to remember that it is impossible for me to do more than merely touch on the points which I think will be of especial interest to what Sir Walford Davies so elegantly calls "the ordinary listener."

Ninety-eight per cent Service

It is one of the aims of the British Broadcasting Corporation, so far as the distribution of the service is concerned, to supply every listener with a service of *two* distinct programmes. In present circumstances this aim cannot be completely realised, but by the distribution scheme which is now to be described it is possible to make one programme available to about 98 per cent of the population, with an alternative programme to approximately 85 per cent.

The wireless broadcasting station at Droitwich, Worcestershire, operates, as you know, on a wavelength of 200 kilocycles, 1,500 metres, and with an aerial power of 150 kilowatts. By virtue of the length of the wave on which it works, this new long-wave transmitter at Droitwich gives vastly greater possibilities of "coverage" than the other transmitters in use in this country, all of which work on "medium broadcast" wavelengths.

In the general design of the long-wave transmitter the aim was to cover with one programme the whole territory with which the B.B.C. was concerned, so that the remaining medium-wave stations should be available for the second programme, this latter being "regional," not only in the geographical sense, but also in the sense that it is identified in character with the particular region in which it originates.

The long-wave transmitter has replaced that which was so familiarly known to us all as Daventry 5 X X, which was in service from July 1925 to October 1934, working on various wavelengths between 1,500 and 1,640 metres and with a power of approximately 25 kilowatts. 5 X X, incidentally, was the first regular broadcasting station in Europe to employ so-called "high power"—that is, a power in excess of about 5 kilowatts.

One of the first things that the designer of a station has to do is to find a suitable site, and you will be surprised to know what a lot of careful consideration has to be given to this point. The limit of range of a broadcasting transmitter is not necessarily determined by the *power* used, even when the frequency is settled. In the case of a high-power transmitter the service may be liable to fading during hours of darkness, and, curiously enough, the unpleasant effect of this fading is not reduced by increasing the power. In practice it is found that you can get a much greater range than that which is given by calculation, because a considerable percentage of fading is hardly noticed by the average listener, even when listening on a set which does not include automatic volume control.

The effect of fading from the listener's point of view depends to some extent on the depth of modulation, but the fading limit is reached when the day value of the field is equal to two-thirds of the "quasi maximum value" of the night field. "Quasi maximum value" is an expression often used at International Wavelength Conferences and is taken to denote the value of the field which is exceeded during darkness for five per cent of the total time of transmission.

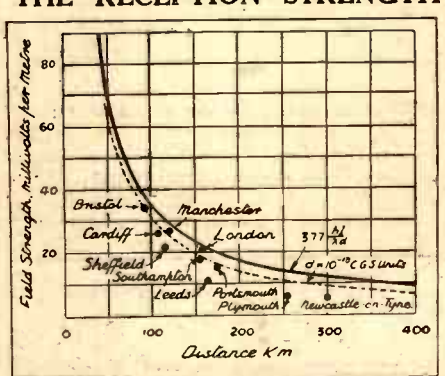
Further Considerations Necessary

On this basis it has been found that the maximum range of a broadcasting transmitter over average English countryside is about 280 miles, at a frequency of 200 kilocycles per second. Since the distance between the extreme North coast of Scotland and the South coast of England happens to be roughly twice that distance, the proper site for the avoidance of fading would, according to this, be half-way between the two coasts—that is, somewhere in Yorkshire. This would also give the required conditions in other extremities, such as the West of Northern Ireland, but not in Cornwall.

Considerations of the field strength have then to be gone into, and it was found that assuming that the intervening country caused average attenuation, it would be necessary to use an aerial power of the order of about 1,000 kilowatts. There is an agreed international limit for the power for broadcasting on particular wavelengths

(*Continued on page 729.*)

THE RECEPTION STRENGTH

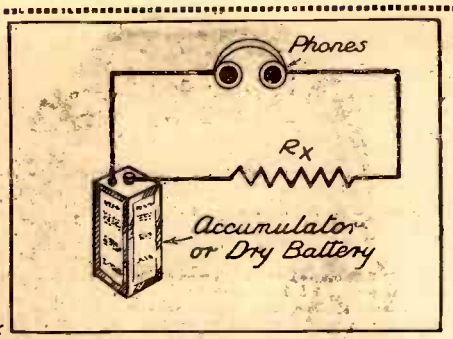


The field-strength curves of the Droitwich long-wave station. The standard theoretical field-strength formula has been used in which λ = 1,500 metres, h is the height of aerial in metres, in this case 167 metres, I = aerial current (83 amps in this case), d = distance of receiving point in kilometres. The lower curve was taken on the basis of average "good country" between the transmitting and receiving points as standard, this being represented by the symbol σ which is taken to be 10^{-15} C.G.S. units. This factor is used in the final determining of the value of the standard formula, which makes no allowance for absorption of energy due to the resistance of the Earth. Thus, above, you have the theoretical field strength-curve and then, under it, the curve taken with the attenuation caused by average good earth conditions taken into account.

TESTING RESISTANCES

SOME PRACTICAL HINTS FOR THE CONSTRUCTOR

By R. S. NICOLL



A pair of phones or a loudspeaker connected in series with the resistance under test, and a small battery, quickly enable one to check up for continuity.

AT this time of the year many wireless enthusiasts are busy rebuilding their sets or making new ones. It often happens that many components which were used in the old set can be utilised in the new one. This especially applies to fixed resistances.

To make certain that the new set will operate straight away, one should check up the approximate values of these resistances.

Flexible resistances may have developed open circuits, while with the wire-ended type it is sometimes impossible to tell the value of a resistance owing to the fact that the colours may have been rubbed off.

A Very Easy Method

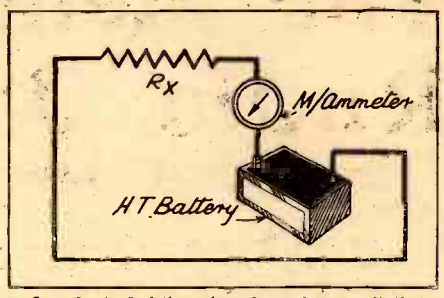
Quite a good method for finding out whether a resistance is open-circuited is to make use of a pair of phones or loudspeaker which should be connected in series with the resistance and a 2-volt accumulator or dry battery. A definite click should be heard on completing the circuit (see Fig. 1).

If there are not definite clicks on making or breaking, then the resistance may be discarded. Do not assume because the clicks are weak that the resistance is at fault. The clicks may be weak if the value of the resistance is high. If you hear any crackling or sizzling noises the resistance should be condemned, but it is as well to make sure that all contacts in the circuit are good.

A more reliable, and therefore better, test is really needed, although the foregoing is very useful where no instruments are available. Where a milliammeter is handy, then the test should be made in the manner to be described.

The resistance, a milliammeter and a fairly new H.T. battery should all be connected in series as in the second figure (Rx is the resistance to be measured). Quite a cheap milliammeter may be used successfully for the purpose of checking up any resistance from a few thousand ohms to a quarter of a million ohms—if one only remembers Ohm's Law, which says: "The resistance of any circuit is equal to the applied voltage divided by the current in *amperes.*"

We know that to get the resistance when the current is in milliamperes we must



In order to find the value of a resistance all that one needs are a milliammeter and H.T. battery. The unknown value can then be found by a simple application of Ohm's Law.

multiply the result by 1,000. Thus, we can test resistances from 200,000 ohms to 10,000 ohms with a milliammeter which has a scale of 0 to 10 milliamperes, using a 100-volt battery. The first resistance mentioned will give a deflection of ½ a milliampere and the latter the full scale of 10 milliamperes.

It Saves Money

It is not easy to measure low resistance values except with a more expensive instrument, as in these cases the resistance of the meter has to be taken into account. But for high values of resistance this may be neglected as the error will be small. An approximate value only is required, and thus practically any milliammeter may be used, provided that the deflection of the pointer is readable.

From the above remarks and a study of the simple diagrams, anyone can be certain of his resistances and so save money and trouble. Trouble comes anyhow, but the use of doubtful components is simply asking for it.

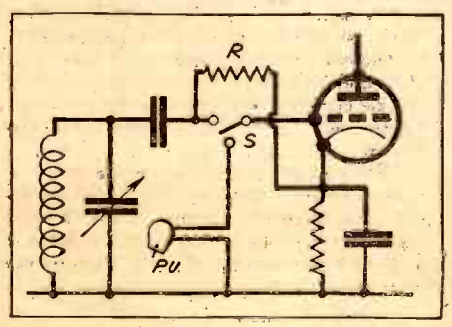
SIMPLE GRAMOPHONE SWITCHING

By L. E. T. BRANCH, B.Sc.

IT is often difficult to arrange a switch in a set so that when it is being set either to "radio" or to "gramophone" it is quite noiseless in both positions. For example, Fig. 1 shows the commonest method of arranging such a switching circuit.

Sometimes this switch is operated by the same knob as the wavechange switch, but whether it is or not there is one very easy method of greatly improving the circuit to ensure that the results are noiseless. The chief reason for any noise is that the contacts of the switch are clearly directly connected to the grid of the first amplifying valve, which is very sensitive, so that the slightest dust on the contacts causes a minute intermittent effect, and this is magnified very greatly by the valves.

Fig. 2 shows a method of altering the connections of such a switch when indirectly heated valves are used so as to gain two advantages. These are (1) no contact if the switch is directly connected to the grid of the valve; (2) on "gramo" contacts are open so that there obviously cannot be any intermittent effect. The resistance R is the usual grid leak of 250,000 ohms (power-grid detection), which on the "gramo" functions merely as a series grid resistance and has no deleterious effect at all. When the switch S is closed the valve becomes a leaky grid detector.



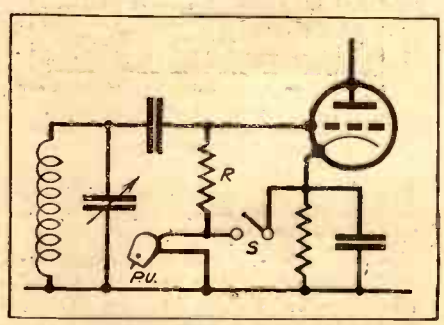


Fig. 1 (left) shows a commonly used method of radiogram switching, in which the switch is directly connected in the grid of the valve. Fig. 2 (above) is a better scheme since it eliminates noises due to bad switch contacts because the switch is not connected to the grid of the valve.

REDUCING "MAN-MADE" STATIC

NOWADAYS, one of the worst forms of interference to radio reception is "man-made" static.

Experiments have shown that in many cases the interfering currents travel to the receiver via the earth connection. If a water main is being used for the earth, and the same main happens to run near or is used for an earth on the interfering machinery, the trouble may be very bad.

Interference can often be reduced considerably by the use of an entirely separate buried earth. In some very bad cases it might even be beneficial to dispense with the earth and use a counterpoise.

But even the use of a counterpoise is not necessary with many sensitive modern sets. Often it will be found that excellent reception is obtainable without any earth at all, and this is worth trying in cases of electrical interference. F. B.

The Memoirs of a Radio Journalist

By SAM HEPPNER

In this, the fourth of his series, our versatile contributor tells you more about his experiences when interviewing well-known radio personalities. For instance, of his attempt to elicit information from the wife of a famous author; his recollection of a sound telling-off from Gillie Potter; of Claude Hulbert's spontaneous humour; and last, but by no means least, the inimitable Billy Bennett's "coloured" incident with a London bobby

IN an earlier issue I referred to the rhinoceros hide that I develop for certain interviews. And as you progress with these memoirs you will realise how serviceable it is at times.

About the time when the Yorkshire accents of that shrewd and temperate controversialist, Mr. J. B. Priestley, were familiar to listeners, I was writing a series of newspaper articles on The Wives of Famous Men. "Concentrate on people that listeners are hearing on the radio at present," said the editor. Accordingly, I called on Mrs. Priestley for a chat.

"You're Late"

At Number Three, The Grove, Highgate, where Coleridge once lived, I was admitted by a manservant, shown through lofty, book-lined passages, and asked to wait in a sunny drawing-room with french windows that overlooked a rose garden. A sleek, black grand piano graced the room.

Presently, Mrs. Priestley appeared. A slim, handsome woman with intense, dark eyes.

"You're late," she said.

I didn't deny it. A minor shaving accident had robbed fifteen minutes of my time.

"You're a quarter of an hour late, and the next person I have to see has turned up a quarter of an hour too soon. So this interview will have to be very brief."

I felt a bit awkward. Just as the ether must remain free from atmospheric disturbances for the purpose of a successful wireless transmission, so must a social atmosphere remain smooth and unruffled if the desired results for a newspaper interview are to be obtained.

A strictly businesslike attitude didn't help matters.

"What do you want to know?" asked Mrs. Priestley.

Gillie Potter is Annoyed

"Oh," I said vaguely, "the usual things, you know; all about yourself, your domestic activities, and so on. How you help your husband in his work. And—how you met each other. Or do you consider that an impertinent question?"

"Yes," replied Mrs. Priestley, coming immediately to the point, "*as a matter of fact, I do!*"

But I must add in fairness that Mrs. Priestley has done a good deal of fine and creditable work on behalf of a slum clearance organisation which, under her effective chairmanship, has already built some first-rate workmen's flats in the St. Pancras district.

And I am always amused by the recollection of a sound telling-off I once had from Gillie Potter. I cheerfully recount the incident, without danger of offence, because I'm quite certain that Gillie's remonstrance was rather in the nature of a leg-pull.

I interviewed him, after being introduced by a friend, at the Alhambra, where he was top of the bill. Twenty-five years previously he had understudied George Robey at the same theatre. How Gillie can talk! If only every radio star could talk as powerfully and continuously as Gillie Potter, what a paradise wireless journalism would be!

We were up in the dressing-room. "I'm expecting some friends," he said, "so I'll have to turn you out soon."

That was six o'clock. I left his dressing-room at nine.

Armed with plenty of good material, I wrote a chatty and intimate story about Mr. Potter which appeared, in due course,

BILLY BENNETT

Billy Bennett, that ever-popular stage and radio star comedian, who achieved fame "over the air" as Alexander of Alexander and Mose.

in one of the less significant publications. Next time I telephoned him, the bell buzzed, and instead of the customary "Hallo!" a brisk, fussy voice said, "Yes, yes?" I could clearly visualise the large straw hat, the sombre, blue eyes and the Hogsnorton tie with broad arrows.

Gillie started to talk and worked himself up into a mild passion. On he rambled. On and on. I listened silently for quite a time. And with the mock pomposity that

CLAUDE HULBERT

will often crack the wittiest spontaneous gags.

makes his broadcast monologues so comical, he ended his recital with the following words, which have since assumed a classic importance in my memory: ". . . and I strongly resent having details of my private life published in some obscure and ephemeral radio production. I was very annoyed. Good-bye!"

Slam!

But you may be sure that if I thought Gillie Potter meant what he said, I should not have published this tale.

Claude's Threatening Letters

I suppose you are anxious to know whether the radio comedians are capable of the same ready humour away from the microphone.

Some certainly are. Claude Hulbert, in that pained, clear diction so familiar to listeners, will often crack the wittiest spontaneous gags.

I first met him at a dance in Staines; we talked, and he told me that if I would call at his home in South Kensington he would give me a good story. He did, too. During the interview he showed me some amusing "fan" letters, and although I have not yet met anyone who can beat an experience of mine in the way of letters from unknown admirers (one kind reader, so delighted with an anti-war article that I wrote in a daily paper, sent me a "Deed of Gift" which made me the owner of a tract of seashore in Denmark; this happened seven years ago, and the land is still my property). Claude certainly had some good specimens. There were flattering letters; abusive letters.

"Do you get any threatening letters?" I asked him; and he replied, wide-eyed and floppy-jawed, "Only from the Gas Light and Coke Company," without a moment's hesitation, which I thought was jolly neat.

(*Continued on page* 730.)

LEARNING FRENCH THROUGH YOUR RADIO

Here is the fifth section of our splendid course of easy-way French instruction

By S. C. GILLARD, M.A.

Owners of radio-gramophones (such as this new McMichael Model 365) are particularly fortunate where their French practice is concerned. Not only can they tune in the French stations, but they can put on French records of a speech or songs and further familiarise themselves with the language.

THERE is still some more to be said about ADJECTIVES. We hear a good deal on the wireless about Hungarian rhapsodies, Viennese orchestras, Polish music, Irish dances, etc. All these words "Hungarian," "Viennese," "Polish" and "Irish" are ADJECTIVES. THEY ALL COME AFTER THE NOUN, AND THEY ALL AGREE IN GENDER AND NUMBER WITH THE NOUN.

Now here is a selection of broadcast items to which I have often listened. Masculines and feminines are all mixed up together.

CHERS AUDITEURS, VOUS ALLEZ ENTENDRE :

une marche turkoise *(F.S.) (a Turkish march)
une marche persienne (F.S.) (a Persian march)
une ouverture italienne (F.S.) (an Italian overture)
un concert hongrois (M.S.) (a Hungarian concert)
un concert viennois (M.S.) (a Viennese concert)
une sérénade chinoise (F.S.) (a Chinese serenade)
la presse parisienne (F.S.) (the Paris press)
un pot-pourri de valses viennoises (F.P.) (a medley of Viennese waltzes)
des chansons françaises (F.P.) (some French songs)
un festival de musique polonaise (F.S.) (a festival of Polish music)
des danses autrichiennes (F.P.) (some Austrian dances)
des danses irlandaises (F.P.) (some Irish dances)
des danses norvégiennes (F.P.) (some Norwegian dances)
des danses russes, espagnoles (F.P.) (some Russian, Spanish dances)
un concert de musique portugaise (F.S.) (a concert of Portuguese music)
des chansons gaéliques (F.P.) (some Gaelic songs)
des chansons slovaques (F.P.) (some Slovak songs)
l'orchestre viennois (M.S.) (the Viennese orchestra)
des chansons lettonnes (F.P.) (some Lettonian songs)
les œuvres finnoises (F.P.) (the Finnish works)
une fantaisie américaine (F.S.) (an American fantasy)
une mélodie napolitaine (F.S.) (a Neapolitan melody)
des chansons et danses souabes (F.P.) (some Swabian songs and dances)
un programme spécial anglais (M.S.) (a special English programme). Etc., etc.

* I have added an M.S., F.S., M.P., F.P. after each phrase for your help. I cannot over-emphasise the importance of these agreements. So treat them with respect.

It will be just as well now if we try to learn by heart some of the French words for the countries of the world and their corresponding ADJECTIVES. That is: ENGLAND, ENGLISH; FRANCE, FRENCH; SPAIN, SPANISH.

l'Angleterre (England) *lah(ng)-gle(r)-tair*	anglais (English) *ah(ng)-gleh*
la Belgique (Belgium) *bel-sheek* (treasure, remember)	belge (Belgian) *belsh* (treasure!)
l'Écosse (Scotland) *leh-koss*	écossais (Scotch) *eh-koss-eh*
l'Irlande (Ireland) *leer-lahnde*	irlandais (Irish) *eer-lahn-deh*
le Pays de Galles (Wales) *payee-de(r)-gal*	gallois (Welsh) *gal-wah*
la Gaule (Gaul) *gohl*	gaulois (Gallic) *gohl-wah*
la Bretagne (Brittany) *bret-an-ye(r)*	breton (Breton) *bret-o(ng)*
l'Europe (Europe) *ler-op*	européen (European) *er-op-eh-ah(n)*
la Chine (China) *sheen*	chinois (Chinese) *shee-nwah*
l'Amérique (America) *lah-meh-reek*	américain (American) *ah-meh-re-ka(ng)*
les États Unis (U.S.A.) *leh-zeh-tah-zü-ne*	
l'Afrique (Africa) *lah-freek*	africain (African) *ah-free-kah(ng)*
l'Asie (Asia) *lah-ze*	asiatique (Asiatic) *ah-ze-ah-teek*
l'Inde (India) *la(n)d*	indien (Indian) *a(n)-de'ah(n)*
les Indes (India) *leh-zand*	
les Antilles (West Indies) *leh-zah(n)-te'ye(r)*	antillien (West Indian) *ah(n)-te'ee'ah(n)*
la Jamaïque (Jamaica) *shah-mah-eek*	jamaïquain (Jamaican) *shah-mah-e-ka(ng)*
le Canada (Canada) *kah-nah-dah*	canadien (Canadian) *kah-nah-de'ah(ng)*
la Prusse (Prussia) *prüss*	prussien (Prussian) *prüss-e-ah(ng)*
la Russie (Russia) *rü-see*	russe (Russian) *rüss*
la Pologne (Poland) *pol-on'ye(r)*	polonais (Polish) *pol-on-eh*

GENDER OF NOUNS
(Continued)

All Nouns are FEMININE which:

1. **Denote people or animals of the Feminine sex.**
   For example: la reine (queen), la mère (mother), la vache (cow), la brebis (ewe).
2. **Denote the names of countries, and end with a silent e.**
   For example: la France, la Russie, l'Espagne (Spain), la Grèce. Exception: le Mexique (Mexico).
3. **Also all nouns which end with the termination -aison, -sion, -tion, -xion.**
   For example: la raison (reason), la division, la passion, la nation, la réflexion.

(À Suivre.)

l'Autriche (Austria) *loh-treesh*	autrichien (Austrian) *oh-treesh-e'ah(ng)*
l'Allemagne (Germany) *lal-man'ye(r)*	allemand (German) *al-mah(n)*
la Bavière (Bavaria) *bah-v'yair*	bavarois (Bavarian) *bah-vah-rwah*
la Saxe (Saxony) *sahks*	saxon (Saxon) *sahk-so(ng)*
la Suède (Sweden) *swaid*	suédois (Swedish) *sweh-dwah*
la Norvège (Norway) *nor-vehsh*	norvégien (Norwegian) *nor-veh-she'ah(ng)*
la Suisse (Switzerland) *sweece*	suisse (Swiss) *sweece*
l'Espagne (Spain) *less-pahn'ye(r)*	espagnol (Spanish) *ess-pahn'yol*
l'Italie (Italy) *le-tahl-e*	italien (Italian) *e-tahl-e'ah(n)*
la Grèce (Greece) *greh-ss*	grec (Greek); grecque (F.) *grek grek*
la Turquie (Turkey) *tür-kee*	turkois (Turkish) *tür-kwah*
la Corse (Corsica) *korss*	corse (Corsican) *korss*
le Danemark (Denmark) *dahn-mark*	danois (Danish) *dahn-wah*
le Portugal (Portugal) *por-tü-gahl*	portugais (Portuguese) *por-tü-geh*
la France (France) *frah(n)ss*	français (French) *frah(n)-seh*
la Hongrie (Hungary) *ho(n)-gree*	hongrois (Hungarian) *ho(n)-grwah*
Vienne (Vienna) *ve'yen*	viennois (Viennese) *ve'yen-wah*

NOTE—All the ADJECTIVES above are spelt with a small initial letter.

Try to learn by heart as many of the above words as possible, especially the ADJECTIVE forms. Practise the imit. pron. and remember, when you read these aloud, give each syllable EQUAL STRESS and SPEAK WITH SNAP. There is nothing languid about French. Above all, listen to French stations and the French lessons given from London. You should be beginning to recognise quite a lot of words and phrases now. Don't be discouraged if you find your progress is slow. Don't forget it took you several years to learn your own language. "À force de forger on devient forgeron," says a French proverb. We mean the same thing when we say: "Practice makes perfect."

I needn't remind you, of course, that these nationality ADJECTIVES (anglais, écossais, irlandais, etc.) have the usual FOUR FORMS. I have given you the MASCULINE SINGULAR ONLY. For practice write down the other THREE FORMS, always repeating aloud what you write.

Now I want to give you THREE very common announcer's phrases.

UNE HEURE DE (an hour of) (*ün er de(r)*)

UNE DEMI-HEURE DE (half an hour of) (*ün dem-e er de(r)*)

UN QUART D'HEURE DE (quarter of an hour of) (*u(ng) kar-der de(r)*)

CHERS AUDITEURS (or MESDAMES ET MESSIEURS), VOUS ALLEZ ENTENDRE MAINTENANT :

une heure de musique galloise (an hour of Welsh music)

une demi-heure de valses viennoises (half an hour of Viennese waltzes)

un quart d'heure de mélodies hongroises (quarter of an hour of Hungarian melodies)

And now the numerals 1–12, for we must begin to tell the time in French.

un, deux, trois, quatre, cinq, six, sept, huit, neuf, dix, onze, douze

u(ng), de(r), trwah, kahtr, sa(n)k, seess, set, weet, ne(r)f, deess, o(n)z, dooz

Finally, here is a small test for you. Without referring to anything above, write down the French for:

Some Norwegian songs, the Austrian dances, a festival of Irish music, the English press, the Chinese station, the Italian army (armée), Turkish cigarettes (same word), the Greek orators (orateur), the Spanish revolution, an American programme.

I will give you a translation of these next week.

PRACTICAL RADIO & ELECTRICITY

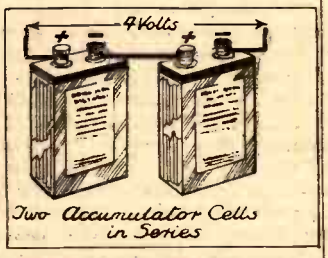
Although this week's instalment may seem rather more theoretical than practical, the various points dealt with are of the greatest importance in both electrical and radio work. A knowledge of Ohm's Law and how to apply it is well worth while. For that reason we have given three simple examples which you can work out for yourself. The answers, and their workings will be given next week.

LAST week we discussed three very important fundamental units, namely, the volt, the ampere, and the ohm.

The volt, you will remember, is the unit of potential and is the motive force in an electric circuit. The ampere is the unit of current, the voltage in the circuit being the driving force behind the current. The ohm is the unit of resistance, resistance being similar to friction. The more resistance there is in a circuit the greater the difficulty in driving the current through that circuit.

Voltage, current and resistance are very closely related, and we cannot proceed very far in electrical work until this relation between the three units is properly understood.

JOINED IN SERIES



When cells are joined in series the total voltage is equal to the sum of the voltages of individual cells connected together in this fashion. For example, each cell in this sketch has a voltage of two; so the total voltage is four.

Ohm's Law

The law, or rule, connecting the units is called Ohm's Law, and it is very simple. It states: the current in a circuit is equal to the number of volts divided by the resistance.

Now there are certain points that we have to remember in connection with this rule. For example, the current must be in amperes and the resistance in ohms. Another factor is that the resistance must always be the total resistance of the circuit. For instance, if you had a battery connected to a lamp the total resistance would be that of the lamp, the length of the wire connecting it to the battery, and the internal resistance of the battery. Usually, however, the internal resistance of a battery is so small in comparison with the various other resistances that have to be considered that it can be neglected. Very often there is no means of finding out the battery's internal resistance. Hence, one ignores it because of this. Also the resistance of the connecting wire is usually so low that it, too, is negligible, but every case has to be treated on its merits.

OHM'S LAW.

This simple rule connecting Voltage, Current and Resistance should be studied and memorised.

It is as follows:

Current (amperes) = Volts ÷ Resistance (ohms)

From this we get:

Resistance (ohms) = Volts ÷ Current (amperes)

and

Volts = Resistance (ohms) × Current (amperes)

You will find this rule very useful in electrical and radio work, so try your hand at a few simple examples, such as those given in column 4.

An Invaluable Rule

Don't let these points confuse you, however. They will clear themselves up later on.

Ohm's Law is extraordinarily valuable, both in radio and electrical work. You see, it is not only useful for finding current flowing in a circuit, but with it you can also find the resistance of a circuit, or the voltage which is forcing a certain current through a circuit.

There are three different ways of stating the law. One way we have already referred to, and that is, current equals voltage divided by resistance. The second is, resistance equals voltage divided by the current. Thirdly, voltage equals current multiplied by resistance.

Now we will take two or three examples, using numbers. Suppose the voltage is 100 and the total resistance of the circuit is 50 ohms. What would be the current? The answer is 2 amperes, because 100 divided by 50 equals 2.

Another example: If the voltage is 210 and the current flowing in the circuit is 5 amperes, what would be the total resistance? The answer is 42 ohms.

Learn It By Heart

A third example: In a circuit having a total resistance of 100 ohms, the current measured on an ammeter is 2 amperes. What is the voltage? The answer is 200 volts, because volts are equal to current times the resistance.

Take my tip and learn Ohm's Law off by heart. Practise simple examples so that when the time comes for more difficult applications the fundamental rules will be firmly fixed in your mind.

There are all sorts of ways of connecting lamps, batteries and other electrical devices together. Two very common and widely used methods are those known as *series* and *parallel* connections.

What do they mean exactly? Perhaps the best way of explaining the two schemes is to take practical examples.

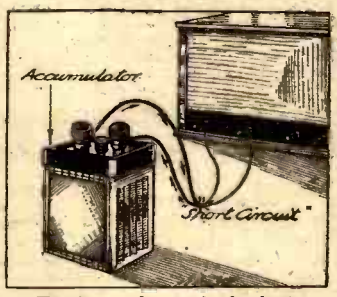
Batteries are marked positive and negative. If you look at an accumulator, such as one of the familiar types used for battery radio sets, you will notice that the terminals on the top of the cell are coloured red and black, and marked clearly either on the terminals themselves or on the accumulator case with the symbols + and −. + denotes positive and − negative. The red terminal is always positive and the black one always negative.

Connecting The Cells

If you take two cells of this type and join a piece of wire from the positive terminal of one cell to the negative terminal of the second, connecting two more wires to the remaining positive and negative terminals, one wire to each terminal respectively, the two cells will then be joined in "series."

The last two wires which you joined are those which will be connected to the electrical device which is to be supplied with current from the cells.

AVOID THIS!



Here is a good example of a short-circuit, as explained in the text. The current takes the easiest path back to the battery, with the result that serious damage to the battery may result.

Now the usual accumulator cell has a voltage of two, when it is fully charged, and by joining two cells together in series the total voltage becomes four. If you joined three cells in series, the total voltage would be six. And for every extra cell joined in series the voltage would be two more.

Motor-car batteries consist of 6- or 12-volt units, according to the type of car. In the case of a 6-volt unit you have three cells connected in series. And you will notice that if you look at the top of one of these batteries there are six terminals altogether, two for each cell. Two sets of terminals will be permanently joined with lead connecting strips.

The Other Method

In the case of a 12-volt unit it is usual to split this into two parts, namely, to use two 6-volt units connected in series, making 12 volts in all. Thus there are six cells altogether.

Parallel connections are shown in one of the sketches. In this case you simply join all the negatives together and all the positives together, taking the wires which are supplying the current to the external circuit from one of the positives and one of the negatives. The sketch shows how two cells would be joined in parallel.

Using this method the total voltage is always the same as that of one of the cells, namely, two volts. No matter how many cells are connected in this fashion. But the advantage of the scheme is that one can obtain a much greater quantity of electricity than from one cell. Or, alternatively, a certain current for a much greater time. It is similar to using a large storage tank for water instead of a small one.

EXERCISES TO TRY.

1. A 12-volt car battery is supplying current to five lamps, three of which take one ampere each, and two head lamps taking three amperes each. What will be the resistance of the circuit?

2. A 220-volt generator is connected to an electric fire having a resistance of 20 ohms. What current will flow through the fire if the resistances of the generator and wiring are ignored?

3. An electric lamp used to light a small room requires ½ ampere, while its resistance is given as 880 ohms. What would be the voltage of the supply mains?

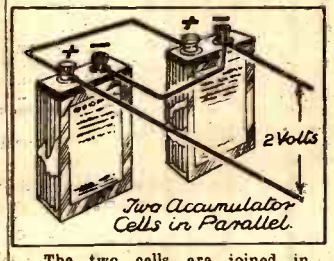
The answers will be given next week.

A Short-Circuit

A term commonly used in electrical work is "short-circuit." What does it mean? Simply this. Electricity always takes the path of least resistance, *i.e.*, the least troublesome path. If it gets a chance to flow back to its source by some way other than through its proper circuit it seizes it. Imperfect insulation may easily cause this to happen. Look at the sketch in the centre of the page. There you have a battery connected to a radio set by two wires. Unfortunately bare wires, instead of properly insulated ones, have been used, and the two wires have been allowed to touch each other. Hence the current, rather than flow through the valves in the set, takes the easy path shown by the arrows. This low-resistance path causes a heavy current to flow and the battery may be badly damaged as a result.

A. J. R.

IN PARALLEL



The two cells are joined in parallel, a method often used to increase the quantity of electricity available.

Barry Kent Calling

The latest news and views of happenings in the "Big House." Every week Barry Kent obtains exclusive information about the B.B.C.

Toscanini Sensation

THE cancellation of the Toscanini series of concerts, which the B.B.C. had arranged to feature in its May Festival, has provided a sensation in broadcasting circles. The B.B.C. has let it be known that the cause of the trouble was quite outside its control. It has been published in New York, however, that the stubbornness of the "Administration" officials at the "Big House" was the real snag. Toscanini declines to argue or bargain, and when there was some hesitation about the fee for an extra concert, he simply threw in his hand, letting the B.B.C. guess the reason.

* * *

"Queen Mary" Broadcasts

Here are the broadcasts that will be given of the "Queen Mary":

1. From Basin to Clyde: Sunday, March 22nd.
2. Description of departure from Southampton, sandwiched round the Derby broadcast, May 27th, afternoon.
3. Mid-Atlantic: May 29th, 8.45 to 9.30 p.m.
4. Arrival in New York: 5.35 to 6.10 p.m. on day of arrival.

* * *

Empire Day, 1936

It is India's turn to provide the Empire Day programme this year. Ceylon will co-operate, the combined offering being on Sunday, May 24th. On the same day there will be a Kipling Memorial programme, and a special broadcast to schools.

* * *

The American "Purge"

There are rumours of a great American "purge" going on in the B.B.C. The crisis out of which it sprang was the description of the Cochran "First Night" of "Follow the Sun." Mr. Graves, the Programme Chief, fairly set about him against the Americanisms that he thought had spoilt that broadcast. There were long and lively debates, with the result that the B.B.C. is to be more crystal-pure British than ever before. No more slang; no more of the rough-and-ready lingo of the "wide open spaces." That is the rule. Perhaps we shall have an Oxford don crooning for Henry Hall soon.

* * *

Mr. Norman to Meet Press

Mr. R. C. Norman, the Chairman of the Board of Governors of the B.B.C., is going to attend one of the periodical meetings which Sir Stephen Tallents has with the Press. This will be the first time so exalted a person as a B.B.C. Governor, let alone Chairman, has consented to give audience to journalists. I hear a lot of puzzling questions are ready. But I warn my colleagues that the Chairman of the B.B.C. has two important assets, each of which will stand him in good stead. First, he has exceptional charm of manner; second, he has a ready wit. So if there is any baiting it will not be all one-sided.

Film Carnival Ball

The Film interests have got their way. They wanted John Watt to compère their big charity ball at the Albert Hall in March. First the B.B.C. said he could accept; then it said he couldn't; then it said he could. Now there is some nervousness as to another change of mind; but I can reassure the film magnates concerned. John Watt will be there and there will be a "Big Broadcast" of the "Stars" present.

* * *

"A Footballers' Hour"

The Crystal Palace Football Club has suggested, and the B.B.C. has accepted, the idea that a "Footballers' Hour" be arranged. The plan is to build a programme from the numerous competent artists that are included in the big football teams. The programme will be put on about the time of the Cup Final.

* * *

Cinema Talks

The B.B.C appears to be having great trouble in getting together a sufficient number of cinema critics in order to "ring the changes." Mr. Alastair Cooke is to continue until the Spring of 1937. Then it is proposed to have Mr. George Atkinson for a period, and then Mr. Sydney A. Moseley: then starting afresh with Mr. Cooke.

* * *

Fat Stock Prices

A small-scale sensation has been created at "B.H." by the opinion advanced seriously from an expert source that in their present form the "Fat Stock Prices" that irritate millions are of no use to anyone. A new scheme is being considered under which a properly edited bulletin of farm prices will be broadcast twice a week, one after the Farming talk on Wednesday, which might be advanced to 6.30, and the other at the same time on one other day of the week.

* * *

Mr. Filson Young on Bells

Mr. Filson Young has been commissioned to build a feature programme about bell ringing. He will travel the country, examining the most famous bells, and observing the most skilled bell-ringers at work. Sir Hamilton Harty probably will be associated with Mr. Filson Young.

* * *

"Gale Warning"

The first feature programme to be prepared with the assistance of the B.B.C. Mobile Recording Unit will be revived in the Regional Transmission on March 11th—almost exactly a year after the original production. "Gale Warning" portrays in sound the drama of the men and the organisation behind the public services affected by a gale. Battersea Power Station, Ramsgate Coastguard Station, a liner in mid-ocean, a lighthouse and a light-ship, the London Fire Brigade—these are some of the sources from which the programme was built up. "Gale Warning" was the forerunner of several feature programmes, including "Cable Ship" "Dinner is served" and "Fog." Listeners will be interested to compare this original effort with subsequent productions of the same type and to note the progress made.

BOY ACTORS AT B.B.C.

Are you listening each week to the serial spy story broadcast in the "Saturday Magazine"? These are the boys who are taking the various parts, "Buller" being the one who is being "bumped." The boys are members of the City of London School.

B.B.C. TO INSTALL WORLD'S LARGEST CINEMA ORGAN

(*Continued from page* 711.)

make up for the fiasco of her Christmas relay—not Gracie's fault, of course!—by giving us a 20-minute broadcast. She will write the script on the way over.

* * *

"My aim in drawing up the new programmes," explained Mr. Maschwitz, "is to reduce as far as possible the percentage of musical items. More spoken word—particularly humorous, of course—is needed for a real balance of entertainment."

* * *

And for the revelation of his new dance-band policy, Mr. Maschwitz had to refer us all to a forthcoming issue of the B.B.C.'s own periodical. A few hot moments followed this statement, a considerable section of the gathering indulging in heckling tactics to which the urbane Maschwitz refused to succumb.

All the same, I ought to put on record the very widespread indignation of the radio correspondents at such a flagrant conspiracy of silence. The B.B.C. is on dangerous ground in openly admitting that, when it thinks fit, it will reserve "scoops" for its own fairly narrow publishing interests—narrow, that is, in comparison with the reader scope represented by that Council Chamber gathering of journalists.

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 MSS. not accepted for publication. A stamped, addressed envelope must be sent with every article.

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

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

The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialties described may be the 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

USES OF A MILLIAMMETER

J. A. R. (Lancaster Gate, London. W.).—"Having lost a perfectly good valve because the coupling condenser in front of it (grid lead, from preceding valve) had broken down, I have been wondering whether I could have prevented this by using my milliammeter to better advantage.

"At present the instrument is connected in the plate circuit of the output valve, and it is arranged to pass 20 milliamps. It is, however, one of those multi-range milliammeters, which is provided with shunts for five milliamps and other values. These I do not use, because I do not understand how they should be employed to guard against faults like the one that has just cost me a new valve.

"If there is any method you can suggest I shall be glad to know of it."

The possession of the milliammeter certainly means that you are well equipped to deal with a fault of this kind. With such an instrument you can keep a constant watch upon valve behaviour.

A good method which the owner of such an instrument can follow is to make a periodical check of the individual valve currents. When the valves are first installed it is the work of but a few minutes to ascertain and make a note of the individual valve's plate currents.

Then, say once a week, the milliammeter may be taken out of the plate circuit of the last valve for a few minutes, to check up that the other readings are still O.K. Incorrect readings are a direct indication that something is wrong, and will suggest a check of the H.T. or grid bias of the valve in question.

Moreover, if distortion suddenly appears, it should be taken as a warning that it is advisable to check up at once.

Had this procedure been followed when your set began to go wrong, the trouble would have been localised before it assumed serious proportions.

WRONG CONNECTIONS, BUT SET "A BIT OF ALL RIGHT"

T. B. S. (Luton).—"What do you make of a bargain receiver, secondhand, with wrong connections, but the set is a bit of all right?

"It belonged to a chap who works at my shop, but he had to leave Luton, and I got it cheap. I had often admired the quality when I had been round to his place and heard it, but I had never really examined the inside of the set until it was mine, and I got it at home, after he had gone.

"Understand, it goes perfectly. Nobody would want to hear a better set, so I do not want to alter it. But what I cannot make out is this:

"The transformer is clearly marked like most L.F. transformers with G., G.B., P. and H.T.+ terminals. Well, G. goes to grid all right, but the others are what I cannot make out.

"H.T.+ goes to the *grid-bias negative*. The other two terminals are both joined to the fixed condenser which, on its other side, is connected to the plate of the detector valve.

"As I say, I do not want to alter it, because it gives such perfect reception, But how do you account for it doing this when it is connected up in this way?"

The explanation is simple enough, T. B. S. Your transformer is connected up to give one of the well-known forms of parallel-feed.

A POINT ABOUT "ELECTROLYTICS"

H. A. (Bootle, Liverpool).—"Perhaps you can settle a bit of a poser that I had asked me the other day—about electrolytic condensers.

"Most of us know from bitter experience how there is nothing easier than to damage one of this type of condenser by connecting it the wrong way round to the electricity supply.

"It was one of the bothers with D.C. sets that an accidental reversal of connections to the supply might have disastrous effects on electrolytics.

"How, then, is it that they are able to be used on universal sets? Surely this is a likely spot, if ever there was one, for current flowing in the wrong direction for such components to stand up to?"

No, there should be no fear of danger from this cause, in a well-designed universal circuit.

The condensers of non-reversible electrolytic type are not used on the live-mains side of the rectifier, but on the rectified-current side of it.

Incorrectly arranged input voltage applied to the rectifier will not produce current through it. So obviously such current will not be able to damage the electrolytic condensers on the other side of the rectifier. Incidentally, there are now "reversible" electrolytics which will stand having the "wrong" polarity for some considerable time.

RESULT OF "TELEVISION" CONTEST

The Prize—a fifty-per-cent interest in the Editor's own Television invention—for the Ideal Two-hour Programme, has been awarded to: Mr. C. Glassby, "Elmwood House," Slaithwaite Road, Thornhill Lees, Dewsbury, for the following:

1. (6 p.m.) News Items.
2. (6.15) Children's ½ Hour (Films, Plays, Natural History).
3. (6.30) Fifteen-minute Trips (Places of Interest, Home and Abroad).
4. (6.45) Women's ½ Hour (Fashions, Cooking Demonstrations, etc.).
5. (7 p.m.) Sports Events.
6. (7.15) How they are made Series (Blankets, Cigarettes, etc.).
7. (7.30) Instructional Films (Swimming, Tennis, Gardening, Drill).
8. (7.45) Variety Turns (Acrobats, Conjuring, Juggling, Short Plays).

RESULT OF "CIPHERS" CONTEST No. 2

THE PRIZE OF TEN SHILLINGS for the correct solution which was the first to be examined after the closing date has been won by:

Mr. D. J. Eades, The Central Y.M.C.A., Gt. Russell Street, London, W.C.1.

The correct solution appeared in the issue dated February 22nd, 1936.

THE "COSMIC" THREE

Despite the fact that it is several years old, the "P.W." "Cosmic" Three still excites a great deal of interest, and we are continually receiving reports of excellent reception from owners of this famous design.

All the copies of this journal dealing with the set were sold out long ago, and we have no blueprint or other diagram available for distribution.

Among the letters concerning this receiver is the following, from Mr. T. F. Jones, "Hereford House," over 135, High Street, Lye, Stourbridge:—

"I should be very glad if you can put me in touch with any reader who has a copy of either 'P.W.' 'Cosmic' Three (not de Luxe model), or Telsen 'Triple' Three, with wiring diagram. I will send money for same. I have lost my copy and want to make the set up again."

We give the address above in case some reader who lives near Mr. Jones may be able to help him. It will, however, be inadvisable for other readers who may have the necessary particulars to post them direct to him, since our experience is that dozens of kindly disposed readers are apt to respond to such an appeal simultaneously—with results embarrassing to the recipient, who may be put to considerable expense in returning surplus copies, to their kindly owners.

WHAT PRODUCES THE CURRENT OF AN INDIRECTLY HEATED VALVE?

J. F. (Great Yarmouth).—"I have been a regular reader of your paper for years. I wonder if you could give me a very brief explanation of what produces the current in the heater of an indirectly heated valve, which, when the filament is hot, is attracted to the anode?"

There is no fundamental difference between the indirectly heated valve's anode current, and that of the ordinary directly heated valve.

You are probably familiar with the fact that on the filament of an ordinary valve—not indirectly heated—there is usually a coating of active electron-emitting substance, which has the ability to release a large supply of electrons when heated.

Passing a current through the filament of such a valve heats it sufficiently to release these electrons, which, drawn across the vacuum inside the valve by the attraction of the positively charged plate, constitute the anode current.

In the indirectly heated type of valve the electron-emitting coating is separated by a thin insulating covering from the wire which is heated—that is to say, there is a separate heater, very close to the electron-emitting coating, but electrically separated from it.

When the indirectly heated valve is switched on, its heater wire warms up, causing the surrounding insulator to warm also. This in turn warms up its external neighbour, which is the electron-emitting coating, and electrons "boil off" this, and are attracted to the plate of the valve, forming its anode current.

It will thus be seen that the main distinction between the two types of valve is that in the one type, directly heated, the electron-emitter is raised to the necessary heat by passing a current through it; while in the other type, indirectly heated, the current is passed through a separate heater wire, placed in very close proximity to, but electrically separated from, the active electron-emitting substances.

HOW MANY OHMS FOR VOLUME CONTROL?

S. L. H. (Gateshead).—"I am going to convert for using a gramophone pick-up by inserting a switch between grid of detector and the wiring to this terminal. The pick-up is to be attached to a variable resistance (potentiometer) for controlling volume.

"How many ohms should the resistance be for best results?"

The resistance should be of high value, of the order of thousands of ohms, but there is no particular figure which can be quoted as the best value to use, since this will depend in any given instance upon the particular pick-up to be employed.

The only way to arrive at the correct resistance, therefore, is to find out what the manufacturer of the selected pick-up recommends for his product and stick to his recommendation. You will be able to obtain the information from the literature accompanying the pick-up or by inquiry of the makers.

(*Continued on next page.*)

RADIOTORIAL QUESTIONS & ANSWERS

(*Continued from previous page.*)

RATTLES AND CRASHES IN THE LOUDSPEAKER

J. O. P. (Battersea).—"My flat is on the top floor, and in the distance I can see the Battersea Power Station. I hate the sight of it.

"I get home late at night, switch on the wireless to hear some music, and just as I am enjoying it there's a rattle and a crash, as though furniture men in iron shoes were dumping down a big armchair in the loudspeaker.

"Sometimes they bring in a couple of settees, too, or a piano, or a ton of coals; that's what it sounds like. And then they knock off for lunch or something and everything is quiet for a bit.

"Then, without warning, they are back on the job again, falling downstairs or something.

"When I wrote to the firm who supplied the set they acknowledged it from the service department. Later they sent a very nice letter—followed by a very nice man in person.

"He stopped (one hour), he looked, and he listened. And all he could say was something that I could have told him—'*It's the Power Station!*'

"He said the set was O.K., but nothing could be done to improve matters because the row comes along the mains. It seems all wrong to me, and I shall be thankful if you can suggest something to stop this unseen furniture removals business, which is getting me ga-ga."

Anyone who lives within sight of a very big power station is certainly in an unenviable position, but we should have thought that partial relief was worth trying for, even though a complete cure is not obtained.

From the technical point of view the first requirement is to add smoothing to the mains leads, and neat little smoothing units are made for this purpose. They consist of mains chokes and by-pass condensers, fitted to the mains at the point of entry (electric light meter) or at the point where the set is plugged into the wall socket.

Apart from any attempt to tackle the interference by technical means, there is the possibility of obtaining assistance from the Post Office Engineering Department. Write to the B.B.C. at Broadcasting House, briefly describing the interference, and they will tell you how to lodge an official complaint.

FOR SMOOTH REACTION

F. P. (Enfield, Middlesex).—"The chief trouble I get is that reaction is not smooth, but starts, however carefully adjusted, by a sudden plop. How can I cure this?"

THE S.T.700 AUTO-DIAL

You can now get celluloid dials for the S.T.700. Special white dials, costing 3/- post free, are available from Celluloid Printers Ltd., Kingston By-Pass Road, Surbiton, Surrey. The white matt surface is ideal for the marking of station names, and any pencil mark that is made wrongly can easily be washed off.

There is no standard cure for this, since it is a trouble that may be caused in many ways, and consequently there are many ways of preventing it. One of the commonest causes is a reaction coil of unsuitable size, but if your coil is of standard size you may find that a different value of reaction condenser or of detector by-pass condenser capacity will cure the trouble.

The value of the detector H.T. may be wrong. Another possibility is incorrect value of grid leak. A faulty or unsuitable H.F. choke is another common source of "ploppiness," and if you use an H.F. stage in front of the detector any instability there might cause ploppy reaction.

Attention to one of the foregoing should put you right, but if not try taking the grid-resistance return to a potentiometer (slider) wired across the L.T. supply instead of to the + lead.

RANDOM RADIO REFLECTIONS

(*Continued from page* 715.)

"I live in a block of flats that are sitting right on top of a railway terminus, as it were. Looking out of the back-room windows, one looks directly on the railway lines of the local station. Engines run immediately underneath our back windows to get on to the turntable, and when stationary they blow off steam, which, if we are not quick in shutting the windows, fills our scullery. However, I can say without hesitation that the exhaust of these engines when on the move, or the blowing off of steam from drain cocks or safety valves when stationary, do not cause crackles or any other interference in my loudspeaker."

* * *

Three days later. I now find that it is very necessary to add a postscript to the above. I have received further letters from readers and at least one provides proof that in certain circumstances interference can definitely result from steam discharges.

I will include details in my next batch of notes. By the way, it has been pointed out to me that the reason some steam-wagons carry chains which drag along the road is to disperse charges of electricity developed by their steam exhausts.

I knew that, but the wheels of the wagons are broken—sorry, I should say the wheels of the wagons insulate them from the earth, whereas locos are very much earthed to the rails they run on. And this, as the monkey said when he fell into a barrel of tar, makes all the difference.

Not, mind you, that the rails necessarily form a good earth connection but, together with the train they make a hefty "earth body."

THE NATIONAL TRANSMITTER

(*Continued from page 721.*)

and, on the wavelength in question, the international power limit is 150 kilowatts.

Apart from this, there would be little prospect of obtaining a British Government licence—also necessary—to work with such a high power as 1,000 kilowatts. It becomes necessary, therefore, to locate the station so as to serve the maximum possible number of potential listeners, rather than on purely geometrical grounds. This means that it is necessary to accept the fact that a reliable service cannot be given from one station to the whole of the British Isles and that, as far as possible, other arrangements must be made to deal with cases where any considerable section of the population would be left unserved. If you glance at a "population map" which gives the six main centres of population: viz., (1) London, (2) the Midlands, (3) South Wales and the North-West of England, (4) Yorkshire and Lancashire, (5) Glasgow and Edinburgh, and (6) Belfast, you will see that the Glasgow and Edinburgh district is the one most remote from the "centre of gravity," so to speak, of population.

High-power Relay Required

For this reason, and following the conclusion reached above, it becomes desirable to provide for this area a high-power medium-wave transmitter to relay the programme radiated by the long-wave transmitter, and then, relieved as we are of the necessity for providing direct for the remote district, we can reconsider the problem of the situation of the long-wave high-power transmitter on the basis of serving the whole of England, Wales and Northern Ireland, and as much as possible of Scotland as may lie outside the service area of the medium-wave transmitter.

Considerations of this kind soon show us that the centre of gravity of population for this remaining area is not far removed from Daventry. This latter site was, however, subject to certain Government objections, not concerned with the broadcasting service. Various other considerations were brought up, but suffice it to say, that after taking into account considerations of other kinds—electrical, practical and, shall we say, political—the site finally chosen was on the Droitwich–Bromsgrove Road, two and a half miles north of Droitwich, and there now stands the giant Droitwich station which has made broadcast engineering history.

ABOUT THESE PROGRAMMES

(*Continued from page 716.*)

"shot" of the death of Nelson, with Mae West supporting the dying hero's head. They would even make General Gordon refer to Queen Victoria as "the big shot." Now let us gratefully admit that the B.B.C. never fools with originals except to cut them down to broadcasting dimensions. If they ever offer to improve on the author whose work they broadcast, this pen will be deeply dipped in vitriol.

Here, for instance, is what might happen to the story of Brown and Alcock, who first of all men flew the North Atlantic in an aeroplane, if a Hollywood producer were to handle it for the B.B.C.

Hiram Brown and Winthrop P. Alcock, two young Briddish aviators (the film, by the way, would be called, "Eagles Fly East") plan to cross the ocean by air. "Gunshot" Muldooney, Irish-American gangster, schemes to cause them to land in Ireland with, unknown to them, a complete plan for a corner in Irish whisky. Said plan is concealed on the person of Mamie Walker, a "dame" employed by Muldooney. Mamie falls in love with Hiram, and Winthrop falls in love with Mamie. Mamie stows away on the aeroplane, "Star of Noo York," and is discovered when the whole outfit is half-way across.

The Plot Develops

Mamie has been allowing petrol to escape from a spare tank. This loss, when discovered by Hiram, sends him off into ecstasies of rage. "I gotta do it, I tell yuh; I gotta do it," he cries, and begins to lighten ship by throwing overboard all the ice-water and chewing gum. Winthrop sides with Mamie, and asks Hiram what is biting him. "Don't be indelicate," replies Hiram. The plane swoops on, and the "effects" brigade wears out three "aeroplane-noise" machines.

Then Hiram realises that he must make for Ireland, and he cusses Mamie. Later, it becomes doubtful whether even Ireland can be reached. Mamie slips the plan into Winthrop's pocket and, hopeless of winning Hiram, dives overboard, saying, "Lissun, big boy! Yuh *gonna* do it." So they crash in a peat-bog, cinema cameras appear by magic and London eventually greets the heroes, who are created "viz-counts" by Royalty. A stirring drama of British pluck and the lurve of a brave woman! But the perdoocer would probably commit suicide after being forbidden to introduce a theme song and a cabaret scene!

A Complete Illusion

Harry Hemsley is a lucky man in this, that his radio audience loses nothing but rather gains by not seeing him. "I do his stuff," for they have the illusion that his little girls and boys are present in the studio. Television will not worry Harry.

Meaning no offence to anyone in particular, I want to suggest to the B.B.C. that they refrain from going out of their way to present negro artists, more especially those who come over inoculated with the virus of cheap American vaudeville. There is no radical feeling behind this suggestion. I just do not think that they fit suitably into the English broadcasting scene. To ask for an exception in the instance of a certain well-known coloured singer and actor would be invidious, and so I leave the subject, feeling that many share my view of it.

I hear a rumour that we are to have a broadcast of a Darts Championship Contest. *Thock. Thock. Thock.* And the calm, passionless voice of the scorer. Verily we go from strength to strength, the admiration of the world. *Vive le sport!* Invalids and children should not listen to this. Hard-boiled old bucks like me may turn out the light and revel in the thrills.

Pamela wants to know why her cuckoo clock never apologises for being late with the Time Signal. Young Bill is shocked at the frivolity displayed in this week's instalment of daddy's "litry work," when the Great (B.B.C.) Charter is in the melting-pot!

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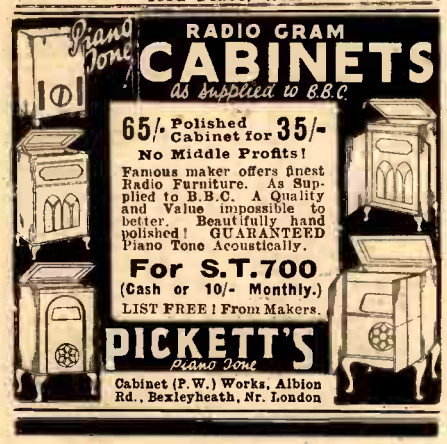

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EVERY SATURDAY **2d**

THE RADIO BULLETIN

A complete guide to all the activities of the radio industry. In it you will find up-to-the-minute news of the latest sets, components and accessories

The Mervyn Sound and Vision Co., Ltd., have recently released a short-wave converter-adaptor. It is a unit which may be employed either as a frequency changer or detector adaptor. That is to say, it can be used in conjunction with a superhet or S.G. set; in which case it operates as a frequency changer, or with a simple receiver such as a detector and 2 L.F., with which it can be used as an ordinary short-wave adaptor.

A 100 : 1 dual ratio dial, together with slow-motion reaction control, facilitate tuning, and the wavelengths covered extend from 13–55 metres in two bands. The price, not including valve, is 42s., and both A.C. mains and battery models are available.

* * *

ALL-WAVE DOUBLET AERIAL

We have received particulars of the **Rogers-Majestic All-Wave Doublet Aerial.** This aerial was originally designed for Rogers-Majestic four-wave receivers, but it is now offered for general use.

It is intended to eliminate, or reduce to a minimum, outside electrical interference, and functions with equal efficiency on long, medium or short waves. The price is 42s., the kit including the necessary doublet copper wire, cabled lead-in, impedance correcting transformer, matching transformer, together with insulators and lightning arrestor. The makers are Fourwave Ltd.

* * *

COMMUTATOR SWITCHES

F. W. Lechner & Co., Ltd., makers of Kabi components, are adding various new items to their existing range. These include 1,500-volt type commutator switches, having from 21-30 contacts; also 2-20 contact click-action commutator switches with the same voltage rating.

Variable power resistances up to 400 watts are also to be added to the present range. The ganged multi-contact switches and potentiometers produced by this firm are, of course, two lines already well known to radio enthusiasts.

* * *

NEW COLUMBIA MODELS

The Columbia Graphophone Company have produced three new models, each model incorporating the firm's new system of "spotlight control."

"Spotlight control" is an aid to easy and accurate tuning. When the set is switched on a small red or green spotlight indicates that the listener has correctly set the tuning to the long and medium wavebands respectively. When the tuning control is rotated, large red or green spotlights sweep across the calibrated dial to the station required. A green vertical column of light on the side of the dial then comes into operation, and when the maximum light shows in the column the set is tuned accurately to the station.

All three models are superheterodynes utilising five valves, including the rectifier. There is a table grand (Model 381), priced at 12½ guineas; a radiogram (Model 622), at 22 guineas; and an automatic record-changing radiogram (Model 632), costing 29 guineas.

Features of these designs include the new silent tuning device, elliptical loudspeaker with a frequency range of 50–7,000 cycles, positive image suppression, mains aerial, three-point tone control, heterodyne elimination. External loudspeaker sockets are provided, and in the case of the table grand model there are gramophone pick-up sockets also.

The automatic radiogram plays eight ten-inch or twelve-inch records at one loading, and automatically switches off when the last record has been played. Alternatively the mechanism can be set to repeat any record or play a single record and switch off.

These new receivers are intended for A.C. mains only. Models 381 and 622 are now available, and the auto-radiogram will be available as from March 1st.

THE MEMOIRS OF A RADIO JOURNALIST

(*Continued from page* 723.)

Then when I wanted to ascertain what sort of a radio fan he was, I asked, "What do you listen to most of the time?" And again he replied without lingering, "My wife!"

Real poetry enthusiasts could recognise the work of Keats, Shelley and Byron by their style alone. But no radio or variety fan could fail to guess the author of the following epic.

"There are no tailors' shops in mid-ocean;
They don't do repairs on the deck.
So for three years he fastened his braces
To a wart at the back of his neck."

Who but the raucous, boisterous Billy Bennett—the comedian whose notorious aspiration to gentility is ever incomplete—could scream this unromantic doggerel across the footlights and reduce the house to paroxysms?

I once asked him how he gets his large number of comedy ideas.

"I have a heavy meal and go to bed and dream them," he informed me.

He made his choicest spontaneous gag, however, while hurrying from the B.B.C. in a taxi to fulfil a music-hall date. The taxi got into a jam at the Elephant and Castle, and Billy Bennett who, as Alexander of Alexander and Mose, invariably blacks his face at the microphone to get the correct atmosphere, hastily changed his clothes, and tried to remove the grease-paint in the taxi. A policeman crept up, swung the door open suddenly and inquired, "What's going on in here?"

And Billy Bennett, flashing his eyes and grinning like a gorgeous buck nigger, replied, "*Ah's jus' decarbonising mysel', offisuh!*"

THE PROFESSOR'S MISTAKES

(*See page* 715.)

A millivolt is one thousandth of a volt.
A microhm is one millionth of an ohm.
A megacycle is one million cycles.

THE LINK BETWEEN

Our Special Weekly Column

By G. T. KELSEY

CONSIDERING the number of cars that are now on the roads, I am rather surprised that not more people have taken advantage of car radio. A car in a traffic jam from which the sounds of music are emanating is still very much a novelty to most of us, and perhaps as far as traffic jams are concerned that is as well, for I shudder to think of the effect upon the point-duty policeman of a string of cars all tuned to different programmes! What an earful!

But it is a fact that even now, despite the fact that car radio equipment has been on the market for several years, one rarely comes across a car that is fitted. And that's what puzzles me. After all, it cannot be on the score of inefficiency that the average motorist holds back, for I have had sufficient demonstrations to convince me that the majority of installations have reached a stage of perfection that is beyond criticism. Nor do I believe that it is altogether a matter of cost.

A really first-class car radio installation such as, for instance, the Ekco, costs 15 guineas, including everything. To us ordinary people it sounds a lot. But to those fortunate members of the community who have both the means and the inclination to run a car, what is 15 guineas considered in relation to the purchase price of the car? No, I am afraid that the question of cost doesn't altogether provide a logical explanation.

My own view, for what it is worth, is that the motoring public as a whole has not yet realised the enormous value of car radio.

On comparatively recent occasions when I have been "taken for a ride"—perhaps I should say taken for a radio ride—I have been most impressed with the advantages of motoring to music. Particularly is it of value on long runs where the monotony of some of the newest types of arterial roads is enough to send anybody to sleep.

I have no doubt that some of my readers are motoring enthusiasts. Well, I expect that you all have your own views upon the pros and cons of car radio. But at least I feel that you will be interested in the explanatory leaflet which Ekco's have prepared concerning their car radio equipment. Even as a non-motorist, I have found it most interesting, and I am therefore going to include it in our postcard literature service. (No. 390.)

The "Bad Boys" Again!

A letter which I have in front of me at the moment starts off: "Dear G. T., I sympathise with you over the "bad boys," but as I am not one of them, will you please send me catalogue Number—, and tell me if your short-wave adaptor will work with my blank superhet." *Not one of the "bad boys,"* and doing that there 'ere!

It is only for fear of destroying the elaborate system which has been developed for the speedy attention to your catalogue requests that I am reluctantly compelled to say that it is impossible to answer letters that are combined with applications for literature.

Please do not think that I am anxious to discourage correspondence, for I delight in hearing your views, and where possible I always endeavour to answer your letters. Fortunately, nearly all of you write your letters quite separately from your applications for literature, but—well, will the "bad boys" kindly note!

It is quite in order to enclose a letter with a literature application providing that your name and address appears on both and they must, of course, be on separate sheets of paper.

The I.C.S. Course

You will, no doubt, remember my reference in a recent issue to the question of radio as a career. Since writing that note I have received a copy of the International Correspondence Schools Radio Prospectus, and I am particularly impressed with the scope and thoroughness of the courses available through this world-wide organisation.

To those of you who have ideas of entering radio professionally, I strongly advise you to obtain a copy of this prospectus, for an I.C.S. course is one of the few ways of becoming really qualified.

The I.C.S. Diploma, which is awarded only to students who pass a comprehensive final examination covering the scope of their entire course, is widely recognised, and is in itself a testimonial that will stand you in good stead in the radio world.

I shall be pleased to arrange for a copy of this prospectus to be sent to all readers who apply to me in the usual way. (No. 391.)

Will readers please note that applications for the catalogues reviewed in "The Link Between" should be addressed to G. T. Kelsey, John Carpenter House, John Carpenter Street, London, E.C.4, mentioning the number given at the end of the review.

HENRY HALL'S HOUR IS REALLY A FORTNIGHT OF WORK

(*Continued from page* 719.)

such negotiations to "fall down" and an entirely different star hurriedly found at the last moment.

In addition, of course, Hodges is doing his general business in connection with the dance orchestra's daily programmes and recording sessions.

Fitting in rehearsals for the "Hour," with the daily rehearsals for the dance-music broadcasts in his most ticklish job. The "Hour" has to be taken bit by bit, a short period of the daily rehearsal time being given over to practising for it.

Much of the music is new and difficult and has to be rehearsed again and again to reach the standard of perfection upon which Henry insists.

So, at an alarming speed, the first week and half the second pass.

On Thursday the Glee Club attends the studios for a rehearsal, and Haver and Lee, "resident comedians of the 'Hour,'" call to confer with Henry Hall about their "patter" for Saturday, which he must always "O.K."

At 8 p.m. on the night of the broadcast Henry Hall puts orchestra, Glee Club and artists through a rigorous practice for an hour and a half.

Must Keep To Time.

It is at this point that Time steps in. Time with a big "T." The bogy of B.B.C. programme production. The "Hour" must be an hour—no less, no more. It cannot start before time. It cannot over-run, because at midnight the B.B.C. must close down to the booming of Big Ben's twelve. And Big Ben won't wait for Henry Hall to finish his programme!

Consequently, during this hectic, full rehearsal so many minutes are allotted to every piece of music, every piece of dialogue, and every announcement. All is cut and dried and put down on a time-table drawn up to the second.

At 10 o'clock a squad of B.B.C. porters prepare the studio. Five microphones are rigged up—two for the orchestra; one for Haver and Lee, the artists, and the Glee Club; one for the announcer; and another slung over the orchestra to drop by the side of one of "the boys" who is to say a few lines of dialogue in the "novelty number."

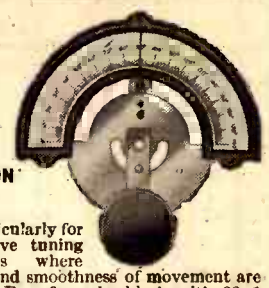
Eleven o'clock. To the steadying glare of the red light "Henry Hall's Hour" goes on the air.

There is no pause. One number follows another. Slick is the word. The hands of the clock are busily pushing past the minutes. Hodges hovers about in the background, tense, ready for emergencies.

At a minute to twelve the orchestra is entering on the last bars of the last number. They finish it. Henry Hall swings round to the singers. His baton drops. They sing "Good-night but not Good-bye."

"Henry Hall's Hour" is over. In millions of homes Big Ben is booming out his twelve, and a few minutes later, as he motors through the first chill hour of morning to his Hampstead home, Henry Hall is wondering sleepily what he will think up for the next "Hour."

IT PAYS TO BUY THE BEST



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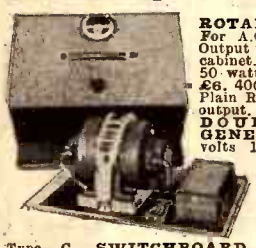

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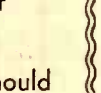

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TECHNICAL JOTTINGS

Items of Interest to Everyone

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

Audio-Frequency Indicator

A DIRECT-INDICATING audio-frequency meter, although not commonly required by the home constructor or experimenter, is a great convenience in many laboratory measurements and in production and testing operations where a large number of measurements have to be made quickly. In some cases a continuous indication of the value of a varying frequency is required. To meet these requirements a new "electronic frequency meter" has been developed, which is of radically new design and gives direct readings from zero up to 5,000 cycles per second and operates from the A.C. supply.

Gas-Discharge-Tube Counter

The meter consists essentially of an amplifier, a gas-discharge-tube counter and an indicator. The principle of operation is briefly as follows: on the application of alternating voltage to the grids of the discharge tubes, the tubes become alternately conducting and non-conducting. At each transition of the current from one tube to the other a single short current pulse is sent through the indicator circuit. As the successive current pulses are identical, the meter reading will depend only on the number of pulses per second—that is, the frequency.

The instrument includes a single-stage amplifier, the gas-discharge-tube counter circuit, a diode switching valve, frequency-indicating meter and power supply (with rectifier and voltage regulator). Five ranges are provided, all starting at zero and reading respectively to 200, 500, 1,000, 2,000 and 5,000 cycles.

Electronic-Frequency Meter

This electronic-frequency meter has already been proved a great time saver in frequency measurements, such as the checking of a large number of radio transmitters. In crystal grinding and similar adjustment operations, the indications of the frequency meter provide a continuous check on the progress of the adjustment—indicating when it is safe to make coarse adjustments and when it becomes necessary to make only fine adjustments, getting near the final value.

Another example of the use of this meter is in tuning motor horns, chimes and similar devices, where a continuous indication of the frequency is very useful during the progress of adjustment. The instrument can also be used with a sound or vibration pick-up for analysing vibrations in machinery. Its use is being extended in many other directions, especially in connection with radio transmitters and other radio apparatus.

High-Ratio Transformers

In many sets, more particularly those not of very recent date, the coupling transformer between the detector and the first low-frequency valve—or the output valve, if there is only a single low-frequency stage—is of a fairly high step-up ratio and often there is no decoupling provided. In such a case, if you have occasion to fit an up-to-date valve to replace one of those originally in the set, you will almost certainly find it essential to decouple the stage, even if the set worked all right without decoupling before. If the set has two low-frequency stages, both will require decoupling.

There are some cases in which even the decoupling is not entirely effective, and it becomes necessary to place a resistance across the transformer secondary. The actual value of this resistance depends on circumstances and you will need to try different values, until you get stability as well as satisfactory signal strength. But in the majority of cases the decoupling will be quite sufficient by itself.

LOOK OUT FOR THESE!

Very shortly we will be able to provide an exclusive presentation of an entirely new set designed by John Scott-Taggart M.I.E.E., F.Inst.P., Fel.I.R.E. It is a set for which thousands of constructors have been waiting.

* * *

The 5-watt Paraphase Amplifier originally intended for this week's competition has been held over so that its constructional description can be given in the same issue—next week.

Make a special point of reading about it, and also note the particularly interesting radio picture competition. Don't forget, both appear in next week's issue of "Popular Wireless."

Detector Overloading

With the ordinary type of receiver it is quite a common thing for the detector or low-frequency stages to be overloaded when a local or powerful station is tuned in, particularly when a very heavy item happens to come over. The usual way to get over this is to use a variable-mu valve in the initial stage, or alternatively it is now a very popular practice to fit some kind of volume control which will control the input to the detector. A simple form of the latter is a resistance, which should be non-inductive and preferably variable, connected across the aerial and earth terminals. The value depends on circumstances, but about 20,000 to 25,000 ohms is an average value to start with.

Using a Differential Condenser

An alternative arrangement is to put a differential condenser into the input circuit, connecting one set of fixed vanes to earth and the other to the aerial lead-in, the moving set of vanes being connected to the aerial terminal of the set.

A still further method is to connect a fixed resistance between the aerial and earth terminals, this, however, being so arranged that it can be thrown into and out of circuit. In this case the resistance can be very much smaller than that mentioned above, and a value of 500 or less ohms usually meets the case. You will note that it is to be made so that it can be switched in and out and, therefore, you only need throw it in when the input is excessively powerful. The resistance itself should, of course, be non-inductive and should be switched in when you are receiving local or powerful stations.

Mains Unit Variations

I have spoken before about the fact that with an H.T. mains unit, since the different voltages are obtained by means of resistances inside the unit, the voltage of the terminals on open circuit will be quite different from the voltage when the unit is actually supplying current to the anode circuits of the valves. In many cases, what you have to look out for is the danger of the voltage actually applied to the anodes being *less* than the rated or supposed value.

When the Load is Insufficient

On the other hand, sometimes you may be using an H.T. unit which is capable of delivering a much *larger* current than that which you are actually using, and in such a case the reverse effect will occur, since there will not be sufficient current drain on the unit to pull down the voltage of the terminals to the specified value, the voltages will be *above* these values and you will have too high voltages on the anodes of the valves.

It is unlikely that there will be a sufficient number of terminals on the unit to enable you to correct matters by moving to another terminal—as you would with an H.T. battery, and therefore you must adopt some other method of adjusting the output voltages of the unit to the correct values.

It is obvious that if you can find some means of increasing the current drain to the intended value, the voltages will automatically assume their correct figures.

Using An Extra Resistance

This you can easily do by connecting a resistance of suitable value across the terminals of the unit, which will, of course, be in parallel with the anode circuits of the valves (or whatever the load on the unit may be).

I have never actually seen this done, but the hint is sent to me in a letter from a reader this week and I pass it on, as some of you may find it useful. As to the actual value of the resistance, this is easily found if you know what current the H.T. unit is supposed to deliver and what current it is actually delivering, because you simply want to take up the difference between the two values. Suppose this difference, for the sake of argument, is 10 milliamps, then all you have to do is to apply Ohm's Law and see what resistance will pass 10 milliamps when the voltage in question is applied to it.

TELEVISION BOOK 5

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